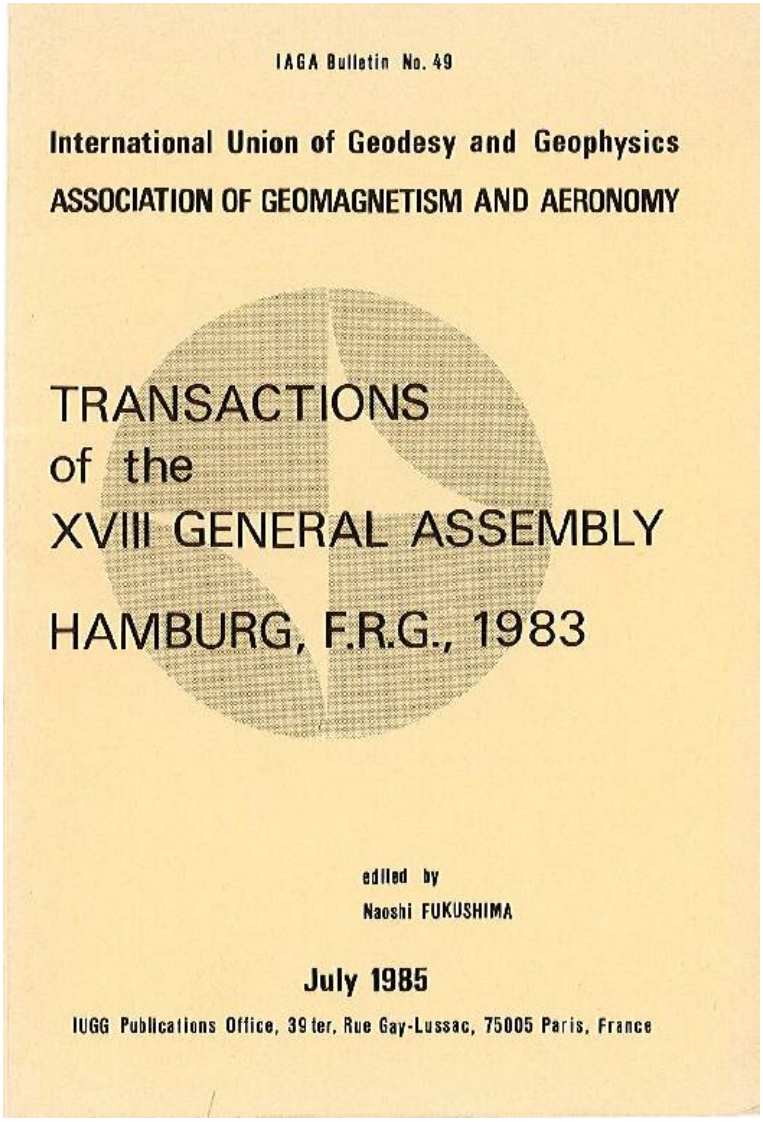

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IAGA Bulletin No. 49

International Union of Geodesy and Geophysics

ASSOCIATION OF GEOMAGNETISM AND AERONOMY

TRANSACTIONS of the XVIII GENERAL ASSEMBLY

HAMBURG, F.R.G., 1983

edited by

Naoshi FUKUSHIMA

July 1985

IUGG Publications Office, 39 ter, Rue Gay-Lussac, 75005 Paris, France

The INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (IAGA) is one of the seven Associations in the International Union of Geodesy and Geophysics (IUGG). The countries which adhere to the IUGG are members of IAGA and may participate in the activities of IAGA. Each Member Country is represented by a single body (called IAGA National Body), established in that country by the body that adheres to the IUGG.

The objectives of IAGA are:

a) to promote studies of magnetism and aeronomy of the Earth and other bodies of the solar system, and of the interplanetary medium and its interaction with these bodies, where such studies have international interest;
b) to encourage research in the above subjects by individual countries, institutions or persons and to facilitate its international coordination;
c) to provide an opportunity, on an international basis, for discussion and publication of the results of the research work indicated above;
d) to promote appropriate standardizations of observational programs, data acquisition systems, data analysis and publication.

At present, the components of IAGA are as follows.

Division I: Internal Magnetic Fields
Division II: Aeronomic Phenomena
Division III: Magnetospheric Phenomena
Division IV: Solar Winds and Interplanetary Magnetic Fields
Division V: Observatories, Instruments, Indices and Data
Interdivisional Commission on Antarctic Research
Interdivisional Commission on History
Interdivisional Commission on the Middle Atmosphere
Interdivisional Commission on External/Internal Geomagnetic Relations
Interdivisional Commission on Developing Countries

Each Division (and some Interdivisional Commissions also) has Working Groups or Topic Groups for specific items of research.

IAGA holds its ordinary General Assembly every four years in connection with each ordinary General Assembly of IUGG. Between ordinary General Assemblies, IAGA holds a Scientific Assembly, so that IAGA meets every other year.

IAGA has two kinds of publications, i.e., IAGA Bulletins and IAGA News. The IAGA Bulletins include

Transactions of the IAGA General or Scientific Assemblies,
Programme and Abstracts of Papers for IAGA Biennial Assemblies,
Geomagnetic Indices and Data (published yearly),
Special Data Summary or Information Booklet (published occasionally).

All the IAGA Bulletins are on sale at the IUGG Publication Office (39ter, rue Gay-Lussac, 75005 Paris, France).

IAGA issues an internal publication called "IAGA News" which contains various information of general interest to the IAGA community. The IAGA News is usually published on a yearly basis, and is available free of charge on request from the Secretary General of IAGA.

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ACKNOWLEDGMENTS

The International Association of Geomagnetism and Aeronomy (IAGA) held its Eighteenth General Assembly during 15 - 27 August 1983, in Hamburg, Federal Republic of Germany, in connection with the XVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG), at the invitation of the FRG National Committee for Geodesy and Geophysics (chairman: Prof. W. Torge). This was the first time for IUGG to hold its General Assembly in Germany.

The practical arrangements for the Hamburg Assembly have been managed by the Local Organizing Committee (chairman: Prof. W. Zahel). Dr. G. Lange-Hesse (worked in Max-Planck-Institut für Aeronomie, Lindau) was involved in the committee, and Prof. D. Voppel (Deutsches Hydrographisches Institut, Hamburg) was the local representative for IAGA. The meetings of IUGG and its seven Associations were held in the Congress Centrum Hamburg (CCH) and the University of Hamburg buildings; all IAGA sessions were held in the building D of the university. The secretariat office for IAGA was staffed by Prof. D. Voppel, Mr. R. Rudloff and Mrs. G. Tschersich (all in Deutsches Hydrographisches Institut). On behalf of IAGA and all the participants of the IAGA Hamburg Assembly, I would like to express our heartfelt thanks to these German colleagues.

This Transactions of the IAGA Hamburg Assembly was printed in U.K. and distributed to all the IAGA registrants from the office of Prof. M. Gadsden, the Secretary General of IAGA after the Hamburg Assembly. I was in charge of the compilation of the Transactions, as the Past Secretary General, who made the arrangements for the Hamburg Assembly. I regret very much that the transactions did not appear in 1984, but the publication was delayed to 1985, the year of the next assembly.

On this occasion I would like to express my best thanks to the IAGA Executive members, IAGA National Correspondents, leaders of IAGA Divisions and Interdivisional Commissions and Working Group, conveners of IAGA sessions during the IAGA General or Scientific Assemblies (not only for the Hamburg Assembly but also those worked for the past assemblies in 1977, 1979 and 1981), who helped and supported me many times while I was in charge of the Secretary General of IAGA.

11 July 1985

Naoshi FUKUSHIMA

Past Secretary General of IAGA

THE EIGHTEENTH GENERAL ASSEMBLY OF IAGA

HAMBURG, FED. REP. GERMANY, 15-27 AUGUST 1983

BRIEF SUMMARY

The IAGA Assembly in Hamburg was held in connection with the XVIII General Assembly of IUGG. The IAGA sessions were held in Building D of the University of Hamburg, situated within walking distance of the Congress Centrum Hamburg (which was used for the main events of IUGG and the scientific sessions for the solid-earth subjects).

The IAGA Secretariat Office was manned by the Geomagnetism staff of the Deutsches Hydrographisches Institute, i.e. Dr. D. Voppel and his colleagues, throughout the conference period. Their service to the IAGA registrants is gratefully acknowledged.

According to the preliminary statistics of the Local Organizing Committee, the total number of IAGA registrants was 592 from 42 countries. For information, the total number of IUGG registrants (excluding accompanying members) was 3205.

Scientific Meetings during the IAGA/IUGG Assembly

a. IAGA Participation in the IUGG Interdisciplinary Symposia

IAGA was the leading Association in organizing the following IUGG Interdisciplinary Symposia:

No. 06 Data Management (cosponsored by all Associations and ICL)
No. 13 Scientific Discoveries from MAGSAT Investigations (cosponsored by IASPEI, IAVCEI and IAPSO)
No. 14 Interim Results from the Middle Atmosphere Program (cosponsored by IAMAP and SCOSTEP)

IAGA cosponsored the following IUGG Interdisciplinary Symposia:

No. 02 Lithosphere Deformations (IAG leading, IASPEI and ICL cosponsored also)
No. 05 Geophysics of the Polar Regions (IUGG Bureau leading, All Associations cosponsoring)

b. IAGA/IAMAP Joint Symposium on the Middle Atmosphere Sciences

Approximately 200 papers were scheduled for this 6-day symposium of broad topics. Since all the program-abstracts of this joint symposium were included in the IAMAP booklet, IAGA registrants received a reprint of that part of the IAMAP booklet.

c. IAGA session

IAGA held its own scientific sessions for 30 different subjects as announced earlier, except for "Cosmic Dust in Planetary Atmosphere", which had to be cancelled because of an insufficient number of papers submitted to this specified topic. The IAGA Program-Abstracts booklet (IAGA Bulletin No. 48) is of 586 pages, which contain the abstracts of 779 papers from 1288 authors and an additional 63 papers of the two IAGA-cosponsored workshops (on "Venus International Reference Atmosphere" arranged by COSPAR, and "Coordinated Data Analysis for IMS" arranged by SCOSTEP).

Resolutions

In addition to a resolution of thanks to the local people, eight scientific resolutions were adopted at the Closing Conference of Delegates on 25 August 1983. The English and French texts of these IAGA resolutions are given in this IAGA Bulletin.

Change in the IAGA Organizational Structure

a. IAGA Internal Bodies

Each IAGA internal body changed its leadership for the next period of 1983-1987. In some Divisions and Interdivisional Commissions, the internal structure was slightly modified. The former "Interdivisional Working Group on Relations between External and Internal Magnetic Variations" became "Interdivisional Commission on External/Internal Geomagnetic Relations". A new "Interdivisional Commission on Developing Countries" was established to promote IAGA sciences in developing countries, based on the conclusions from the Ad Hoc Committee's work since the IAGA Edinburgh Assembly in 1981.

b. IAGA/IASPEI Joint Working Group on ELAS

In order to study the earth's asthenosphere from a broader standpoint, a Joint Working Group was established from 1983-87 between IAGA and IASPEI on the electric conductivity of the asthenosphere (abbreviated to ELAS), which will contribute also to the international lithosphere program.

c. IAGA/IAMAP Joint Advisory Board

The role of this joint committee will become very important in planning the IAGA Assembly in Prague, Czechoslovakia, with a part of IAMAP (especially ICMUA) joining.

d. IAGA/URSI Joint Working Groups

The existing two JWGs (on "Passive Electromagnetic Probing of the Magnetosphere" and "Wave Instabilities in Space Plasmas") expressed their wish to continue.

e. New membership of the IAGA Executive Committee and Internal Organization leaders is shown elsewhere in this IAGA Bulletin.

Slight Modification of the IAGA Statues and By-Laws

The Conference of Delegates on 15 August 1983 accepted the proposal from the U.K. National Committee to add a rider on the IAGA Statute 7, which specifies the length of term for IAGA Executive Committee Members. The adopted rider is: "With the exception of the election of the Secretary General, no person shall be eligible for election to any position on the IAGA Executive Committee who has served already on the Committee for four periods".

IAGA By-Law 1 was modified to accommodate the two new Interdivisional Commissions (on "External/Internal Geomagnetic Relations" and "Developing Countries") in the IAGA internal structure.

The English text of the revised IAGA Statutes and By-Laws is included in this IAGA Bulletin.

OPENING CONFERENCE OF DELEGATES

August 15, 1430 - 1630, Room: E01

President Cole declared the XVIII General Assembly of IAGA open. Chief Delegates were asked to sit in the front rows and the quorum for Chief Delegates was satisfied. The opening meeting was held in the following order.

1. Welcome Address by the Local Organizer

Dr. D. Voppel of the Deutsches Hydrographisches Institut gave a welcoming speech. (shown in the next page)

2. Secretary General's Report

Secretary General Fukushima asked all the participants to observe one minute's silence for all the IAGA colleagues who had passed away in the last four years. He then gave a short report on the activities of IAGA over the period. He emphasized that all the important actions of IAGA have been described every year in the IAGA News. He expressed his thanks for the support given to him by the leaders of IAGA internal bodies, and the conveners of the scientific sessions for the Edinburgh and Hamburg Assemblies, etc.

3. Presentation of Diplomas to the IAGA Honorary Members

Secretary General Fukushima announced that the diplomas were ready for distribution to all the IAGA Honorary Members. The diplomas were presented personally by President Cole to Dr. Viggo Laursen, Prof. Marcel Nicolet, Prof. Takesi Nagata, Father Jose O. Cardus and Dr. Leroy R. Alldredge, to the acclamation of all present. A diploma was to be mailed to Prof. Jean Coulomb. President Cole offered his congratulations to these honoured scientists, and then asked for the approval of the participants to use this opportunity to present an Honorary Membership award from SCOSTEP to Sir Granville Beynon. Sir Granville gave a short speech after receiving the diploma.

4. Report from the Executive Committee

President Cole explained some important actions taken by the Executive Committee since the Edinburgh Assembly, including the following appointments to the ad hoc committee for this Hamburg Assembly.

Nominating Committee
- Chairman: L.R. Alldredge (U.S.A.)
- Members: K.I. Gringauz (U.S.S.R.), T. Obayashi (Japan) E. Oni (Nigeria), C.G. Sucksdorff (Finland)

Finance Committee
- Chairman: M.D. Fuller (U.S.A.)
- Members: J.O. Cardus (Spain), A. Egeland(Norway) (Remark: Because of the absence of A. Egeland, J.A. Holtet substituted)

Resolutions Committee
- Chairman: M. Gadsden (U.K.)
- Members: M.-L. Chanin (France), C.A. Reddy (India), M. Siebert (F.R.G.), A.N. Zaitzev (U.S.S.R.)

5. Report and Remaks from the Nominating Committee

The Nominating Committee chairman Alldredge read from the IAGA By-Law 13 and then presented the list of Executive Committee officers for the next period of 1983-87. Then he explained the procedures and made some necessary remarks relating to the election by the Chief Delegates.

6. Appointment of New Division Leaders

The candidates for new chairmen of IAGA Divisions and Interdivisional Bodies were named. These names were submitted for ratification. It was reported that the final appointment of the leaders including co-chairmen (or vice-chairmen) would be made by the Executive Committee and announced at the Final Plenary Session. It was pointed out that good discipline and geographical representation would be sought, when the candidates for co-chairmen were discussed in the Business Meeting of each IAGA Internal Body.

7. Modification of IAGA Statutes

A proposal was presented by the U.K. National Committee to add a rider to Statute 7. This proposal had been known to the IAGA member countries in advance according to the instruction described in the Statute. After some discussion regarding the proposed rider, it was adopted by the vote of Chief Delegates after a slight modification. The adopted rider is:

"With the exception of the Secretary General, no person shall be elected to any position on the IAGA Executive Committee who has served already on the Committee for four periods".

8. Notice for IAGA Logo Competition

President Cole announced the display of 26 entries in the pigeon hole area to welcome the input of voices from the IAGA scientists, which will be considered in the final selection.

9. Presidential Address

by K.D. Cole (see the following pages)

Welcoming Speech by D. Voppel

Mr President, Dear Colleagues !

On behalf of the Local Organizing Committee for the XVIII General Assembly of the IUGG, I cordially welcome you in Hamburg. This is the first time that IUGG meets in Germany, and many of you may expect a perfect organization, because one aspect of the German's national character is said to be their ability to organize. However, this is only a statistic finding. Concerning this aspect I am not a typical German. If you find something is well organized for IAGA, put it to the credit of Professor Fukushima's input. If you note breakdowns or something like that, please contact me. My colleagues and I will do our best to help you.

Hamburg has a more than hundred years' tradition in geomagnetic work, mainly connected with field observations like measurements on the sea, in the Antarctic regions, at the geomagnetic observatory, and in magnetic surveys. I only remind you the name of Georg von Neumayer. Now, a small group with the "Deutsches Hydrographisches Institut" is continuing this work. Thus please allow me - as a representative of the host - to make some self-publicity: For informing the IAGA participants of the actual state of the magnetic activity, we are transmitting the magnetic record of Wingst Observatory to the IAGA building during this meeting. This is a cooperation between the Research Group of the German Office for Ionospheric Wave Transmission in Darmstadt and the German Hydrographic Institute in Hamburg. You can look at this record in the Poster Session Room D 03.

I wish you an enjoyable time in Hamburg and fruitful discussions on general and specific topics of our common fields of research: Geomagnetism and Aeronomy.

PRESIDENTIAL ADDRESS

Keith D. COLE

In this address I will concentrate on that area of science within IAGA with which I am most concerned in my own research, viz. solar-terrestrial physics (STP). STP means different things to different people. I should like to state what I perceive as the current range of this now well established interdisciplinary subject.

Solar-terrestrial physics, as it is currently practised, concerns the processes of emission of electromagnetic waves and particles by the sun, their transmission through interplanetary space and their interactions with the atmosphere, magnetic field and solid earth. Comparative studies of differing responses of the planets are important in this field.

Solar electromagnetic radiation and its variations

The solar "constant" (S) is now known to be variable. Changes of order 0.01% in S have been reported on time scales of the period of rotation of the sun. The changes appear to be accounted for approximately by the darkness of sunspots. Whether there are any measurable (indirect) effects of these changes upon the upper atmosphere remains to be determined.

Of more obvious importance, are the variabilities of solar electromagnetic radiations with wavelengths shortward of about 300 nm. Some measurements suggest that on time scales of the rotation of the sun there is variability of about 1% in emission at 300 nm, about 10% at 175 nm, and about 70% at 100 nm. The changes in the neutral minor constituents of the upper atmosphere brought about by this variability, and the consequent changes in the thermodynamics of the mesosphere and upper stratosphere need to be modeled - not solely for the study of these regions but also for understanding the effect of changing upper atmosphere boundary conditions upon motions at lower levels of the atmosphere. The more energetic and ionising radiation of the sun at wavelengths less than about 100 nm give rise to variations of the ionosphere at F region altitudes, due to variations of EUV emission, and at lower E and D regions due to X rays.

The general solar-terrestrial physics problem here is to determine the evolution of structures and processes on the sun which produce variability in solar emissivity in the various wavelength regions and to understand their effect on the ionisation, minor constituents and thermodynamics of the upper atmosphere.

It is of interest to note that minor constituent metal ions play a central role in the processes of solar emissions of EUV radiation. Since magnetic fields are a strong influence on the mobility of these ions it seems clear that magnetic structures in the outer layers of the sun's atmosphere will produce characteristic morphological relationships to variations across the disc of the various EUV emissions.

Solar corpuscular radiation and its variations

(a) High energy particles

From time to time the sun emits energetic protons in the range roughly from 10^4 ev to 10^9 ev per particle. These particles ionise the mesosphere and stratosphere causing the eventual production of nitric oxide which can destroy ozone. It is widely believed that a "solar proton event" in August 1972 destroyed some few per cent of the atmosphere's ozone and it has been speculated that much greater destruction may have occurred during a much more severe event in the past. Such events give rise also to enhanced ionisation densities in the stratosphere and mesosphere which cause changes in propagation of vlf waves such as are used in some forms of communication.

(b) Low energy particles - the solar wind

The solar wind arrives at earth's orbit bearing with it magnetic field structures and intrinsic modulations of its velocity, density and velocity distributions of its component ions (mostly protons) and electrons. Though structures on the disc of the sun (e.g. solar flares, and magnetic field disturbances) play a basic role in the establishment of structures in the solar wind, there is ample time (of the order of a day or so) for significant evolution of these structures through plasma processes to take place on the way to the earth's orbit.

(c) Interaction of the solar wind with the geomagnetic field

The interaction of the solar wind with the geomagnetic field giving rise to the bow shock, the geomagnetic tail, magnetic disturbances and auroral and ionospheric storms is influenced not only by the velocity and density but also the magnetic field of the solar wind and possibly also by the chemical composition and velocity distributions of particles. The production and evolution of structures and particle velocity distributions in the solar wind is therefore of central importance to solar-terrestrial physics.

The flow of energy from the solar wind into the geomagnetic field manifests itself by the establishment of a "boundary" layer in which solar plasma flows, and a geomagnetic tail. From the low-latitude part of the boundary layer and from the tail there flow electric currents of the order of millions of amperes (the Birkeland currents) to the polar ionosphere near the site of auroras. The electrons which cause the aurora are accelerated along the geomagnetic field by electric fields associated with the Birkeland currents. In the ionosphere electric current is continued orthogonal to the geomagnetic field as Pedersen currents causing intense heating of the thermosphere at altitudes above about 115 km. The bombardment of the atmosphere by auroral electrons also causes significant heating at somewhat lower altitudes. The combined heating of the thermosphere by these sources is often in excess of that caused by solar EUV radiation. The Lorentz force of ionospheric currents (called ion-drag by some authors) also accelerates the thermosphere. To understand the general circulation of the thermosphere it is necessary to take into account not only the EUV energy source of the sun but also the auroral and polar sources of energy and momentum provided by the interaction of the solar wind with the geomagnetic field.

The same electric fields which cause the dissipation in the thermosphere just mentioned, also cause the energisation and redistribution of magnetospheric plasma. Electric fields parallel to the geomagnetic field accelerate electrons and ions, from both the magnetosphere and the ionosphere, while electric fields orthogonal to B change the energy of magnetospheric plasma by causing it to drift to regions of different magnetic field strength. The

changes in the composition of the ionosphere and magnetosphere, and in the velocity distributions and densities of ions and electrons, together with the plethora of electromagnetic (including hydromagnetic) waves which these generate constitute one of the active areas of magnetospheric physics which is making significant contributions to plasma physics. Nature provides us, in the solar-terrestrial environment, a wider range of plasma than man has yet been able to produce in his laboratories, and in situ measurements of plasma parameters are affording tests of fundamental plasma theory. Currently there is particular excitement over the need to have multiple simultaneous spaced measurements of plasma structures, e.g. the earth's boundary layer and bow shock, on scales of the order of an ion gyrodimension.

It is important to realise that measurable effects of the solar wind interaction with the geomagnetic field are not restricted to the polar regions and the magnetic field connected thereto. A doughnut shaped ring current established in space around the earth particularly in magnetic storms has three major effects. One is to cause heat to flow into the middle latitude ionosphere along the geomagnetic field, a second is to cause the loss of significant amounts of hydrogen from the earth by creating fast hydrogen atoms through charge-exchange, and the third is to create "tropical" aurora by the bombardment of the equatorial upper atmosphere with fast neutrals also created by charge exchange with ring current ions. In addition to the ring current effects at low latitudes, there are effects of electric fields of solar wind origin on the electrodynamics of the equatorial ionosphere and equatorial electrojet.

Solar wind induced effects in the mesosphere and stratosphere

(a) Nitric oxide production

From time to time in the auroral zone very energetic electrons and their bremstrahlung come down to mesospheric and stratospheric altitudes respectively. These can cause transient ionisation which produces nitric oxide in the recombination process. The nitric oxide can cause a transident decrease in ozone concentrations. These are somewhat rare events and a more likely scenario for the change in concentrations of nitric oxide at these altitudes is for the NO to diffuse downwards from the thermosphere where it is produced in copious quantities. The amount of NO produced by recombination of aurorally produced ions is often comparable to and in excess of that produced by the EUV of the sun. Eddy diffusion of this aurorally produced NO downwards to the mesosphere and upper stratosphere seems to be the feasible process.

(b) Auroral and auroral electrojet heating

Further the heating of the thermosphere in the aurora and the auroral electrojet may possibly lead to significant eddy conduction of heat downwards to the mesosphere and perhaps upper stratosphere disturbing the temperature and wind fields there.

It is important to establish the maximum depth in the earth's atmosphere to which the direct and indirect effects of solar variability go. The possibility must be seriously entertained that the alteration of the phases of temperature and wind fields without significant change of energy in the stratosphere, may in turn cause phase shifting (again without significant change of energy) of tropospheric systems.

Conclusions

STP involves a wide range of physics of partially and fully ionised gases in magnetic fields and of aeronomy. Though its prime concern is with the effect of the sun and its variability on the earth, comparative studies of the effect of solar variability on the various planets are of considerable value. Given that the solar system is an example of one of the basic systems in a galaxy and given that plasma form a great fraction of the universe, it is apparent that the knowledge gained through STP studies by in situ measurements and their comparison with theories must be seen, in due course, to be one of the soundly based components of astrophysics and cosmology. IAGA is a major forum for STP. IAGA scientists provide expertise to SCOSTEP (ICSU's Scientific Committee for Solar-Terrestrial Physics) for the coordination of international interdisciplinary programmes of observation and analysis in this field.

CLOSING CONFERENCE OF DELEGATES

August 25, 1630 - 1800, Room: E11

President Cole presided over the Closing Conference of Delgates. The quorum was satisfied for the Conference of Delegates. The draft of the Resolutions was available the day before.

1. Opening Remarks and Fixing of Agenda

The agenda shown on the blackboard was approved.

2. Report of the Resolution Committee and Adoption of Resolutions

The Resolution Committee chairman Gadsden reported on the work of the Resolutions Committee during the Hamburg Assembly and presented the draft of nine resolutions - one a resolution of thanks to the Local Organizing Staff, and eight scientific resolutions. They were discussed one by one, and all of them were adopted; some with modifications. (The Resolutions with final wording are shown elsewhere in this IAGA Bulletin.)

3. Report of the Finance Committee

The Finance Committee chairman Fuller gave his report (which is shown in this Bulletin under the item "Finance Report of IAGA"), and stated as follows.

"We propose that IAGA express its thanks to the Secretary General for the excellent management of the limited funds. Special thanks should go to the Government of Japan for considerable financial support, and to the University of Tokyo for its generous assistance. Both have contributed in important ways to keeping the expenses of IAGA at a low level."

The report and proposal from the Finance Committee were unanimously accepted by the Conference of Delegates.

4. Election Results for Membership of the Next Executive Committee

The election was carried out during the first week of the conference period, according to the procedure designated in the IAGA statutes and By-Laws. (The names of new EC members are listed elsewhere in this IAGA Bulletin.)

5. Leaders of IAGA Divisions and Interdivisional Commissions

The names of the new leaders of IAGA Divisions and Interdivisional Commissions for the period 1983-87 were introduced for ratification by the Conference of Delegates. (The names of the new leaders are shown elsewhere in this IAGA Bulletin.)

It was reported that the "Interdivisional Working Group on Relations between External and Internal Magnetic Variations" wished to become an Interdivisional Commission. This proposal was accepted, and the name was decided to be the Interdivisional Commission on External/Internal Geomagnetic Relations. The creation of the Interdivisional Commission on Developing Countries was also approved.

6. Modification of IAGA By-Laws

President Cole explained the need for a light modification of IAGA By-Law 1 (which lists all the Divisions and Interdivisional Bodies), in order to accommodate the two new interdivisional commissions mentioned in the preceding agenda item.

7. EC Reports on Important Actions

President Cole explained some important actions taken by the IAGA Executive Committee relating to administrative matters, such as the establishement of a new joint committee with IASPEI on ELAS, the continuation of two joint working groups with URSI, IAGA cosponsorship to international meetings, publications and other important matters. (These are described in the minutes of the Executive Committee meetings shown elsewhere in this IAGA Bulletin.)

8. IAGA National Report

The U.K. National Committee reminded the participants of the importance of National Reports, and it was announced that the U.K. report appeared in a regular journal of wide circulation.

9. New IAGA Logo

It was announced that the winner of the IAGA logo competition was Dr. E. Friis-Christensen of Denmark. His design will be used as the new logo of IAGA, after possible modification by professional artists.

10. Next Assembly of IAGA in 1985

The Fifth Scientific Assembly of IAGA will be held in Prague, Czechoslovakia, during 5-17 August 1985. A leaflet with the preliminary information was widely distributed.

11. Remarks from the Outgoing President

President Cole mentioned his wish for the future development of IAGA sciences all over the world. He asked all the participants to join in expressing thanks to the outgoing Secretary General Fukushima for his service over the past eight years.

12. Short Remark by the Next President

Prof. D.I. Gough expressed his acceptance of the presidency and asked for the continued support of IAGA colleagues.

The Conference of Delegates closed with a long acclamation for the service of the Local Organizing Staff and the outgoing President.

MINUTES OF THE IAGA EXECUTIVE COMMITTEE MEETINGS

Hamburg, Fed. Rep. Germany

August 1983

The IAGA Executive Committee (hereafter abbreviated to EC) Meetings were held in Hamburg, Federal Republic of Germany, before and during the XVIII General Assembly of IAGA. All meetings were held in Room 2047 in Building D of the University of Hamburg, except for two: the first one in the evening of Sunday, 14 August (held in Room 5-5 in the Hamburg Congress Centrum), and the one on Thursday, 18 August lunch time in Room 06 of Building A with IAMAP EC. All other IAGA EC meetings were held in Room D2047 during the lunch hours of 15 (Monday), 16(Tuesday), 17(Wednesday), 19 (Friday), 22 (Monday) with IASPEI EC, 23 (Tuesday), 24 (Wednesday) and 25 (Thursday) of August, thanks to the arrangement of the local secretariat. Among the IAGA EC members, A.J. Dessler and D.J. Williams were unable to come to Hamburg. Some members were absent from early or later meetings due to their travel schedules, but the quorum was always satisfied. The following is a summary of discussions and conclusions reached during the EC meetings without keeping to chronological order. The minutes of the meetings with IAMAP and IASPEI EC members are given separately, whereas the meetings with the chairmen of IAGA Divisions and Interdivisional Bodies are included under Item V in the following minutes.

I. Approval of the Agenda

It was agreed to follow the agenda proposed by Secretary General Fukushima, with some additional items to be discussed in due course. The schedule for the meetings with IAGA Internal Body Leaders, IAMAP and IASPEI EC was announced.

II. Minutes of the Previous EC Meeting, and Matters Arising from the Minutes

The minutes of the previous EC meeting (in Ottawa, Canada, 16-18 May 1982) have been published in the IAGA News No. 21, pp. 5-16 (issued in November 1982). These minutes were approved. Some matters arising from the minutes were discussed under the appropriate items in the following minutes.

III. Preparations for the Scientific Sessions of the IAGA Hamburg Assembly

Secretary General Fukushima reported on his compilation of the IAGA Programme-Abstracts Booklet (IAGA Bulletin No. 48) in collaboration with

the session conveners and the German Local Organizing Committee. He emphasized the great effort of Dr. Voppel in making room arrangements, including the time and facilities for poster sessions.

The IAGA Programme-Abstracts Booklet, at 586 pages, is too thick to include the IAGA/IAMAP Joint Symposium on the Middle Atmosphere Sciences (about 200 pages compiled by the IAMAP Secretariat), so the Local Organizing Committee kindly offered to reprint the MUA-1 Section (the IAMAP notation for the MAS symposium) of the IAMAP Booklet and distribute it free to IAGA registrants.

Some IAGA sessions encountered real difficulty in the time table for oral presentations because too many papers were submitted without the guarantee of the authors' presence. It is of course ideal to show the time table in advance, and to have the paper presentation according to the prescribed schedule. Although this procedure can be followed in domestic conferences, ti is not always practical for international conferences because the authors' participation is not always guaranteed. As a possible solution Roederer suggested that time be assigned only for invited papers.

It often happens that the conveners need to reconstruct the programmes at the last minute and show them again on the notice board in the conference building. We need to consider possible ways for conveners or chairmen to reduce the work involved in checking the presence of authors. Fukushima proposed to the Local Organizing Committee the use of a "check sheet", which asks each registrant to report their own intention regarding paper presentation and also any information regarding their colleagues who are unable to attend.

IV. Liaison with IAGA Member Countries

The Secretary General reported that he had notified the IAGA National Correspondents of the necessary actions to be taken by Chief Delegates for two main administrative matters (election of the next EC, and U.K. proposal for Statutes modification) during the XVIII General Assembly of IAGA in Hamburg.

He reported also that he had contacted the IAGA National Correspondents (and Local Correspondents also) usually on a quarter-yearly basis, and he was very grateful to them for their cooperation in disseminating and collecting important information.

V. Activities of IAGA Internal Bodies, Including the Creation of the Interdivisional Commission on Developing Countries

During the Hamburg Assembly the EC had two meetings with the chairmen of IAGA Divisions and Interdivisional Bodies, i.e. on 14 August (Sunday) evening and 23 August (Tuesday) lunch time.

The meeting on 14 August was used for the exchange of information on the candidates for leaders of each internal organization for the next period

of 1983-87, the items for discussion during their Business Meetings, including possible modifications within their organizations. Some Divisions wished to have more co-chairmen (or vice-chairmen) for a better representation of research subjects and geographical coverage, which seemed a reasonable desire. After hearing all the proposals and comments from the chairmen of IAGA Divisions and Interdivisional Bodies (those leaders who were unable to attend this meeting had submitted some written memoranda in advance), the EC decided to present only the names of the appointed new chairmen to the Opening Conference of Delegates on 15 August (Monday) afternoon for ratification.

The second meeting on 23 August (Tuesday) began with a welcome address and an expression of appreciation to the Chairmen of IAGA Divisions and Interdivisional Bodies for their excellent service over the past period of 1980-83. The reported items were the names of candidates for co-chairmen (or vice-chairmen), the leaders of internal working groups or topic reporters, and the modification of the structure, if any, which emerged from the Business Meeting of each Division and Interdivisional Body. Malin expressed the opinion that the "Interdivisional Working Group on Relations between External and Internal Magnetic Variations" should be converted to the "Interdivisional commission on External/Internal Relations" (with a simpler name). [Notes: this was presented to the Conference of Delegates on 25 August, and the name finally adopted was "Interdivisional Commission on External/Internal Geomagnetic Relations".] President Cole introduced the desire of active colleagues working for developing countries to establish an interdivisional commission within the IAGA structure, which will contribute to the development of IAGA sciences in developing countries.

The EC reviewed the nomination for co-chairmen (or vice-chairmen), and some desirable modifications were made. The list of appointed co-chairmen (or vice-chairmen) was prepared, for the Closing Conference of Delegates on 25 August for ratification, along with the proposal for the modification of By-Law 1 to satisfy the revised status of the two new interdivisional commissions.

Discussion with Division leaders included a number of practical problems to be considered, such as

(1) necessity of increasing the number of co-chairmen (or vice-chairmen) to cover the broad subjects within each Division for the next period,
(2) desirability to reduce the number of co-chairmen (or vice-chairmen) to a reasonable limit in the future,
(3) while an adequate geographical representation of leaders may not be guaranteed for each period, it must be taken into account to achieve a good geographical coverage over a period of time,
(4) the efficiency of Reporter Review Sessions, etc.

The discussion with IAGA Internal Body Leaders also covered the response to the following proposed future program and project.

VI. New Program and Project Proposed for Consideration within the IAGA Community

(a) Global Change Program: This is proposed as a major program for the 1990's, to be carried out under ICSU auspices to study the global change and related processes in the geosphere-biosphere, including the impact of human activity on the system. (A report by J.G. Roederer on the ICSU Colloguium

on Global change, held in Warsaw on 3 August 1983, is given elsewhere in this Bulletin). The general response in the Business Meetings of IAGA Internal Bodies was that while recognizing the importance of the program a detailed selection of practical subprograms and the subsequent construction of the whole program should be made in the future. The consensus of the EC was that, despite the absence of concrete reactions in the Divisions Business Meetings, IAGA should express to the ICSU and interest in the program and its hope for development in the practical planning.

(b) MARSA Project: This project, "Magnetospheric Atmospheric Response to Seismo-Acoustic events" was proposed by the Soviet Geophysical Committee, and Dr. M. Gokhberg also outlined this project in the Business Meetings of the Divisions concerned. The general feeling was that the coordinated measurements on this project might be better achieved on a national basis, rather than international collaboration at this stage. Dr. Gokhberg was encouraged to collect responses from Division leaders, although no formal action could be taken within IAGA at the Hamburg Assembly.

VII. Cooperation of IAGA with Other Associations within IUGG

The Secretary General reported that IAGA did not become involved in the proposed creation of IUCRS (IUGG-URSI Inter-Union Commission on Remote Sensing, which will replace the former Inter-Union Commission on Radio Meteorology), because IAGA already has effective Joint Working Group with URSI which use remote sensing techniques for the study of the magnetosphere. He also reported on his cooperation with the IUGG Secretary General in requesting the grants and loans for 1984 to ICSU.

During the Hamburg Assembly, the IAGA EC met with the IAMAP and IASEI ECs to discuss immediate cooperation for the subjects of common interest to both Associations. The minutes of these meetings are shown separately, attached to the minutes of the IAGA EC meeting.

VIII. Cooperation of IAGA with URSI, COSPAR, SCOSTEP and Other ICSU Bodies

URSI: IAGA has two Joint Working Groups with URSI (on "Passive Electromagnetic Probing of the Magnetosphere" and "Wave Instabilities in Space Plasmas"), and they wish for continuation over the next period of 1983-87. It is hoped that a clash can be avoided in dates for the IUGG/IAGA and URSI conference in 1987. IAGA arranged a meeting opportunity for INAG (URSI Working Group G1, Ionospheric Network Advisory Group) during the Hamburg Assembly.

COSPAR: COSPAR cosponsored several symposia (Middle Atmosphere Sciences, Middle Atmosphere Program, Remote Sensing for Climate Studies) during this IUGG Hamburg Assembly. The COSPAR Workshop on the Venus International Reference Atmosphere is being held during this Hamburg Assembly through the arrangement of IAGA. It is anticipated that a request will be made to cosponsor some symposia or workshops for the 1984 COSPAR meeting in Graz. It is felt that COSPAR is dealing with remote sensing so that the creation of

IUCRS would be questionable. IAGA expressed regret for the cancellation of the planned session "Cosmic Dust in Planetary Atmopsphere" (because of the insufficient number of submitted papers) to COSPAR, IAU and IAMAP, despite their support. It may have been too early for the topic, although it must arise in the near future.

SCOSTEP: President Cole introduced the recent activities of SCOSTEP including discussions on future projects or programs for the latter half of the 1980s. He welcomed any suggestions from IAGA.

FAGS: In response to the gradual reduction in the annual grants to FAGS from ICSU, a long letter was sent to the President of ICSU from the Secretary Generals of IUGG and URSI (both in Brussels). The IAGA EC decided to express its sincere thanks to them for their great effort in reminding the ICSU of the basic importance of FAGS activity.

IX. IAGA Cosponsorship of International Conferences

The Secretary General reported that the reports of two workshops in 1982 with IAGA cosponsorship were already published in IAGA News No. 21 (November 1982).

A report has already been received from the organizer of the International Symposium on Ground-Based Studies of the Middle Atmosphere (10-13 May 1983, Schwerin, G.D.R.). IAGA cosponsorship was approved to the "Workshop on Latin American Geomagnetic Observatory and Survey Practice" (16-22 October 1983, at Observatorio Nacional in Rio de Janeiro, Brazil) with K.L. Svendsen as the IAGA representative. This was earlier planned for 1980 but it had to be postponed to 1983.

In 1984 the following symposia or workshops want to have cosponsorship, and the present status is:

a) Seventh International Symposium on Equatorial Aeronomy (22-29 March 1984, Hong Kong) ..... Cosponsorship has been approved as published in IAGA News No. 21, pp. 92-93.
b) International Workshop on Geophysical, Radioastronomical and In Situ Observations of Solar Wind (summer 1984, Moscow) ..... Cosponsorship will be given when a detailed plan is known to IAGA.
c) Seventh Workshop on Electromagnetic Induction in the Earth and Moon (15-22 August 1984, at the University of Ife, Ife, Nigeria) ..... IAGA will cosponsor and ask IUGG for cosponsorship.
d) International MAP Symposium (26-30 November 1984, Kyoto, Japan)..... IAGA cosponsorship is given with a representative of Division II on the Program Committee.
e) COSPAR Symposium on Shocks and Acceleration Processes in Collisionless Plasmas (June 1984, Graz, Austria).....IAGA cosponsorship is given, with V. Vasyliunas as the IAGA representative on the Program Committee.
f) It has been anticipated that requests will be received from COSPAR for cosponsorship of some other symposia or workshops in its 1984 Graz Meeting. If such requests come after the Hamburg Assembly, the new President and Secretary General will deal with them according to the general rules of IAGA. It was also agreed to cosponsor some international (including regional) meetings of interest to IAGA, if

IAGA is approached by the organizers, such as "Longitude Zero" (an international symposium to commemorate the centenary of the adoption of Greenwich as the prime meridian, 9-13 July 1984 in the National Maritime Museum, Greenwich, England).

X. IAGA Publications

Secretary General Fukushima reported the publication of the following IAGA Bulletins since the last meeting of the EC.

No. 46 Transactions of the Fourth Scientific Assembly of IAGA in Edinburgh in August 1981. (The printing and distribution was done in Edinburgh)

No. 47 International Geomagnetic Reference Field 1980: Charts and Grid Values. (The U.S. Geological Survey arranged for this publication)

No. 48 Programme-Abstracts Booklet of the XVIII General Assembly of IAGA

The following information was also conveyed and our thanks must go to the colleagues who prepared the material for publication.

No. 32k Geomagnetic Data 1980.
(This will appear very soon under the new director of the International Service of Geomagnetic Indices, J.A. As. He hopes that in future years the No. 32 series will make a quicker appearance.)

No. 40 Dst-index for 1957-69 or even to 1976.
(Although the publication has been delayed for several years, the final arrangement with IGSI is being made.)

It was agreed that the retiring Secretary-General Fukushima would be the editor of the IAGA Bulletin No. 49 "Transactions of the XVIII General Assembly of IAGA in Hamburg, F.R.G.". The next issue to IAGA News will be compiled jointly by the retiring and incoming Secretary-Generals.

XI. IAGA Finances

The Secretary General presented the financial reports which had been sent to IUGG, as well as a budget for the next 4 years. He reported that he had to ask the Division leaders to cut down on their reserves for the Hamburg Assembly, because of the reduction in the IUGG allocation from 1982 and the indirect support from the Japanese government. He thanked all Chairmen of IAGA Divisions and Interdivisional Bodies for their kind understanding of the financial crisis of IAGA. (These records were approved by the Finance Committee. The report of the Finance Committee and the relevant tables are shown as Appendix).

The IAGA EC was notified of various discussions going on within IUGG, such as the rise in the subscription unit for IUGG, rules for the share of IUGG allocation among Associations. The IAGA EC feels that the share must be based principally on the scientific activity, such as number of scientific papers submitted for the bienniel assemblies and sales of publications through the IUGG Publications Office. The EC discussed various ways to reduce the expenses in the future. Roederer suggested the reduction in the

frequency of EC meetings, i.e. President and Secretary meet every year and the whole EC meet in alternate years.

XII. Any Other Business, Including the IAGA 1985 Assembly and the Next IAGA EC Meeting

IAGA Resolutions: The draft of IAGA resolutions was approved by the EC before they were presented to the Closing Conference of Delegates. One of the IAGA resolutions was conveyed to the IUGG Resolutions Committee and it was adopted as an IUGG resolution after some modifications to the wording.

1985 IAGA Assembly: Bucha brought and distributed a leaflet (with some preliminary information and a return sheet of request for future circulars of the Fifth Scientific Assembly of IAGA (5-17 August 1985, Prague, Czechoslovakis) widely to the IAGA participants.

Next EC Meeting: Based on the discussion regarding IAGA's expenses, the next whole EC meeting will be during the Prague Assembly in August 1985. However a meeting will be planned between the new President and Secretary General and the key person(s) of the Prague Assembly and any additional members of the EC who can join without any extra cost to IAGA.

The EC expressed its thanks to the outgoing members for their service over the past period(s).

APPENDIX

IAGA FINANCES DURING THE PERIOD OF 1979-82

REPORT OF FINANCE COMMITTEE

The finance committee, consisting of M. Fuller (chairman), J.O. Cardús, and J.A. Holtet held a meeting on Monday 22nd August, during the General Assembly of IAGA at Hamburg and examined the financial accounts for the period 1st January 1979 to 31st December 1982. The documents had been audited by S. Kojima, Chief Accountant, Faculty of Science, University of Tokyo.

At the beginning of the period the cash in hand and in banks amounted to $32,168.87 and at the end of the period was $19,629.54. A talk with the Secretary General Fukushima revealed that the sifnigicant decrease was caused by a reduction of $4,750 in the IUGG allocation to the Association in 1982 and the loss of $6,000 of additional external support. This has placed IAGA finances in a critical situation.

In the face of this situation the Secretary General has cut operational expenses of the secretariat and was forced to reduce allocations to IAGA Internal Bodies. However, Dr. Fukushima has been able to maintain the former level of activity in the short term. He has noted also that IAGA needs more income to maintain its present activities; otherwise, IAGA will have to consider a reduction in public services to the world IAGA community.

We propose that IAGA express its thanks to the Secretary General for the excellent management of the limited funds. Special thanks should go to the Government of Japan for considerable financial support, and to the University of Tokyo for its generous assistance. Both have contributed in important ways to keeping the expenses of IAGA at a low level.

Hamburg, 23 August 1983

M. Fuller J.O. Cardús J.A. Holtet

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY

Financial Report for the Period 1 January 1979 - 31 December 1982

(Amounts in U.S. dollars)

RECEIPTS

		IUGG	Grants & Contracts
15.	IUGG Allocation	94,050.00	x
2.	UNESCO Grants	x	0
3.	Other Grants	x	3,000.00
4.	Contracts with UNESCO, etc.	x	0
5.	Sales of Publications	3,614.06	x
6.	Miscellaneous	5,688.81	x
7.	Total Receipts	103,352.87	3,000.00
8.	Cash on hand & in Banks, 1 Jan. 1979	32,168.87	
10.	Total	135,521.74	3,000.00

EXPENDITURES

		IUGG	Grants & Contracts
11.	Administration		
11.1	Personnel	5,400.00	x
11.2	Quarters (rents & services)	0	x
11.3	Supplies and equipment ...	1,579.45	x
11.4	Communications	11,916.77	x
11.5	Travel (administrative only)	0	x
11.6	Miscellaneous	91.72	x
12.	Publications		
12.1	Proceedings of Assemblies	6,774.78	x
12.2	Proceedings of Symposia ..	626.85	x
12.3	Periodicals (IAGA News) ..	18,102.00	x
12.4	Others	0	x
13.	Assemblies		
13.1	Organization	4,826.43	
13.2	Travel	41,862.67	3,000.00
14.	Symposia		
14.1	Organization	3,912.68	x
14.2	Travel	20,378.44	x
16.	Grants (Permanent Services) ..	0	x
17.	Contracts with UNESCO, etc. ..	0	x
18.	Miscellaneous	420.41	
19.	Total Expenditures	115,892.20	3,000.00
20.	Cash on hand & in Banks, 31 December 1982	19,629.54	
22.	Total	135,521.74	3,000.00

JOINT MEETING OF IAGA/IAMAP
EXECUTIVE COMMITTEES

Date: August 18, 1983. 1245-1400

Present from IAGA: K.D. Cole, M. Gadsden, N. Fukushima, V. Bucha D. Valencio.
Present from IAMAP: W.L. Godson, R.G. Roper, H. Dutsch, C. Mateer, R.G. Soulage, W.H. Hitschfeld, J. Lastovicka, H. Reiter.

Prof. Cole spoke of the Prague Assembly in 1985 at which the whole of IAGA and part of IAMAP will participate, and called for a plan of action for cooperation between the two Associations in planning the meeting.

Dr. Godson explained that part of IAMAP will also be meeting in Hawaii during the same time period; that part of their people, those connected with upper atmosphere, i.e., radiation, ozone, atmospheric electricity, atmospheric chemistry, dynamics and cloud, feel that they would get better participation at Prague rather than Hawaii.

Dr. Bucha circulated the announcement of the Prague meeting and mentioned some physical arrangements, to accommodate up to 1000 persons. Dr. Gadsden asked if approximately 150 IAMAP people could be expected. The consensus was that the number was about right, so it appears that there is no problem in the number of people expected to attend.

Dr. Roper told of the anticipated 200 middle atmosphere papers and wondered if a separate symposium should be held before or after the Assembly. The decision was to accommodate those papers during the two weeks, as an extension of time would be difficult for the local arrangements committee.

Discussion was held on the possibility of cutting down on the number of papers accepted. It was suggested that Poster Sessions should be enhanced in the minds of people so that they would not feel slighted by having their papers presented in that fashion. It was pointed out that papers from developing countries should be encouraged and accepted, and also that it might be difficult for persons to get travel financing if their papers were to be presented in poster sessions only.

Dr. Gadsden suggested that the IAGA Secretary General, the Division leaders, the existing Joint IAGA/IAMAP Advisory Board form the Program Committee for the Prague Assembly. The Joint IAGA/IAMAP Advisory Board was established after the Seattle meeting and consists of leaders of IAMAP Commissions on radiation, ozone, atmospheric chemistry, upper atmosphere, IAGA Commissions on the Middle Atmosphere, Division II and Division III. It was noted that the IAMAP Commission on Atmospheric Electricity and Electrodynamics should be added to work on the Prague Assembly. It was also suggested that IAMAP leaders of the areas of interest which are to be included at Prague should also be on the Program Committee. It was suggested that a member of SCOSTEP and COSPAR should be on the Program Committee, with the idea that this contact would be of mutual benefit in planning future symposia.

JOINT MEETING OF IAGA/IASPEI
EXECUTIVE COMMITTEES

Date: August 22, 1983. 1245-1400

Present from IAGA: K.D. Cole (President), M. Gadsden(Vice-President), N. Fukushima (Secretary General), V. Bucha, C.-G. Falthammar, V.A. Troitskaya, D. Valencio; D.I. Gough (Division I chairman) M.W. McElhinny (Next chairman of Division I).
Present from IASPEI: B.A. Bolt (President), Z. Suzuki (Vice-President), R.D. Adams (Secretary General), H. Berckhemer, I.S. Sacks, F. Stacey.

The IAGA President Cole made introductions and noted it was the first joint meeting since Madrid, 14 years ago. The meeting was called because of the common interests in the lithosphere program and to set up a mechanism for cooperation between the two groups. The immediate project of concern is the ELAS (Electric Conductivity of the Asthenosphere) Project and it was suggested that a joint committee, or working group, be set up to liaise between the two Associations.

Dr. Grough explained the activities of the Division I Working Group, I-3 on Electromagnetic Induction and the need for seismologists on the ELAS committee.

Dr. Bolt expressed an interest in the cooperative working group. There was considerable scientific discussion on the need for, and areas in, the cooperative program, for example, the need for a combined experiment of calibration between the electromagnetic people and the seismologists.

Dr. Suzuki stated that something on this order had been done in Japan and that perhaps appropriate people from Japan should be included in the deliberations of the Joint Working Group.

It was agreed that after the initial WG was formed, additions could be made as necessary, even from other fields of research for the earth's interior.

There was discussion on how to formalize the new Joint Working Group, and it was decided that each Association would include it in their internal structures to be handled in their own way.

The IAGA Secretary-General Fukushima quoted from the IUGG rules concerning establishing inter-association working groups: it is not necessary in this case to ask approval from IUGG, and it is sufficient to notify IUGG of the actions taken by IAGA and IASPEI.

The question of finances for running workshops and/or symposia was raised and since the Associations do not have much money to use for this purpose, it was stated that funding would have to come from the active member countries.

Some names were suggested from both IAGA and IASPEI sides as possible members of the IAGA/IASPEI Joint Working Group on ELAS. (These names are shown elsewhere in this Bulletin under the item of "IAGA Internal Structure").

REPORTS FROM IAGA ORGANIZATIONAL UNITS

Division I on Internal Magnetic Fields

BUSINESS MEETING OF DIVISION I

The business meeting of Division I was held at 16.30-17.45h, 19 August, Friday, chaired by D.I. Gough (Canada). Present: L.R. Alldredge (USA), S. Barker (USA), D.R. Barraclough (UK), M. Beblo (FRG), E.R. Benton (USA), V. Bucha (CSSR), W.H. Campbell (USA), K.M. Creer (UK), D.J. Dunlop (Canada), I.A. Eltayeb (Sudan), M. Gokhberg (USSR), V. Haak (FRG), A.G. Hahn (FRG), W.J. Hinze (USA), S.E. Hjelt (Finland), P.J. Hood (Canada), J.A. Jacobs (UK), M. Kono (Japan), R.A. Langel (USA), L.K. Law (Canada), F.J. Lowes (UK), M.W. McElhinny (Australia), J. Meyer (FRG), W. Mundt (GDR), G. Murthy (Canada), E.R. Niblett (Canada), W.D. Parkinson (Australia), N.W. Peddie (USA), H.A. Roeser (FRG), K. Rosa (CSSR), H.C. Soffel (FRG), J.T. Weaver (Canada), D.E. Winch (Australia).

1. Officers of the Division for 1983-87

The chairman presented the following slate of nominations:

Chairman:	M.W. McElhinny (Australia)
Vice-Chairmen:	M. Kono (Japan)
	R.A. Langel (USA)
	M.S. Zhdanov (USSR)

There being no further nominations, these names will be recommended to the IAGA Executive Committee.

2. Nominations from the Working Groups

WG I-1	Chairman:	D.R. Barraclough (UK)
	Vice-Chairman:	W.W. Mundt (GDR)
WG I-2	will change its officers in 1985. The chairman is I.A. Eltayeb (Sudan), the Vice Chairman is D.E. Loper (USA).	
WG I-3	Chairman:	B.A. Hobbs (UK)
	Vice Chairman:	S.E. Hjelt (Finland)
WG I-4	Chairman:	P.J. Hood (Canada)
	Vice Chairman:	W.J. Hinze (USA)
WG I-5	will change its officers in 1985. The Chairman is D.A. Valencio (Argentina), the Vice Chairman is C.E. Barton (USA).	
WG I-6	Chairman:	S.K. Banerjee (USA)
	Vice Chairman:	H.C. Soffel (FRG)

3. Resolutions from Division I

Resolution 1. (From WG I-1, I-2 and I-4)

IAGA, RECOGNIZING
(1) the value of the MAGSAT global vector survey in defining the main magnetic field of 1980;
(2) the need for knowledge of the rapidly changing secular variation; and
(3) the extreme usefulness of satellite observations of the magnetic field in delineating long-wavelength crustal anomalies,
URGES that another magnetic vector field satellite survey be carried out, most desirably at a level significantly lower than MAGSAT and preferably before 1990. A satellite such as the proposed Geopotential Research Mission of the USA would be excellent for the performance of these tasks.

Proposed by C.G.A. Harrison (USA); seconded by N.W. Peddie (USA); passed without dissent.

Resolution 2. (From WG I-1)

IAGA, NOTING that it plans to issue, in 1985, a revision of the International Geomagnetic Reference Field extending it from 1985 to 1990, and
RECOGNIZING the crucial importance of recent data on secular variation for the accuracy of the revision,
URGES geomagnetic programme directors to make an extraordinary effort to transmit their most recent data related to secular variation, including magnetic observatory mean values for 1983 and repeat survey results, to the World Data Centres before July 1, 1984.

Proposed by N.W. Peddie (USA); seconded by D.R. Barraclough (UK); passed without dissent.

Resolution 3. (From WG I-4)

IAGA, CONSIDERING the importance of long wavelength anomalies for the investigation of large-scale structures in the deeper parts of the Earth's crust,
RECOMMENDS the compilation of geomagnetic surveys of Europe in such a way as to allow the establishment of a consistent anomaly map.

Proposed by P.J. Hood (Canada); seconded by W.J. Hinze (USA); passed without dissent.

4. The MARSA Project

Dr. M. Gokhberg (USSR) described this study of the magnetospheric-atmospheric response to seismo-acoustic events. After discussion it was agreed that this project has the sympathetic interest of members of Division I but is not directly related to the work of this Division. Should IAGA set up a study group on MARSA, Dr. Parkinson agreed to act as our representative in such a group.

5. ICSU Global Change Programme

Dr. Gough described this programme from the attached report. It was agreed that this important proposal falls outside the area of direct concern of Division I.

6. IAGA Assembly Programme at Prague, August 5-17, 1983

The programme proposals originated in the Working Groups. They are:

WG I-1: I1. Geomagnetic modelling: methods, theoretical constraints, predictions and applications. 3 half-days.
Convenor: F.S. Barker (USA),
Co-convenor: D. Zidarov (Bulgaria).

I2. IGRF proposals and assessments. 1 half-day.
Convenor: D.R. Barraclough (UK).

WG I-2: I3. Magnetic and velocity fields at the core-mantle boundary and core-mantle interactions. 3 half-days.
Poster session. 1 half-day.
Convenor: F.J. Lowes (UK)
Co-convenor: D.E. Loper (USA)

WG I-3: I4. Electromagnetic soundings with controlled sources. 1 half-day.

I5. Fluids, volatiles and other factors controlling earth conductivity. 1 half-day.

I6. Electromagnetic induction studies. 2 half-days.
Convenor (for I4, I5, and I6): O. Praus (CSSR),
Co-convenor: T.J. Shankland (USA)

WG I-4: I7. Magnetic anomalies over the margins of continents and plates. 2 half-days.
Convenor: W.J. Hinze (USA),
Co-convenor: H.A. Roeser (FRG).

I8. Interpretation of magnetic anomalies from the lower crust. 2 half-days.
Convenor: W. Mundt (GDR),
Co-convenor: J.L. Le Mouel (plus a co-convenor from ICL).

WG I-5: I9. Analytical methods for paleomagnetism. 1 day.
Convenors: P. Schmidt (Autsralia), J.C. Briden (UK).

I10. Paleofield behaviour and core processes. 1 half-day. (joint with I-2) (plus one half-day with I-2?)
Convenors: S. Braginskiy (USSR), P.L. McFadden (Australia), K.A. Hoffman (USA).

I11. Paleointensity methods and results -- joint with I-6. Laurasian paleomagnetism and plate tectonics. Poster session only.
Convenors: M. Krs (SSR), L. Yonnenshain (USSR), D. Kent (USA).

WG I-6: I12. Magnetic carriers, domain structures and the origin of remanence: 1 day.
Convenors: G. Smith (USA), H.C. Soffel (FRG), C.A. Lawson (USA).

I13. Paleointensity methods and results. 1 day, joint with WG I-5.
Convenors: M. Kono (Japan), R.S. Coe (USA), J. Shaw (UK).

I14. Magnetic fabric studies, 1 half-day.
Convenors: J-J. Wagner (Switzerland), F. Hrouda (CSSR).

Pre-IAGA Workshop: Reconciliation of magnetic measurements on natural and synthetic materials.
Convenors: V. Kropacek (CSSR) N. Petersen (FRG), S.K. Banerjee (USA).

7. Organization Structure

The chairman introduced the question whether the division would wish to reorganize its structure in Topics rather than the existing Working Groups. After discussion, a consensus emerged in favour of retaining the present structure of Division I.

REPORT ON DIVISION I OF IAGA

With its six Working Groups the Division encompasses a wide range of scientific studies of the geomagnetism of the solid Earth. WG I-1, on the Analysis of the Main Field and Secular Variations, continues the difficult task of description of the main field in periodically updated International Geomagnetic Reference Fields (IGRFs). In 1981, at the Edinburgh Assembly, the WG decided to specify Definitive reference fields (DGRFs) in the light of the latest available data, for past recent epochs. A series of DGRFs and IGRFs is thus under development. Magnetic satellite data contribute heavily to the more recent reference fields. The scientific sessions sponsored by WG I-1, at the Assemblies in Edinburgh and in Hamburg, were much concerned with methods of data analysis and expression of the main field in spherical harmonic coefficients up to degree and order 10. This task, of preparing reference specifications of the continuously-varying main field, is very much a product of IAGA and it is difficult to see how such work could be done by any more local organization. Reference fields are essential in many types of geomagnetic studies both of the main field itself, and of the local magnetic anomalies of the Earth's crust.

Working Group I-2, on the Theory of Planetary Magnetic Fields and Geomagnetic Secular Variation, continues in its Sessions at Assemblies, and in the work of its members, to attack the great difficulties of mathematical analysis of the geomagnetic dynamo. It is understood that a convecting, conducting fluid in a rotating planet may generate currents and fields in a number of ways, provided the motions are not axisymmetric and are turbulent. Workers in this field are exploring the possible magnetohydrodynamic systems which have the required asymmetry. They are also taking into account the constraints due to paleomagnetic data (including reversals) and to data from the space vehicles concerning the fields of Jupiter and Saturn. As is to be expected in this most difficult area of geophysical theory, the situation is one of slow but real advance. A very useful session on paleomagnetism and dynamo theory was held in Hamburg to the benefit of both groups of workers.

Working Group I-3, on Electromagnetic Induction and Electrical Conductivity (Earth and Moon), held its sixth Workshop on EM Induction in the Earth and Moon at the University of Victoria, Canada, in August 1982. The first in this series of international workshop meetings, which are held in even-numbered years between the IAGA Assemblies, was held in 1970 in Edinburgh, and the others have been in Ottawa (Canada), Sopron (Hungary), Murnau (FRG) and Istanbul (Turkey). The next will be in Ife, Nigeria. Typically they attract about 100 registrants and cover the whole field of electromagnetic studies, both observational and theoretical. This vehicle of workshop meetings lasting 5-6 days has proved well adapted to the needs of those studying EM induction in the Earth and must be considered a notable achievement of IAGA. Good sessions have also been held at the Assemblies in Edinburgh and Hamburg. The WG has also given origin to a Committee on ELAS (electromagnetic lithosphere-asthenosphere study) and a discussion at the Victoria Workshop, in August 1982, has led to the development of plans for a large-scale international experiment known as EMSLAB. If it succeeds, this experiment will involve magnetovariation and magnetotelluric studies from the Juan de Fuca Ridge across the subduction off the west coast of the United States into the continent. It should make a major contribution to the ELAS project. During the Hamburg Assembly of IUGG, IASPEI and IAGA agreed to create an Inter-Association Working Group on ELAS including members of the old ELAS Committee and also seismologists from IASPEI.

Working Group I-4 on Magnetic Anomalies (Land and Sea) is co-ordinating the production of a unified magnetic anomaly map of North America, and is assisting in the production of a similar unified magnetic map of Europe. In both cases, misfits of contours occur at national boundaries because different reference fields, representing the core field, have been deducted in the different national surveys, and for other reasons of technique. The production of an accurate, unified map is therefore no simple matter, especially where mapping is more advanced in one of two contiguous countries. Political problems add to the difficulties. IAGA has an important contribution in solving such problems because the countries concerned meet as equal members of the Association. Scientifically, as the Sessions in Edinburgh and Hamburg show, workers on magnetic anomalies are giving much attention to long-wavelength regional anomalies. These have wavelengths compatible with either core or crustal sources. It is important to try to identify the source region, because if it is in the crust the anomaly may carry significant information about plate kinematics. As is well known, magnetic anomalies are often informative in relation to mineral resources.

Working Groups I-5 (Paleomagnetism) and I-6 (Rock Magnetism) are closely interrelated and will be discussed together. Paleomagnetists in the last 30 years have been largely concerned with the use of paleomagnetic directions in tracing the relative motions of lithosphere plates. This type of work continues, as can be seen in the "Microplates" session at Hamburg. Two problems which affect such work are multiple magnetizations in a rock (which must be separated) and the apparently large number of small continents in earlier times which have now fused in large continents. For Precambrian rocks accurate dating is a further problem. In recent years many paleomagnetists have turned back to the study of the geomagnetic field of the past, including studies of its intensity, which is much harder to determine than its direction. Studies of magnetization directions in very recent lake-flow sediments are building a data base on secular variation, which may soon illuminate that topic. Archeomagnetic studies are very active.

Rock magnetists are remarkably active, studying the factors which stabilize remanent magnetizations in large oxide grains as well as such previously neglected phenomena as viscous remanent magnetization (VRM). In the past VRM has been seen as a nuisance, to be removed because it obscures an original magnetization which is of interest. Recently it has become evident that VRM is of interest in itself, and may develop high coercivity and behave much like a thermal remanence. This is only one aspect of a surge of experimental activity in rock magnetism illustrated by the fine Session I-7 at Hamburg. In relation to current paleomagnetic studies of past geomagnetic field intensities, the renewed studies of the physics of rock magnetism take on special urgency.

From the above brief and incomplete notes it will be clear that Division I of IAGA is in good health and is supporting a variety of task in international science in a useful and effective manner.

(D. I. Gough, Chairman of Division I)

Division II on Aeronomic Phenomena

NOTES ON DIVISION II BUSINESS MEETING

16 August 1983, Hamburg

1. Previous meeting

H. Rishbeth summarized the main points in the report of the Div. II Business Meeting at Edinburgh on 4 August 1981. The report had been distributed through the usual channels.

2. Division Officers 1983-7

H. Rishbeth announced that the Executive Committee had submitted to the IAGA Conference of Delegates, for their approval, the name of M.H. Rees (USA) as Division Chairman for 1983-7. For the position of Vice Chairman, four names were passed to the EC for consideration: A. Brekke (Norway), S. Kato (Japan), V.I. Moroz (USSR), C.A. Reddy (India).

3. Joint Working Groups in which Division II is involved or interested

H. Rishbeth reminded the meeting of Division II's policy that groups should only be set up, or continue, if they have a well-defined function and if their scientific community actively desire to run such a group.

(a) Div II/Div III WG on the Auroral Oval. M.H. Rees reported that the group had met earlier in the day, and that there was a (rather small) balance of opinion in favour of continuing the Working Group. After some discussion it was decided that if Division III supported continuation and if an active leader could be found to drive the group, Division II would favour continuation.

(b) Working Group, IAGA/URSI, on Wave Instabilities. H. Rishbeth proposes to check with appropriate persons to determine if there are persons who are enthusiastic about continuing this WG. If so, then Division II would continue to support it.

(c) Working Group, Div II/Div I on External/Internal Variations. A.D. Richmond noted that the WG has been filling a useful role, and has organized 5 symposia. However about 60% of its activities are concerned with external variations, not External/Internal relations, and thus perhaps it is becoming more a Div II body than a Div II/Div I body. It was agreed to continue the WG with A.D. Richmond as Div II representative.

(d) Working Group on Solar Fluxes (ICMUA). P.C. Simon said that the group had yet to meet in Hamburg, but reported on a recent workshop in Washington, where the group defined future measurements, needed calibrations, etc. The consensus was that it is worthwhile to continue this WG.

(e) SHISCAT. J.A. Gledhill reported that, because of lack of funds for the necessary technical design study, planning work was at a standstill. H. Rishbeth recalled that this had been the subject of an IAGA resolution at the Edinburgh meeting.

4. Division II Working Groups

II-A Electrodynamics of the Middle Atmosphere

H. Rishbeth commented that this group is an active, selfmotivated one that had arisen from within the community, and asked R.A. Goldberg to present a brief report. Goldberg explained that the group had been set up following a meeting of interested sceintists at the Edinburg Assembly, and now comprises 33 people from 11 countries. Meetings at Hamburg would be held on 22 and 24 August.

It was decided to continue the officers unchanged for the next four years (Chairman: R.A. Goldberg, Vice Chairmen: A. Brekke, H. Volland).

II-B Ground Based Optical Interferometry

H. Rishbeth reported that this group had formed itself and was now seeking IAGA sponsorship, at the suggestion of the IAGA Chairman who had suggested that it be constituted as a WG of Division II (Letter, K.D. Cole to J.W. Meriwether, 26 April 1983). Rishbeth welcomed this initiative and called for discussion.

Reactions were generally favourable. In discussion, the following comments were made:

- The originally proposed title (which included "Fabry-Perot") should be modified so that other types of instrument -- e.g. Michelson -- could be included;
- Installations existed in India and at Halley (Antarctica) but were not shown on the supplied list and map;
- This 'instrument-based' type of WG might be more appropriate to Division V than Division II.

Given the strong interest of Division II in the scientific results of optical interferometry, the meeting approved the formation of WG II-B, but Rishbeth would approach Division V to ascertain their interest in having some involvement with the group. No recommendation as to officers was made by Division II.

5. Reporter Reviews

There was discussion as to whether reporter reviews should continue. It was suggested that an alternative system, in which invited reviews would be given at the start of each session, would be preferable. The production of written reports and bibliographics for reporter reviews was commended, with verbal discussion of the highlights.

H. Rishbeth emphasized that the discussion of the future of reporter reviews was not to be construed as criticism of individual reporters. A 'straw vote' -- which was not considered to be in any way binding on the incoming Chairman -- yielded 11 votes in favour of continuing the present system, and 7 in favour of changing it, with about 20 abstentions.

Without making any commitment to whether topic reporters would in fact be appointed, nominations for Topics II-1 to II-9 were invited by the Chairman. (To be made outside the meeting.)

6. Programme for Prague Symposium

Two sessions suggested by the Auroral Oval Working Group were as follows:
(Div II/III) Remote mapping of auroral regions (2)

(Div III/II) Dayside cusp and magnetopause boundary layers (2)
Further suggestions from the floor as modified in subsequent discussion:
(Div II/IV/III) Interaction of the solar wind with non-magnetic planetary bodies (1)
Thermospheric structure, dynamics and energetics of earth and planets (4)
Middle atmosphere electrodynamics and chemistry (1)
Equatorial and auroral plasma phenomena (2)
Evolution and loss of planetary atmospheres (1)
Airglow and auroral excitation and models (3)
Metallic atoms and ions (1)
(Numbers in brackets are suggested number of half-day seesions in the Div II programme, as subsequently proposed by M.H. Rees)
Plus 1 half-day general contributions Total 18

7. IAGA Division II Resolutions

IAGA COMMENDS the service rendered to the scientific community by the World Data Centre C2 for Geomagnetism, Kyoto, and the National Institute of Polar Research, in their production of the AE Index;
HOPES that the production of AE will be extended to cover recent years and to fill gaps in the series;
HOPES that the production of AE will be expedited by the provision of digital magnetometers at the contributing observatories.
(To be passed to Div V for comment)

IAGA NOTES the scientific importance of Interplanetary Magnetic Field data and HOPES that such data will continue to be recorded and transmitted to the WDCs.

IAGA COMMENDS the progress being made by the World Data Centres in developing computer-based techniques for data transmission and storage;
HOPES that the need for the greatest possible compatibility in hardware and software and the standardization of data formats will constantly be kept in mind.

Division II reminds IAGA of the 1981 Resolution concerning the need for consultation between ICSU bodies in scheduling of major meetings, specifically in connection with the IUGG and URSI assemblies due to be held in 1987.

8. Project MARSA "Magnetospheric Atmospheric Response to Seismo-Acoustic Events"

M. Gokhberg (Institute of Physics of Earth, Moscow), described his proposals for study of the aeronomic effects of industrial explosions of energy of several hundred tons of TNT. Several such explosions, both on the surface and below it, have produced atmospheric waves which have generated ionospheric waves, which propagate with speeds 1 km/s E-W, 10 km/s N-S, or hydromagnetic waves in the magnetosphere and generate field-aligned currents which reach the conjugate point. Doppler shift measurements give data on the ionospheric perturbations.
Information on this subject is to be made available by Dr. Gokhberg to interested persons. Interested persons are to meet later during the IUGG Assembly to discuss proceeding with a cooperative program of future observations. Action was left to Dr. Gokhberg.

9. ICSU Colloquium on Global Change

A call for expression of interest with suggestions for possible IAGA participation was made. It is apparent that more information is needed but that IAGA could play a role, since the documents were somewhat uninformative and had not been made available before-hand. Div II scientists were asked to propose possible projects.

(16 August, 19:45 - 21:40)

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Subsequent Developments (22 August 1983)

3(a) Division III supported continuation of the Auroral Oval WG. Proposed officers: C.I. Meng, P. Taskanen, M. Balne, H.B. Garrett.

3(b) The present Div II representative on the Wave Instabilities WG (S. Ossakow) will be invited to continue in office.

4. WG II-B will be established within Div II and will elect its own officers. Div V took note of the existence of this group but did not propose a joint arrangement between Divisions II and V.

5. The appointment of Div II Topic Reporters will not be proceeded with at the moment.

IAGA Division II Report, 1980-83

The major IAGA events during the period 1980-83 were the IAGA Assembly at Edinburgh in August 1981, and the IUGG Assembly at Hamburg in August 1983. For both events there was a very full Division II programme, parts of which were arranged in conjunction with other bodies. Division II shares with Division III a strong interest in the high-latitude upper atmosphere and its links with the magnetosphere, and shares with IAMAP a strong interest in the Middle Atmosphere. The Chairman has therefore tried to maintain good contacts with leaders of these bodies, both directly and through Division II representatives on the interdivisional or interassociation bodies. As a result there have been successful joint symposia. In the case of the Middle Atmosphere (given the situation that IAGA and IAMAP both met in August 1981 on opposite sides of the North Sea) a division of Middle Atmosphere sessions was made between IAGA and IAMAP, and was probably as sensible as could be expected in the circumstances. IAGA probably did not have sufficient involvement in middle atmosphere science at Hamburg in 1983, and this matter remains for the further attention of the new Division II leaders.

Upper atmosphere dynamics and photochemistry remain strong Division II topics, increasingly in connection with other planets, and planetary studies should be a mojor Division II thrust in future. Division II programmes should remain 'science-based', and not become 'technique based'.

The internal structure of the Division included the three Topic Reporters for each of nine topics. Considerable attention was paid to geographical distribution of these posts. In the event, valuable contributions to the Division's work came from a minority of the officers (which of course is true of most organization!). A different structure might be considered for the future, with a smaller number of officers and a wide community of correspondents to be kept in touch and canvassed for their opinions on Division matters.

All working groups have been reviewed and some disbanded during the period. The Divison's policy is that working groups should be set up only if they have a specific job to do and are actively wanted by their scientific community, who will run them themselves. This seems to be the case for the groups II-A on Middle Atmosphere Electrodynamics (established 1981) and II-B on Ground-Based Optical Interferometry (established 1983), which have been welcomed into the Division II fold.

The Division has co-sponsored various international scientific symposia within its field of interest. Part of the Divisional budget has been used in this way, and part for the support of Division officers or representatives as provided for in IAGA rules. It is a pity that the availavility of funds did not secure a fuller participation by Division II officers in their Division's programme.

During my term of office I have enjoyed excellent relations with the IAGA management, and would like to thank all those who contributed actively to Division II. I believe that, in Fred Rees, the Division has a very good Chairman for 1983-1987 and wish him well for his term of office.

Hamburg, 25 August 1983

Henry Rishbeth
Chairman of Div. II

Division III on Magnetospheric Phenomena

SUMMARY REPORT OF THE BUSINESS MEETING
on August 18, 1983

1. Division Leaders for the Period of 1983-87

It was agreed, without dissent, that the following slate for the incoming Divisional Executive be submitted to the IAGA Executive Committee for approval.

Chairman:	A. Nishida (Japan)
Vice-Chairmen:	B.J. Fraser (Australia)
	D.J. Southwood (U.K.)
	C.-U. Wagner (German Democratic Rep.)

2. Topic Reporters for the Period of 1983-1987

The candidates for the new topic reporters and their alternates were shown at the business meeting. The final result is as follows.

Y. Kamide (Japan) for Topic III-1. Magnetosphere-ionosphere interactions.
S.W.H. Cowley (U.K.) for Topic III-2. Magnetosheath, magnetospheric boudary and plasma penetration.
D.T. Young (U.S.A.) for Topic III-3. Distribution and properties of magnetospheric plasma.
L.R. Lyons (U.S.A.) for Topic III-4. Energetic particle populations including cosmic ray entry.
A.D.M. Walker (South Africa) for Topic III-5. ULF waves.
M. Ashour-Abdalla (U.S.A.) for Topic III-6. Plasma waves and wave-particle interactions.
W. Baumjohann (F.R.G.) for Topic III-7. Magnetic storms and sub-storms, including aurora-magnetosphere relations.
G.L. Siscoe (U.S.A.) for Topic III-8. Magnetospheres of other planets.
S.D. Shawhan (U.S.A.) for Topic III-9. Active space experiments, laboratory experiments and computer simulation.

3. Working Groups under Division III

It was agreed to maintain the three Working Groups of Division III with the following leaders:

Working Group III-1. ULF Pulsations Chairman: W.J. Hughes (U.S.A.)
Working Group III-2. Composition of Hot Magnetospheric Plasma
Co-Chairmen: R.G. Johnson (U.S.A.), H. Balsiger (Switzerland).
Working Group III-3. Quantitative Magnetospheric Models
Chairman: W.P. Olson (U.S.A.)

4. Joint Working Groups with Division II and URSI

Division III supported the continuation of the following Joint Working Groups.

Joint Working Group (IAGA Divisions II and III) on Auroral Oval and Its Extension into Space (New Chairman: C-I. Meng (U.S.A.); Vice-Chairmen: P.J. Tanskanen (Finland), M. Blanc (France), H.B. Garrett (U.S.A.))

Joint Working Group (between URSI Commission H and IAGA Division III) on Passive Electromagnetic Probing of the Magnetosphere
Co-Chairman from IAGA Division III: A.J. Smith (U.K.)
Co-Chairman from URSI Commission H: K. Tsuruda (Japan)
(Note: At the URSI General Assembly in 1984, K. Tsuruda was replaced by U.S. Inan (U.S.A.))

Joint Working Group (between URSI Commissions G and H, and IAGA Divisions II and III) on Wave Instabilities in Space Plasmas
Co-Chairmen from IAGA: S.L. Ossakow (U.S.A., representing Division II), L.R- Lyons (U.S.A., representing Division III)
Co-Chairmen from URSI: E.J. Fremou (U.S.A., representing Commission G), T. Sato (Japan, representing Commission H)
(Note: At the URSI General Assembly in 1984, E.J. Fremou was replaced by B. Fejer (U.S.A.), whereas T. Sato remains.)

5. Recommended Symposia for Division III for the Prague Assembly

1. Response of the magnetosphere to the solar wind during quiet geomagnetic conditions (proposed from WG III-3, 2 half-days)
2. ULF waves in space plasmas (WG III-1, 3 half-days)
3. Hydromagnetic waves at low latitudes (L 3) (WG III-1, 1 half-days)
4. ELF/VLF wave studies of plasmasphere plasmapause dynamics (Joint IAGA/URSI WG on Passive Probing of the Magnetosphere, 1 half-day)
5. Control of the solar terrestrial interaction and magnetospheric substorm activity by the interplanetary medium (Kamide, Feldstein, 2 half-days)
6. Interplanetary and earth bow shocks (jointly with Division IV, Harvey for Div. IV, 1 half-day)
7. The earth's deep magnetotail (Cowley, Southwood, Hughes, 1 half-day)
8. Remote mapping of auroral regions (jointly with Div. II, Auroral Oval WG, 1 half-day)
9. Dayside cusp, magnetopause and magnetospheric boundary layers (Jointly with Div. II, Auroral Oval WG and WG III-3, 3 half-days)
10. Reporter Revies (2 half-days)
11. General Contributions (3 half-days)

(G. Rostoker, Chairman)

Division IV on Solar Wind and Interplanetary Magnetic Fields

SUMMARY OF THE BUSINESS MEETING
(1930 - 2100h, 17 August 1983)

1. Modification of the Internal Topics

The following changes were made: 1) Topic IV-2 was renamed; 2) Topic IV-4 was eliminated; and 3) Topics IV-5 and IV-6 were combined into a new topic. The new Topics, together with the Reporters that were selected at the meeting are as follows.

Topic IV-1. Large-Scale Characteristics of the Interplanetary Medium
A.J. Lazarus (U.S.A.), J.L. Steinberg (France).

Topic IV-2. Waves, Discontinuities and Turbulence in the Solar Wind
M. Goldstein (U.S.A.), D.A. Gurnett (U.S.A.)

Topic IV-3. Solar Wind Interaction with Unmagnetized or Weakly Magnetized Bodies
M.K. Wallis (U.K.), T. Gombosi (Hungary), T.E. Cravens (U.S.A.)

Topic IV-4. Plasma Composition and Neutral Gases
H.J. Fahr (F.R.G.), K.W. Ogilvie (U.S.A.), Gruntman (U.S.S.R.).

2. The Programme and Conveners for the Next Meeting in Prague

a) Large-Scale Structure and Dynamics (Proposed conveners: E.J. Smith (U.S.A.) and O.A. Vaisberg (U.S.S.R.), 1-day)
b) Waves, Turbulence, and Kinetic Physics (A. Barnes (U.S.A.), A. Richter (F.R.G.), 1-day)
c) Composition of the Solar Wind (P. Bochsler (Switzerland), F. Ipavich (U.S.A.), 1/2 day)
d) Shocks (S.J. Schwartz (U.K.), C.C. Harvey (France), 1/2 day)

Notes:
1) It was suggested that the Chairman explore the possibility of a session on shocks sponsored by both Division IV and Division III.
2) It was recommended that a session on comets be organized jointly by Divisions II, III and IV.
3) The chairman will designate a principal convener for each of the titles above.
4) G4 should be scheduled for 1/2 day.
5) B4 should immediately follow R4 (1/2 day).

3. Division Leaders for the Period of 1983-1987

F.M. Neubauer (F.R.G.) was appointed the new chairman. The several candidates for co-chairmen were recommended for consideration by the Executive Committee.

4. Resolutions

No resolutions were introduced.

(L.F. Burlaga, Chairman)

Division V on Observatories, Instruments, Indices and Data

BUSINESS MEETING OF DIVISION V

The business meeting of Division V was held at 11.00 - 13.15h, 19 August, Friday, chaired by C. Sucksdorff. Thirty-six persons from eighteen countries were present. The following decisions were made:

1. The new structure of Div. V was discussed and agreed upon. New numbers were given to the Working Groups. A new Ad-Hoc Working Group was created to clarify the confusion in geomagnetic coordinate systems. New names were accepted for the old Working Groups 2 and 10, "Meteor observatories" and "Ground Based Measurements for Satellite Geomagnetic Surveys". The proposal was passed to the IAGA Executive Committee.

2. The new officers of IAGA Div. V were agreed upon, except for the third co-chairman of the Division and some co-chairmen of the Working Groups, which parts were to be filled after discussions with people in question and concerning the Division Co-Chairman, after discussion with the IAGA Executive committee. [The new final structure is given elsewhere in this publication; it was already in IAGA News No. 22, pp. 42-43, issued in February 1984.]

3. The meeting decided to propose Dr. J.H. Allen to be nominated as IAGA representative in the MONSEE Steering Committee.

4. Chairman reported that about 2000 US dollars were at present in the bank and that some new money, probably less than the usual 5000 dollars, would be available for Div V for the next 4 years.

5. The possible use of some of the Div V money for new QHM's was discussed. The use of the new QHM's was found so much easier than the measurements with the old ones that these might improve the calibration of the observatory standards.

6. Dr. Stuart repreated request for papers for IAGA News, supported by Dr. Gadsden. Dr. Wienert considered the observatory yearbooks still be the right place for technical papers. Dr. Kring-Lauridsen recommended that technical papers published in observatory yearbooks should be referred in IAGA News, if they might have general interest in other observatories.

7. Div. V decided to continue the service for developing countries where Drs. Stuart and King-Lauridsen act as contact in questions concerning training, instruments and measurements. Other possibilities to help developing countries were discussed, but nothing new appeared.

8. The following three resolutions were accepted to be forwarded to the Resolution Committee:

1. IAGA, RECOGNIZING the importance of the accurate survey of the geomagnetic field components made by the MAGSAT satellite in 1979/80 and
NOTING that little secular variation information essential for accurate magnetic charts can be derived from a single survey,
URGES that another similar survey be made before 1990.
(proposed by D.R. Barraclough, WG V-5)

2. IAGA, NOTING that the quality of results deduced from long time series depends on the accuracy and homogeneity of the data set; and
CONSIDERING that observatory K indices from various networks have been used for many years in deriving planetary magnetic activity indices Ap, Am, and Aa, and that now many observatories are converging to digital recording systems which offer the possibility of deriving new indices by computer;
RECOMMENDS (1) that routine derivation of K indices continues by hand scaling according to the method proposed by Bartels and developed by Mayaud in IAGA Bulletin No. 21; and (2) that new machine-derived indices be given distinctly different names to avoid confusion with the K index..
(proposed by J.H. Allen)

3. IAGA, NOTING that World Data Center - C2 for Geomagnetism (Kyoto, Japan) has completed derivation of Auroral Electrojet (AE) magnetic activity indices for IMS years 1978 and 1979 and that they have continued this work by completing AE for the first half of 1980; and
CONSIDERING that with international cooperation they may continue the work of deriving AE for future years,
COMMENDS those responsible for this important work and

ENCOURAGES countries operating observatories whose records are used for AE to provide for digitizing analog records from these sites and to convert to digital recording at the earliest possible date.

(proposed by J.H. Allen)

9. Div. V decided to propose the following programs for the Prague meeting in August 1985.

3 x 1/2 day	Workshop on Geomagnetic Observatoreis, Surveys and Repeat Stations (E.R. Niblett: proposed convener)
3 x 1.2 day	Processing of Geomagnetic Data for Indices and for other Applications. (C. Sucksdorff: proposed convener)
1/2 day	Div. V Reviews (Invited)
1/2 day	Business meeting of Div. V
1/2 day	Meteor Stations, Wind Data and Analysis

10. Dr. V.P. Golovkov informed that IZMIRAN in Moscow is now ready to begin again the publication of the observatory annual mean values and that there will be no more delay in the publication than before, i.e. about one year.

(C.G. Sucksdorff, Chairman)

Interdivisional Commission on Antarctic Research

REPORT OF THE BUSINESS MEETING
(19:30-21:00, 17 August 1983)

1. The Chairman, Prof. J.A. Gledhill, welcomed the 12 members who were present. In the absence of Prof. T. Hirasawa, Prof. K. Kaminuma acted as Secretary.

2. Matters Arising from the Edinburgh Meeting

   (a) The catalogue of Antarctic IMS Data had been produced by Prof. Hirasawa and issued by the National Institute of Polar Research in Tokyo. The chairman expressed the gratitude of members for this.
   (b) After some correspondence it had been decided that it is not possible for IAGA IDCAR to nominate persons to serve on the SCAR Upper Atmospheric Physics Working Group. Several members are, however, also on that group.
   (c) A newsletter had been circulated to members.

3. Proposals for Officers

   Names put forward were:

Chairman	Prof. J.A. Gledhill (South Africa)
Co-Chairman	Dr. A.N. Zaitzev (USSR)
Others, possibly Vice-Chairmen	Dr. T.J. Rosenberg (USA) Dr. B.J. Fraser (Australia) Dr. H. Fukunishi (Japan)

Dr. Fukunishi or Dr. Rosenberg would act as Secretary.

4. Arrangement for Prague Meeting

Members were sharply divided on the merits of having a special session on Antarctic Research (AIMS SOUTH), as had been proposed and accepted at the Edinburgh meeting, or of including Antarctic papers in the normal sessions of Divisions II and III, with perhaps a special period set aside for Antarctic results. It was finally resolved to put the matter to the membership at large in the next issue of the newsletter, with a charge to AIMS - Antarctic Ionospheric and Magnetospheric Studies. It was thought undesirable to restrict it to the IMS. Also to be included is the question of whether a single event should be chosen for particular study - 13 July 1982, or the whole of June 1982, were suggested.

5. ISAAC

Prof. Gledhill reported briefly on the ISAAC cruise. The ship had spent nearly 4 weeks in the South Atlantic, cruising through the region of most dense low-energy electron precipitation. Particle E and auroral E had been seen on many occasions and the only night of airglow results so far reduced showed 16 rayleighs of 3914 Å emission at a time coinciding with a well-developed particle E layer. The project premised to be very informative.

6. Future Plans for International Cooperation in Antarctica

(a) The Leningradskaya - Molodezhnaya cruise will probably not take place until 1985/86.
(b) A coherent radar experiment is planned for Siple and Halley Bay for 1986 onward.
(c) Project SHEEP (Southern Hemisphere Energetic Electron Precipitation) would involve cooperation with digital riometer data from Siple, Halley, Sanae and Campbell Island ionosondes and VLF recording, together with satellite data, will be involved, as well as a program in the conjugate region.

7. Working Groups

(a) Pulsations. This matter was left until Prof. K.D. Cole had had an opportunity to raise it at the Division III Working Group on VLF pulsations.
(b) It was decided not to have a WG on Noctilucent Clouds, but to draw the attention of expeditions to the possibility of observing them from ships on the way to Antarctica.

8. ICSU Global Change Program

Members will be informed by the next Newsletter and asked for suggestions.

(J.A. Gledhill, Chairman)

Interdivisional Commission on History

ACCOMPLISHMENTS OF THE IAGA INTERDIVISIONAL COMMISSION ON HISTORY 1980 - 1983

The period between 1980 and 1983 has marked an interval of renewed interest and growth for the IAGA History Commission, with the Commission having grown to 120 corresponding members. The commission had an extremely successful scientific session at the 1981 Edinburgh conference. Dr. S.R.C. Malin prepared an excellent exhibition on the history of geomagnetic research under the co-sponsorship of the Commission. Dr. A. Thom, an expert on megalithic stone structures, delivered the keynote address at the Edinburgh session and attracted an audience of upwards of 300 people. The rest of the session and business meeting were equally well attended. Finally, under the leadership of Prof. M. Gadsden, the History Commission sponsored a very successful tour of the stone rings in Scotland.

Between the Canberra and Hamburg conferences, a regular newsletter was begun. The newsletter has stimulated much interest and has lead to a steady stream of information on scientific history articles, meeting dates, books, etc. relevant to the IAGA and its members. The History Commission has expanded its role, through the newsletter, from a body mainly reporting historical events of interest to the IAGA, to a focal point for coordinating historical data sources (through the concerted efforts of Dr. J. Feynman). This represents a major addition to the role of the History Commission and promises a valuable and healthy future for the Commission.

The Hamburg meeting marks a high point for the Commission. 30 papers have been submitted covering a wide diversity of historical subjects. For the first time, a session (chaired by Dr. J. Feynman) was devoted entirely to the use of historical records in scientific research. Dr. W. Schröder chaired a session on historical events and people with 17 papers - twice the papers given at the Edinburgh meeting (most of these were unsolicited!). Under the leadership of Prof. J. Meyer (and the assistance of Prof. W: Kertz), the History Commission was again a co-sponsor of a historical tour -- to Göttingen .

(NOTE: Shown below is a suggested Charter of the History Commission-- a search of the records reveals that none currently exists. It is hoped that this charter will become an official IAGA document) (from the IDCH Newsletter)

CHARTER
International Association of Geomagnetism and Aeronomy
Interdivisional Commission on History

The IAGA is the principal international organization responsible for scientific matters related to the study of geomagnetism and aeronomy. Geomagnetism in this context is interpreted as including the disciplines ranging from the history of the solar and terrestrial magnetic fields to the particles and fields around other stars. The Interdivisional History Commission is responsible for:

1) Keeping records of the history of the IAGA and of its scientific activities.
2) For the utilization of historical records in scientific studies.
3) For the general study of history as it pertains to those fields of science covered by the IAGA.
4) Coordinating all interchanges with other organizations related to the above for the IAGA.

In order to perform these activities, the Commission will:
1) Maintain a mailing list of interested members.
2) Publish a newsletter.
3) Organize sessions at the biennial IAGA assemblies.
4) Take part in IAGA Executive Council meetings as requested.

When appropriate, the Commission will be responsible for encouraging and sponsoring trips to historic sites near the assemblies and will promote the publication of members' papers in journals.

The Commission will have a Chairman and a Vice-Chairman and 1 or more Co-Chairmen. The Chairman and Vice-Chairman will be responsible for the administration of the Commission while the Co-Chairmen will be responsible for specific sub-disciplines (i.e., historical events and people, the use of historical records, etc.). Ad-hoc committees to deal with specific issues or the commemoration of special historical events will be authorized.

Commission Leaders for 1983-1987

Chairman:	H.B. Garrett (U.S.A.)
Vice-Chairmen:	S.R.C. Malin (U.K.)
	J. Feynman (U.S.A.)
	W. Schröder (F.R. Germany)

Proposed Topics for the Prague Assembly

1. Historical records in geophysics and space physics.
2. Events in geophysics and space physics and the people than made them happen.

Possible Contribution to the Global Change Study

One of the most-used methods of estimating the future global state of the geophysical environment is to project from a knowledge of past variations. Historical records can give us unique and invaluable information on changes in the global environment that have taken place on time scales ranging from decades to centuries. However, the use of these records to produce scientifically valuable data sets requires special techniques and careful evaluation. We propose a session devoted to the presentation, discussion, and scientific evaluation of such data set in the context of the future global environment.

(H.B. Garrett, Chairman)

Interdivisional Commission on the Middle Atmosphere

Business Meeting on 19 August 1983

Attendees: Taubenheim (Chairman), Ackerman, Bossy, Bowhill (part-time), Brasseur, Chanin, Gadsden, Hauchecorne, Lastovicka, Richmond, Roper, Simon

1. Status of Middle Atmopshere Program(MAP)

The status of the MAP was reported by Prof. Bowhill (Chairman of MAP Steering Committee of SCOSTEP), who informed the meeting about current activities of MAP projects, national programs, communication by MAP-Newsletters and Handbook, future meetings, and continuation after 1985 by Middle Atmosphere Cooperation (MAC).

2. New Chairman and Co-Chairman

The meeting was informed that L.R. Megill will not continue to be the chairman of the IAGA-IDC on the Middle Atmosphere, and that correspondingly the former co-chairman, J. Taubenheim, was recommended by the IAGA Executive Committee as the new chairman. P.C. Simon was proposed as new Co-Chairman, and the meeting agreed to forward this proposal to the IAGA Executive Committee.

3. Working Group Report

P.C. Simon reported on the activities of the Working Group on Solar UV Irradiance. The WG will hold a meeting on 22th August in Hamburg, the minutes of which will be distributed to all participants.

4. Reorganization of the Commission

The meeting difined the objectives of the IAGA-IDC on the Middle Atmosphere as

- to improve our understanding of middle atmosphere structure and processes,
- to make recommendations for IAGA conferences and to establish scientific programs for symposia on the middle atmosphere during IAGA Assemblies,
- to serve as an advisory group for the representatives of IAGA at the MAP-Steering Committee, and
- to promote international scientific projects on middle atmosphere research.

The Working Groups on the IAGA-IDC are to provide platforms for informal exchange of information related to key scientific problems at an international level. It was proposed to establish the following working groups:

(I) WG on Irradiances Relevant to Aeronomic Processes in the Middle Atmosphere (Chairman: P.C. Simon, Institut d'Aeronomie Spatiale, Brussels, Belgium)

(II) WG on Aeronomic Processes of the Middle Atmosphere (Chairman: G. Megie, Service d'Aeronomic, Verrières-le-Buisson, France)

(III) WG on Global Survey of Chemical Processes and Related Airglow Phenomena in the Middle Atmosphere (Chairman: G.E. Thomas, University of Colorado, Boulder, CO., U.S.A.)

J. Lastovicka recommended to consider a topic on "Natural External Forcing upon the Middle Atmosphere", which could become a further working group. It was agreed that the Commission Chairman should publish a short notice in the "IAGA News", asking for comments on and announcements of interest in this topic form the IAGA community. For a topic on "Heterogeneous Chemistry in the Middle Atmosphere", proposed by M. Ackerman, the question of establishing a working group and its chairmanship will be further considered.

5. Future Meetings

The next major scientific meeting of the Commission will be at the IAGA Assembly in Prague, 1985, where also several IAMAP commissions (e.g. ICMUA) will participate. The meeting agreed that a symposium on Middle Atmosphere Sciences should form a part of the scientific program of the Prague Assembly, and that the scientific topics defined in the foregoing paragraph could form a framework for a programme to be further specified by the IDC in the near future. The chairman of the working groups and all attendees were asked to send more specific remommendations, comments, and ideas on the Prague program as soon as possible to the Chairman of the IDC, who will be an ex-officio member of the Program Committee of the Prague IAGA Assembly.

6. Resolutions

There were no resolutions from the meeting.

7. ICSU Project on Global Changes

The meeting was shortly informed about the ICSU proposal of a planned International Project on Global Changes. As there were no immediate comments from the attendees, they were asked to give any comments, if wanted, to the Commission Chairman till the end of the Hamburg Assembly.

(J. Taubenheim, Chairman)

Interdivisional Working Group on Relations between External and Internal Magnetic Variations

SUMMARY OF THE BUSINESS MEETING
held on 19 August 1983

1. Proposal to Change the Status of the Working Group

It was agreed to propose to the Executive Committee to change the present "Working Group" to an Interdivisional Commission, with a simple

naming, such as 'External/Internal Relations'. (Note: The final naming approved by the Closing Conference of Delegates was "Interdivisional Commission on External/Internal Geomagnetic Relations".

2. Leaders of the Working Group (Interdivisional Commission) for 1983-87.

The following names were submitted to the Executive Committee for approval.

Chairman:	D.E. Winch (Australia)
Co-Chairmen:	S. Matsushita (U.S.A.)
	G.P. Gregori (Italy)

3. Proposed Sessions for the Prague Assembly

1. Three-dimensionally conceived Sq, L and electrojet fields. (Proposed convener: E. Oni)
2. Techbiques and results of Earth conductivity determinations using external/internal fields (W.H. Campbell and G.P. Gregori).
3. Integration of the main, ionospheric and magnetospheric contributions to the magnetic field (D. Schlapp and D.R. Barraclough).
4. General contributions of external/internal fields (D.E. Winch).

(S.R.C. Malin, Chairman)

IAGA/URSI JOINT WORKING GROUP ON
PASSIVE ELECTROMAGNETIC PROBING OF THE MAGNETOSPHERE

Report on Activities 1981-83

Meeting of the Working Group was held in 1981 at the IAGA and URSI meetings which were held concurrently in Edinburgh and Washington respectively. Both meetings endorsed the continuation of the working group in its presently constituted form. Dr. K. Tsuruda (for URSI) and Dr. A.J. Smith (for IAGA) took over the chairmanship from Dr. D.L. Carpenter and Dr. M.J. Rycroft respectively.

Valuable contacts have been maintained between members of the working group, both at the meetings mentioned above and by correspondence. A newsletter has been mailed out and the mailing list has been updated; it now includes 37 scientists from 12 countries.

One of the important activities of the group has been to sponsor (jointly with the URSI Commission H working group on wave analysis) a symposium on multipoint and multispectral wave techniques and their application to ionosphere/magnetosphere studies. This was originally proposed by Dr. Tsuruda and is now scheduled for the 1984 URSI Meeting in Florence.

As in previous years a joint observing campaign, oriented towards whistler observations of plasmapause dynamics, was co-ordinated at the Antarctic L = 4 chain of stations during the 1982 and 1983 Antarctic winters. Multistation direction finding whistler observations in this area have been enhanced by the installation of a Sheffield pattern goniometer receiver (identical to that at Halley) at Sanae station.

A meeting of the working group was held during the IAGA Assembly at Hamburg in August 1983 which was well attended. This will be reported in the next newsletter.

(A.J. Smith, Co-chairman)

Ad Hoc Committee on Developing Countries

At the Edinburgh Assembly in August 1981, IAGA established an ad hoc Committee on Developing Countries. This committee worked for two years with Prof. E. Oni (Nigeria) as chairperson. During the IAGA Hamburg Assembly, it was decided to establish the Interdivisional Commission on Developing Countries.

A brief report by the IAGA President is given below, which outlines the IAGA's action towards the establishment of the new Interdivisional Commission. The brief report is followed by the report of the Ad Hoc Committee on Assistance to Developing Countries, written by E. Oni.

BRIEF REPORT OF INTERDIVISIONAL COMMISSION ON DEVELOPING COUNTRIES

At the Edinburgh Scientific Assembly the Executive Comittee of IAGA eatablished an ad hoc Committee on Developing Countries. It worked for two years with Professor E. Oni (Nigeria) as chairperson.

At Hamburg (1983) the members of the committee met with President Cole in the chair, with the view to transforming the committee from an ad hoc one to an Interdivisional Commission on Developing Countries.

After the Report by Professor Oni on activities over the past two years, there was discussion of the report, and further ideas on new initiatives, training of scientists and technicians, equipment problems and educational matters.

The Interdivisional Commission on Developing Countries was created by the Executive Committee who appointed as chairman Professor R.G. Rastogi, Director of the Indian Institute of Geomagnetism, Bombay, India. Three

Regional Co-chairmen were proposed and agreed to by the meeting. They are Dr. E. Oni (Regional Co-chairperson for Africa), Dr. Q.L. Liu(Regional co-chairman for Asia) and Dr. I.G. Pacca (Regional Co-chairman for Latin America and the Carribean).

A consultant group of IAGA scientists was established within the Commission. It was considered that this should be an open group ensuring strong links with all Divisions of IAGA and with the countries. A partial list of consultants was suggested at the meeting. It was agreed that more could be added and that Professor Rastogi should write to these persons asking them to serve as consultants. The partial list formed at the meeting is K.L. Svendsen (USA), H.G. Barczus (France), A.N. Zaitsev (USSR), V.A. Troitskaya (USSR), P.H. Serson (Canada), W. Mundt (GDR), W. Schröder (FRG), K.D. Cole (Australia), U. Schmucker (W. Germany), N.J. Skinner (Botswana), D.I. Gough (Canada), A.A. Ashour (Egypt), I.A. Eltayeb (Sudan).

There was established also a Member's Group, one member for each country. The list is not complete and so far it is as follows: J.P. Patel (Kenya), M. Fahim (Egypt), J.G. Negi (India), C.A. Onwumechili (Nigeria), M.H.A. Hassan (Sudan), D.A. Valencio (Argentina), I. Galindo (Mexico), N.B. Trivedi (Brazil).

Plans for the immediate future

A workshop on Data Analysis was proposed to take place in India in (tentatively) January 1985.

A workshop on instrumentation was proposed and Professor Oni was asked to determine if there would be a sufficient number of persons interested and with what kind of instruments.

Sub-committees were established with coordinators as follows:

1. Education and Training, Dr. E. Oni
2. Applied Geomagnetism, Dr. J.G. Negi
3. Aeronomy, Dr. Olatunji
4. Special Projects (e.g. MAGSAT), Dr. B.P. Singh
5. Instruments, Dr. K.L. Svendsen
6. Exchange of Educational Materials, Dr. W. Schröder

The Comission is now under the chairmanship of Professor R.G. Rastogi. Full details of the proceedings of the Hamburg meetings on Developing Countries will be printed and circulated by him.

K.D. Cole
President IAGA

REPORT OF THE IAGA AD HOC COMMITTEE ON ASSISTANCE TO DEVELOPING COUNTRIES

1. Preamble

At the fourth Scientific Assembly held in Edinburgh in August 1981, a Committee on Assistance to Developing Countries was set up. There were no specific terms of reference and no fund was made available. The members of the Committee are as follows:

E. Oni (Chairman), M. Fahim, K.L. Svendsen, S.R.C. Malin, V.A. Troitskaya, J.P. Patel, I. Galindo, I.G. Pacca, Q.-L. Liu, G. Rajaram, K.D. Cole, N. Fukushima.

2. MODE OF OPERATION OF THE COMMITTEE

Since it has not been possible for the members of the Committee to meet, the mode of operation has been through correspondence. Quite a number of members put forward useful suggestions and as a result of all these, the Chairman sent the following write-up to the Secretary General of IAGA for publication in IAGA News.

'Audio-Visual Material'

Following steps taken by the Committee to popularise "Geomagnetism" in Developing Countires, it is now possible to purchase a documentary film entitled "The Earth is a Magnet" from the British Broadcasting Corporation. The film was made in 1980 and it lasts 50 minutes. The film is available and can be purchased from BBC Enterprises Ltd., 503 Villiers House, The Broadway, London W5. It costs 130 pounds sterling on video cassette or 310 pounds on 16mm film. Scientists from developing countries are advised to purchase the film and circulate it throughout their countries.

We have also received news that the United States has embarked on a project for preparation of a series of educational films on geophysical disciplines. These films will be useful to scientists from developing countries when completed.

The Committee also welcomes any relevant Audio-Visual materials which may be available in other developed countries. Donors should please contact the following: Dr. Ebun Oni, Department of Physics, University of Ibadan, Ibadan, Nigeria.

Equipment and Apparatus

There are many magnetic observatories, institutions and university departments who have equipment, especially magnetometers, which are good but are no longer being used. Such equipment can be passed on to scientists from developing countries. Those who are interested in donating such equipment and scientists from developing countries who are interested in accepting them should please get in touch with the following coordinator: Dr. Emil Kring-Lauridsen, Danish Meteorological Institute, Lyngbyvej 100, DK-2100 Copenhagen, Denmark.

Training of Scientists and Technicians from Developing Countries

India had a bilateral agreement for training scientists and technicians in geophysics from developing countries. The request is to be made to the High Commissioner for India at the Embassy of India in the country of the applicant.

In the case of training in geomagnetism in India, scientists from developing countries who wish to take advantage of this should please contact the following: Professor R.G. Rastogi, Director, Indian Institute of Geomagnetism, Colaba, Bombay 400 005, India.

Distribution of Journals to Develping Countries

K.L. Svendsen and a number of his colleagues have been giving their old journals (after one year) to libraries in developing countries. There may be other individuals and institutions who are willing to donate old journals to libraries in developing countries. Those who are interested in donating such journals, and scientists from developing countries who are willing to accept them for their libraries, should please get in touch with the following coordinator: Mr. K.L. Svendsen, NOAA, EDIS/NGSDC, 325 S Broadway, Boulder, Colorado, 80303, U.S.A.

Conclusion

It seems to me that it is necessary to have a Committee on Assistance to Developing Countries, but there is a need to make funds available to such a Committee. IAGA is in a position to solicit for funds from UNESCO as well as ECA (Economic Commission for Africa) and other similar bodies. Not much can really be achieved without any source of funding. I would like to suggest that a more serious attention should be paid to this aspect in Hamburg.

Ebun Oni,
Chairman, IAGA Committee on
Assistance to Developing Countries.

Note: Prof. R.G. Rastogi, Chairman of the Interdivisional Commission on Developing Countries, compiled and published the Proceedings of Discussion Meeting of Ad-Hoc Committee on Developing Countries, August 17 and 19, 1983. This report is available on request from
The Director, Indian Institute of Geomagnetism
Colaba, Bombay - 400 005 INDIA.

PROGRAMMES AND HIGHLIGHTS OF THE IAGA SCIENTIFIC SESSIONS

During the XVIII General Assembly of IAGA in Hamburg, the following scientific sessions were held, in addition to the Reporter Review sessions of Divisions I-V. Thirty of these sessions (from I1 to GE in the following list) are IAGA sessions, and the last three are organized jointly as indicated. The Programme-Abstracts booklet for these sessions (except for MAS) was published as IAGA Bulletin No.48 of 586 pages, which included the abstracts of 842 papers. For the Joint IAGA/IAMAP Joint Symposium on the Middle Atmosphere Sciences (MAS), the programme and abstracts were included in the IAMAP booklet, and the 202-page reprint from it for MAS was provided to all IAGA registrants.

Code	Session Title
I1	Mathematical Modelling of the Geomagnetic Main Field and Secular Variations, and Its Applications.
I2	Origin of Main Fields and Secular Changes of the Earth and Planets.
I3	Electromagnetic Studies of the Earth.
I4	The Origin and Significance of Regional Geomagnetic Anomalies.
I5	Megaplates and Microplates.
I6	Paleomagnetism and Dynamo Theory.
I7	Basic Theory and Experiments on the Magnetic Properties of Oxides and Sulphides.
GI	General Contributions to Division I on Internal Magnetic Fields.
2I	Ionospheric Modification.
2Q	Equatorial Ionospheric Irregularities
G2	General Contributions to Division II on Aeronomic Phenomena.
PE	Electrodynamics of Polar Atmosphere and Magnetosphere.
PA	Comparative Study of Planetary Magnetospheres, Ionospheres and Atmospheres
PP	Role of Ionospheric Plasma in the Plasmasphere and Magnetosphere.
3H	Theory and Modelling of Hydromagnetic Waves.
G3	General Contributions to Division III on Magnetospheric Phenomena.
4L	Large-Scale Solar-Interplanetary Relations.
4T	Turbulence and Kinetic Physics in the Solar Wind.
4S	Solar Maximum Transition.
4C	Problems Related to Solar-Wind Composition.
G4	General Contributions to Division IV on Solar Wind and Interplanetary Magnetic Field.
VW	Workshop on Geomagnetic Observatory and Survey Practice.
GV	General Contributions to Division V on Observatories, Instruments, Indices and Data.
HE	Historical Events or People.
HR	The Use of Historical Records in the Study of Geomagnetism and History.
EO	Origin and Comparison of Sq and L Variations
ES	Separation of the Observed Magnetic Field into Main, Ionospheric and Magnetospheric Contributions.
EI	The External and Internal Magnetic Separation during IMS.
EE	Equatorial Electrojet and Counter Electrojet
GE	General Contributions on Internal/External Effects.

MAS Middle Atmosphere Sciences (IAGA/IAMAP joint symposium, cosponsored by COSPAR and SCOSTEP).
VRA Workshop on the Venus International Reference Atmosphere (VIRA) (arranged by COSPAR Working Group, cosponsored by IAGA and IAMAP).
CDW Coordinated Data Analysis Workshop 6 for the IMS (CDAW-6) (arranged by SCOSTEP and cosponsored by IAGA).

The actual programmes of the above scientific sessions are given below, along with short summaries or comments from the conveners and/or chairmen of these sessions.

I1. MATHEMATICAL MODELLING OF THE GEOMAGNETIC MAIN FIELD AND SECULAR VARIATION, AND ITS APPLICATIONS (Conveners: D.R. Barraclough, W. Mundt)

August 24, a.m. Room: D01

Chairman: S.R.C. Malin

N.W. Peddie, A.K. Zunde: An assessment of the near-surface accuracy of the International Geomagnetic Reference Field 1980 model of the main geomagnetic field (I1.01).
R. Macnab, K.G. Shin, S.P. Srivastava: Application of the new International Geomagnetic Reference Field to large sets of marine magnetometer data (I1.02).
J.E. Humble: Field model comparisons: cosmic ray differences between the predicted and adopted 1980.0 fields (I1.03).
W. Mundt, E. Ritter, A. Best: Test of IGRF 1980 main field and secular variation in Europe (I1.04).
F.J. Lowes: The 'perpendicular error' effect in IGRF modelling (I1.05).
J.C. Cain, J. Frayser, D.R. Schmitz: In search of a compleat geomagnetic model (I1.06).
F.S. Barker: Generation of high order global models using a locally dense domain constructed from low order models (I1.07).
V.P. Golovkov, N.V. Kulanin: Geomagnetic field space energetic spectrum applied to regularize spherical harmonic analysis (I1.08).

August 24, p.m. Room: D01

Chairmen: N.W. Peddie, F.S. Barker

F. Molina, O. Battelli, A. De Santis, A. Meloni: A geomagnetic survey of Italy. Comparison with planetary reference fields (I1.09).
F.-Y. Sun, C.-C. An, Y.-F. Xu: Some characteristics of geomagnetic field and its secular variation in and near China in the last 20 years (I1.11).
F.S. Barker, D.R. Barraclough: The distribution of magnetic observatory data and its effect on secular variation models (I1.13).
V.P. Golovkov: Modern concepts of the geomagnetic field dynamics within the time range from ten to one milliard years (I1.14).
E.R. Benton: Some estimable bounds on the intensity of upwelling necessary for dynamo action in Earth's liquid core (I1.15).
V.P. Golovkov, N.M. Rotanova, S.V. Philippov, T.A. Chernova: Geomagnetic field 60-year variations' global distribution (I1.17).

One of the major themes that emerged was the evaluation and use of the International Geomagnetic Reference Field (IGRF), in particular the latest version produced at the 1981 IAGA Assembly in Edinburgh. It seems to be generally agreed that the current IGRF describes the geomagnetic field well near 1980 and that it is a significant improvement on previous versions. This is largely because the IGRF is controlled, near 1980, by the high quality data provided by the vector geomagnetic field survey satellite, Magsat which was in orbit from November 1979 until June 1980. Unless a similar satellite mission is flown in the near future, the accuracy of future IGRFs is likely to decline once again, since they will be based essentially on Magsat data updated using the poorly distributed set of magnetic observatory data.

Many of the papers presented were concerned, wholly or in part, with the problems of accurately describing the secular variation on global and regional scales. The importance of a knowledge of the secular variation to both practical probelms of chart production and theoretical problems concerned with the outer layers of the Earth's core and the lower mantle was also stressed.

The following 10 papers from this interesting and successful session have been published as a special issue of Physics of the Earth and Planetary Interiors (Vol. 37, No. 1, January 1985): numbers 1 to 5; 9 to 11, 13 and 18.

(D.R. Barraclough)

I2. ORIGIN OF MAIN FIELDS AND SECULAR CHANGES OF THE EARTH AND PLANETS (Convenor: E.R. Benton)

August 22, a.m. & p.m.; Room: D 01

Chairmen : I.A. Eltayeb, J.A. Jacobs, D.E. Loper

D.J. Stevenson: Physical State of the Earth's Core (I2.01)

T. Spohn, G. Schubert: Modes of Mantle Convection and the Thermal Evolution of the Core (I2.02)

D. Crossley: Oscillatory Flow in the Liquid Core (I2.03)

S. Stergiopoulous, K.D. Aldridge: Ringdown of Inertial Waves in a Spheroidal Shell of Rotating Fluid (I2.04)

G.E. Backus: Application of Mantle Filter Theory to the Magnetic Jerk of 1969 (I2.06)

L.R. Alldredge: Impulses and Jerks in the Geomagnetic Field (I2.07)

M. Fuller, I.S. Williams: Transitional Fields During Geomagnetic Reversals (invited) (I2.08)

C.G. Constable, M.W. McElhinny: A Secular Variation Record from Lake Sediments in North Queensland, Australia (I2.09)

P.L. McFadden, M.W. McElhinny: A Physical Model for Paleosecular Variation (I2.10)

G.R. Ierley: Theoretical Estimates of the Westward Drift (I2.11)

D.E. Smylie, A.M.K. Szeto: Coupled Motion of the Inner Core and Possible Geomagnetic Implications (I2.12)

D.R. Fearn: A Limit to the Strengths of Planetary Magnetic Fields (I2.13)

D.W. Collinson: The Origin of Primary and Secondary Magnetization in Lunar Rocks -Evidence for the Ancient Lunar Magnetic Field (I2.14)

J.W. Warwick, D.R. Evans: Jupiter's and Saturn's Fine-Scale Magnetic Fields (I2.15)

J.E.P. Connerney, M.H. Acũna, N.F. Ness: Magnetic Secular Variation of Jupiter and Saturn (I2.16)
R. Thompson: Standing Magnetic Fields: Time for a Change? (I2.17)
R. Thompson: Geomagnetic Evolution: 400 Years of Variation of Planet Earth (I2.18)
A.M. Soward, C.A. Jones: The Role of J.B. Taylor's Constraint in Dynamo Models (I2.19)
M.R.E. Proctor, D.R. Fearn: Self-Consistent Dynamo Models Driven by Hydromagnetic Instabilities (I2.20)
M. Stix, P.H. Roberts: Time-Dependent Electromagnetic Core-Mantle Coupling (I2.R1)
J.A. As: Current Systems Creating a Pure Dipole Field (I2.R2)
J.A. As: The Jerks in the Secular Change of the Geomagnetic Field (I2.R3)
H.H. Schloessin: Phasor Relationships Between Magnetic Field and Fluid Core Motion, with Gravitational Control and Feed-back Mediated by the Lower Mantle (I2.R4)

This session was very heavily attended (about 100 at times) and enthusiastically received. Because some 27 papers were scheduled for presentation (of which 23 were delivered), there was insufficient time for adequate discussion. Consequently, an impromptu supplementary meeting was arranged for Wednesday evening, 24, August 1983, at which over 30 attendees held a very lively give-and-take discussion (mostly on jerks and reversals) for nearly 2 hours.

The delivered papers fall roughly within six sub-categories.

1. Core physics and dynamics (Crossley; Ierly; Schloessin; Smylie and Szeto; Stergiopoulous and Aldridge; Stevenson; Stix and Roberts)
2. Short Term Time-Dependence of the Geomagnetic Feidl -Impulses and Jerks (Alldredge; As; Backus)
3. Longer Term Time Dependence of the Geomagnetic Field - Historical and Paleosecular Variation, Reversals (Constable and McElhinny; Fuller; McFadden and McElhinny; Thompson)
4. Theory of the Geodynamo (Fearn; Proctor and Fearn; Soward and Jones)
5. Mantle Convection and Core Evolution (Spohn and Schubert)
6. Lunar and Giant Planet Magnetism (Collinson; Connerney, Acũna and Ness; Warwick and Evans)

Stevenson set the physical stage for this session in his invited talk, which dealt with core composition and homogeneity; the nature of the core-mantle and inner core-outer core boundaries; thermodynamics and transport properties of the core; and its dynamics. Especially notable are his skepticism about the relevance of all existing dynamo models because of the gross oversimplification always made to date, in boundary conditions at the core-mantle boundary (CMB). He favors a CMB which may be tesselated into plates by anti-ridges formed beneath cold descending plumes in the mantle. (In IAGA Session I6 he further developed this idea by considering an α^2 dynamo in which the α effect is concentrated in vertical planar sheets into the core beneath the anti-ridges). Stevenson also emphasized his belief that the Kennedy-Higgins core paradox should no longer be of concern; the core geotherm can comfortably be adiabatic throughout. Nontheless, some subsequent work dealt with aspects of a stably stratified regime in the core. For example, Crossley explained his research on diagnostics, excitation and detection of gravity-inertia, Kelvin, high and low frequency waves in a stably stratified core while the experiment of Stergiopoulous and Aldridge is aimed at resonating Kelvin and/or inertial modes in a fluid sphere by precessing a small solid central spheroid at a preferred rate. This experiment bears some similarity to the work of Smylie and Szeto, who attribute the

dipole moment of the earth to precession about a titled axis of the solid inner core. On the other hand, Benton presented in the MAGSAT session--IUGG Symposium I3--magnetic evidence for detectable up and down-welling must be below the core-mantle boundary which suggests the absence of a stably stratified layer there.

Westward drift can be adequately explained by electromagnetic core-mantle coupling in the view of Ierley; while Stix and Roberts have developed a model of time-dependent electro-magnetic core-mantle coupling for comparison with variations in earth rotaion for the period 1906-1975, concluding that a large toroidal field (100-200 Gauss) is possible.

As might be expected, several papers on magnetic impulses or jerks (step function change in secular acceleration) generated a lot of lively interest. Backus used mantle filter theory to probe thoroughly just what the 1969 jerk can and cannot reveal about conductivity of the deep mantle. He is greatly impressed by the very high accuracy with which pre- and post-1969 magnetic time dependence can be fit by two different parabolae. However, a radial integral of conductivity (with a weighting kernel that vanishes linearly with r at the CMB) is the constrained quantity, but that still permits arbitrarily large deep mantle conductivity. As an interesting speculation, Backus raised the possibility that the 1956 elbow in Morrison's length of day data could be the beginning of the magnetic jerk seen at earth's surface some 13 years later (Backus paper on this work should appear in Geophys. J. Roy. Astron. Soc. in Sept. 1983). Alldredge's concern was with the reality of the global nature of the jerk, its epoch of occurrence at 1969, the duration of the transition as only 1 year or less, and whether it represents internal or, more probably, external influences. Along with Backus, he concludes that the jerk does not limit the value of deep mantle conductivity. J.A. As considered the effect of the external ring current on the 1969 jerk. In the evening discussion, Courtillot described a bit about the latest work of the French group, which is believed to establish not only the 1969 jerk beyond doubt, but also the existence of another jerk near 1910.

Fuller's invited paper on reversals continued the idea, initiated at Edinburgh with a paper by R.L. Wilson, of having a paleomagnetic observer discuss those observations for the would-be theorists and modelers. Fuller reviewed the distinctive features, advantages and drawbacks of lavas, sediments, and intrusives, pointing out that all three records are valuable. He also noted that Larson has questioned the validity of some of these records on the basis that they might merely be superpositions of opposite polarity signals. Although caution is recommended, there still may be enough records in existence to look for systematics (such aspects received attention by Barton, Coe and Hoffman, for example, in IAGA Session I6). The usual passage of the VGP close to either the meridian through the sight, or the one 180° away (on the far side) is one such systematic (but some new records suggest that perhaps only the early part of the typical transition is axisymmetric). Fuller thinks the data should be able to distinguish between quadrupole and octupole dominated lower order spherical harmonic models of the reversal process.

New sediment records from two volcanic crater lakes close together in Australia were presented and compared by Constable and McElhinny. Inclination, declination, relative intensity and radiocarbon dates have all been obtained. Although intensities for both lakes agree rather well, the directions do not. McFadden and McElhinny described interesting work revealing a latitude dependence of dispersion in reversal records when VGP is assumed to have a spherical distribution. The assumption that the energy in the non-dipole field

is proportional to that in the dipole leads to dipole wobble that appears to be related to the frequency of reversals. Thompson showed a short film, two years in the making, composed of individual contour maps (at intervals of 3000 nT) of the vertical non-dipole field from about 1600 A.D. to present. Growth and decay of isoporic foci on a time scale substantially shorter than for their westward drift was apparent.

Soward and Jones reported on the special ways in which dynamo states that are compatible with the constraint of J.B. Taylor have been approached in a horizontally plane layer dynamo in which Coriolis forces balance Lorentz forces. Proctor and Fearn discussed apparent convergence in a linear, kinematic but dynamically self-consistent dynamo, whose energy source is the instability of mean axisymmetric field generated by the chosen flow. Both the mean zonal field and motion greatly exceed the meridional counterparts. Fearn described an extension of the local magnetic field gradient instability analysis of Acheson to a global system consisting of a cylindrical annulus. Generally, Acheson's results are confirmed, qualitatively, and application to Mercury, Venus, Earth, and Mars was displayed.

Noting the problems with magnetic data quality for the lunar samples, Collinson reviewed the presence of thermoremanence in lavas extruded some 4 to 3.2 billion years ago, and discussed the possibility of transient-production of $\vec{B}$ by impact or an acient dynamo in a small lunar core. The secondary magnetization is most easily explained if there is a permanent global lunar magnetic field.

The Pioneer and Voyager flybys of Jupiter and Saturn, combine their data with earlier ground based radioastronomy data to give the beginnings of secular variation studies of the giant planets. Warwick and Evans reported that the decimetric data shows movement of a Jovian hotspot by 60° in 10 years; decametric observations give nearly time invariant surface fields over a 30 year interval. A real puzzle is provided by the Pioneer 11 flyby of Saturn: the inferred miniscule 1° tilt angle of the best fitting dipole means there should be virtually no modulation of the radio emission; yet, the observed emission is highly modulated. Connerny, Acuña and Ness confirm that Jupiter seems to lack secular variation of its dipole tilt and moment over a five year time interval. Although the structure of the edge of Saturn's B-ring permits some inference about the magnetic field, it is still too early to estimate any secular variation for Saturn. The more reliable error bars needed await the hoped for ISPM and Galileo missions late in this decade.

The paper by Spohn and Schubert seems designed to help distinguish between the two currently favored models of mantle convection, whole mantle and two layered. Since the Rayleigh number is so enormous, one must expect thermal boundary layering which acts as a conductive throttle. Whole mantle convection is found to be capable of removing several times as much heat as does layered mantle convection in $2 \cdot 10^9$ years. Yet, after considering how mantle convection couples to the thermal evolution of the core, they find they cannot really choose between these two models, for both suggest about the same behaviour (a plateau in the time dependence of the heat flux).

The overall impression left by the IAGA Symposium is one of a rich variety of work on both traditional and novel areas of this field. Concomitantly, meetings must cope with the need for much more discussion time, even at the price of accepting fewer papers.

(E.R. Benton)

I3. ELECTROMAGNETIC STUDIES OF THE EARTH (Conveners: V. Haak, O. Praus)

August 23, a.m. and p.m. Room: D02

I: Regional Studies of Electrical Conductivity

E.R. Niblett, R.D. Kurtz, M. Chouteau: Recent results from deep magnetotelluric sounding in the Canadian Shield (I3.01).

S.C. Constable, M.W. McElhinny, P.L. McFadden: Controlled source electrical studies of the Australian crust (I3.02).

S.E. Hjelt: Deep electromagnetic studies of the Baltic Shield (I3.03).

K. Pajumpää: Conductivity anomalies in Finland as revealed from four magnetometer array studies (I3.04).

X.R. Kong, U. Schmucker: Geomagnetic and magnetotelluric soundings in the Rheingraben (I3.05).

A. Ádám, L. Szarka, M. Varga: Crustal conductivity anomalies in the Pannonian Basin interpreted by physical and mathematical modeling (I3.06).

V. Červ, J. Pek, O. Praus: Models of induction anomalies in Czechoslovakia (I3.07).

R. Del Valle, M.T. Diaz, J.M. Febrer, N. Fourcade, H.G. Fournier, J.C. Gasco, M.A. Keller, H. Nunez, M.C. Pomposiello: Magnetotelluric study of a sedimentary basin, off shore, along the NE coast of the Antarctic Peninsula (I3.08).

P. Tarits, M. Menvielle: The Andean anomaly of conductivity in term of deviation of telluric currents (I3.09).

G. Schwarz, V. Haak, E. Martinez, J. Bannister: Electrical conductivity studies in the Central Andes, on a profile from the Pacific coast to the Eastern Cordillera (I3.10).

A. Dupis, G. Petiau, A.L. Thera: MT soundings in the Assal Lake region (I3.11).

M. Menvielle, J.L. Le Mouel, D.Y. Cheng: Geomagnetic study in Tibet (I3.12).

II: Studies and Applications in Shallow Structures

G.J.K. Dawes, T. Devlin, V.R.S. Hutton, R.G. Roberts: A Broadband geoelectromagnetic study of the Travale Geothermal Field, Tuscany (I3.16).

A.J. Berktold, H.J. Dittus, K.H. Eigner, U. Teufel: Telluric, magnetotelluric and geomagnetic depth sounding measurements in the geothermal area of Travale/Tuscany (Italy) (I3.17).

G. Musmann, J. Otten: Active audiomagnetotelluric application in geothermal areas (I3.18).

G. Fischer, V.B. Le Quang, I. Muller: VLF ground surveys, a poweful tool for the study of shallow two-dimentional structures (I3.19).

J. Heikka, A. Zhamaletdinov, T. Demidowa, S.E. Hjelt: MHD-test registrations in Northern Finland (I3.20).

P.-A. Schnegg, G. Fischer: A new pulsed audio magnetotelluric technique (I3.21).

III: Laboratory Studies

E. Hinze, M. Manko, G. Will: The dispersion of the electrical conductivity of Dreiser Weiher olivines (I3.22).

G. Nover, E. Hinze, G. Will: Measurements of the frequency dependence of the electrical conductivity of rocks from the Urach 3 and Falkenberg drillings (Germany) (I3.23).

Z.V. Chanishvilli, V. Kropáček, M. Laštovičková: Thermal and electrical properties of basaltic rocks in the temperature interval 20 - 900°C (I3.24).

P.H. Morat, J.L. Counil: Natural electric field in rock samples under stress. Experimental results (I3.25).

IV: Theory and Modelling

M. Hvoždara: Solution of the stationary approximation for MT field in the layered Earth with 3D inhomogeneity (I3.27).
H.W. Dosso, W.B. Hu, W. Nienaber: Analoque model electromagnetic response of an ocean channel and a seamount (I3.28).
P. Kaikkonen, L.L. Vanyan: Numerical thin sheet modeling of magnetotelluric field distortions by the hybrid technique. III Results for Rheingraben (I3.30).
P. Kaikkonen: Numerical thin sheet modeling of magnetotelluric field distortions by the hybrid technique. IV Results for the Baltic Shield (I3.31).
M. Mareschal, G. Vasseur: Bimodal electromagnetic induction in nonuniform thin sheets: Tests and application to Scotland (I3.32).
L.J. Lanzerotti, G.P. Gregori: Evaluation of canonical geomagnetic Depth Sounding parameters (I3.33).

V. Deep Conductivity of Earth and Moon

D.E. Winch: Impedance modelling of the Earth based on solar and lunar daily magnetic variations (I3.34).
B.A. Hobbs, L.L. Hood, F. Herbert, C.P. Sonett: Low frequency electromagnetic induction in the Moon: Linearised inverse theory and lunar core calculations (I3.35).
U. Schmucker: Electromagnetic response estimates in the period range of Sq (I3.37).
E.P. Velikhov, G.I. Gorbunov, Yu.M. Volkov, L.L. Vanyan, T.A. Demidova, A.A. Zhamaletdinov, S.E. Hjelt, J. Heikka, R. Piirainen: Deep electromagnetic sounding in Finland (I3.28).
A. Meloni, L.V. Medford, L.J. Lanzerotti, G.P. Gregori: Electromagnetic studies of the Earth using induction on a trans-Atlantic cable (I3.39).
L.L. Vanyan: Electrical conductivity of the asthenosphere (I3.40).
H. Jödicke, J. Untiedt: Electrical conductivity structure of the crust and upper mantle beneath the Rhenish massif (I3.R2).
A.M. Isikara, Y. Honkura: Some results obtained from electric and magnetic research in the North-Anatolian fault zone (I3.R4).
M. Beblo, A. Björnsson: Magnetotelluric model of Iceland (I3.R5).

The actual program consisted still of 37 contributions which had to be presented in 4 sessions, i.e. in 360 minutes of time. Under these circumstances it seemed infeasible and inhuman to present all contributions orally, and it seemed that we have to face the problem of an ever increasing number of contributions also in the future. We decided to present all papers as posters during several days from Friday 19 evening until Wednesday 24 evening. The actual presentation was on Tuesday, 23 August. The general impression was that a great number of visitors was attracted and that the exchange of ideas and information was more intensive than in any oral session. From 1630 to 1800 as open panel discussion in the lecture room between a group of 4 chairmen (Filloux, Hjelt, Hobbs, Schmucker) and the auditorium was arranged. The topics which were not prescribed circled around the problem of establishing an Earth reference electric model, the existence of low resistive layers in some parts of the continental crust, and around the improvement of transfer functions. We feel that this type of sessions could face the great number of contributions. There is no solution to distinguish between first class (orally

presented) and second class (poster presented) papers since this classification prohibits a serious communication between all scientists. However, it is essential for this newer type of presentation, that the posters can be displayed for several days before and after the actual "session". Most (21) of the papers were concerned with "Regional studies" of the resistivity structure in several parts of the world. 4 papers were devoted to laboratory studies, 6 papers to theory and modeling, and 6 papers to the deep (below 100 km) conductivity. In a subsequent action 13 papers have been published in a special issue of the J. Geophysics, Vol. 55, no. 33, pp. 143-231, "Electromagnetic Studies in the Earth", 1984.

(V. Haak)

I4. THE ORIGIN AND SIGNIFICANCE OF REGIONAL GEOMAGNETIC ANOMALIES (Conveners: A.G. Hahn, P.J. Hood)

August 18, a.m. Room: D2095

Chairman: A.G. Hahn

J.R. Heirtzler: Extinction of oceanic magnetic laneations at subduction zones (Invited, presented by P.J. Hood) (I4.01).
N.-A. Mörner: The lithospheric field: Geomagnetic anomalies and deformations (I4.03).

August 18, p.m. Room: D2095

Chairman: P.J. Hood

R.A. Langel, H. Frey: A reduced-to-pole satellite anomaly map of the world and its relationship to global tectonics (I4.05).
R.R.B. Von Frese, R. Oliver, W.J. Hinze: Long-wavelength magnetic and gravity anomaly correlations of Africa and Europe (I4.06).
D.C. Mishra: Long wavelength magnetic anomalies from lithosphere - Indian Shield and Himalayas (I4.07).
D.E. Ajakaiye, D.H. Hall, T. Millar: Aeromagnetic anomalies across the Nigerian younger granite province (I4.09).
J. Korhonen: Aeromagnetic survey of Finland
J.S. Rathore, J. Hospers, E. Finnstrøm: An aeromagnetic study off the S.W. coast of Norway and its tectonic significance (I4.14).

August 19, a.m. Room: D2095

Chairmen: A.G. Hahn, P.J. Hood

I. Zietz: The first magnetic map of the United States: A crustal interpretation (I4.16).
P.J. Hood, D. Teskey: Canadian magnetic anomaly map program: A review of recent advances (I4.17).
Y.-H. Wang, Y.-F. Xu, G.-T. Ren, Y.-F. Yan, F.-Y. Sun: Studies on the geomagneic anomalies in China (I4.18).
M. Tanaka, S. Matsumura: Geomagnetic anomalies in and around Japan detected from terrestrial and aeromagnetic surveys (I4.19).

P.J. Wasilewski: Magnetic mineralogy of the crust and upper mantle and the significance for interpretation of satellite measured anomalies (I4.20).
P.J. Wasilewski, E.R. Padovani: Crustal magnetization beneath the Rio Grande Rift and Colorado Plateau based on xenoliths (I4.21).

In this session several papers dealt with national surveys covering large areas, like the surveys of Canada, Finland, Japan and the U.S.A. The authors (Hood & Teskey, Korhonen, Tanaka & Matsumura, Zietz) demonstrated a great number of features in the anomaly maps which clearly correspond to major geological structures which are important in the exploration for ore deposits. Correlations were made also with other geophysical data, mainly those of gravity measurements. New methods of portraying magnetic survey data in planimetric form were presented such as the shaded relief technique which emphasizes tectonic features. It was shown that magnetic anomalies in many situations provide the clearest and most comprehensive indications with respect to prospecting and geological mapping applications.

Still larger areas were considered in three papers based on the results of the 1979/1980 Magsat mission. Here were shown correlations with tectonic structures (Langel & Frey), with gravity anomalies (von Frese, Oliver & Hinze) and with lithospheric large-scale deformations (Mörner).

The use of geomagnetic anomalies for prospecting purposes was demonstrated for areas in China (Wang et al.), Nigeria (Ajakaiye, Hall & Millar) and offshore Norway (Rathore, Hospers & Finstrøm).

Thorough rock magnetic studies on the conditions for generation and transformation of magnetic minerals and the consequences for the interpretation of magnetic anomalies were communicated in two papers (Wasilewski; Wasilewski & Padovani).

It is clear from the papers presented in this session that the value of regional magnetic anomaly map compilations is becoming increasingly well recognized. Moreover in view of the fact that magnetic surveying activity continues at a high level throughout the world, we expect to see compilations for all of the continents to be prepared in due course; a start has already been made in North America and Europe.

(A. Hahn and P.J. Hood)

I5. MEGAPLATES AND MICROPLATES (Conveners: D.B. Stone, A.N. Khramov)

August 18, a.m. Room: D2098

Chairman: D.B. Stone

C.G.A. Harrison, T. Lindh: Polar wandering paths for the major cratonic areas of the earth (I5.01).
B. Keating, C.E. Helsley, K. Kodama: Tectonic implications of the rotational history of the island arcs (I5.02).
H.J. Mauritsch: Palaeomagnetic investigation in the East African Rift, West of Arusha, Northern Tansania (I5.03).
J.P. Patel: Lower Proterozoic polar wander path for Africa (I5.04).
J.S. Rathore: The magnetic fabric signatures of sheared zones (I5.05).
H.A. Roeser: Results from combining a world map of the magnetic seafloor spreading anomalies with a world map of the oceanic plateaus (I5.06).
P.W. Schmidt: Analysis of palaeomagnetic data by the linearity spectrum method (I5.07).
D.R. Watts: Palaeomagnetic data from West Antarctica: A review (I5.08).

August 18, p.m. Room: D2098

Chairman: M. Fuller

S.K. Runcorn: Paleomagnetism of the Moon

R.S. Coe, B.R. Globerman, P.W. Plumley, G.A. Thrupp: Paleomagnetic investigation of tectonostratigraphic terranes of Alaska (I5.11).

M. Fuller, R. McCabe, I.S. Williams, J. Almasco, R.Y. Encina, A.S. Zanoria, J.A. Wolfe: Paleomagnetism of Luzon (I5.12).

M. Kono, K. Heki, Y. Hamano: Paleomagnetic study of the Central Andes: Counterclockwise rotation of Peruvian block (I5.14).

J.-L. Lin, M. Fuller, W.-Y. Chang: Phanerozoic APW paths for North China and South China blocks and implications for the tectonics of Central Asia (I5.15).

P.L. McFadden, M.W. McElhinny, X.H. Ma, Z.K. Zhang: Permo-Triassic paleomagnetism of the Tarim Block, China (I5.17).

D.T.A. Symons: Paleomagnetic data and the tectonics of Terrane I of the Western Canadian cordillera (I5.19).

D.T.A. Symons: Geotectonics of Wrangellia - Further paleomagnetic data from Vancouver Island, Canada (I5.20).

F. Theyer, N. Weinreich, U. Bleil: Neogene polar wander path for the Pacific: Plate motion and field behavior (I5.21).

D.A. Valencio, J.F.A. Vilas: Evidence of a microplate in the Southern Andes? (I5.22).

August 19, a.m. Room: D2098

Chairmen: D.T.A. Symons, E.R. Deutsch

N. Abrahamsen: Possible rotaions and translations in the Scandinavian Caledonides (I5.24).

V. Bachtadse: Palaeomagnetic evidence for Hercynian rotations of Central Europe (I5.25).

M. Becke, H.J. Mauritsch: Palaeomagnetic investigations in the Permian Bozener Quarzporphyr in the Southern Alps (Italy) (I5.26).

S. Cirilli, P. Márton, L. Vigliotti: Implications of a combined biostratigraphic and palaeomagnetic study of the Umbrian Maiolica formation (I5.27).

E.R. Deutsch: Ordovician paleomagnetism, rotation of microplates and closure of the Proto-Atlantic ocean (I5.29).

J.F. Diehl: Paleomagnetism of the late Cretaceous-early Tertiary North-Central Montana alkalic province (I5.30).

D.J. Dunlop, M.J. Stirling: Tectonic history of 'Grenvillia': Evidence from paleomagnetism and thermo-chronometry of the Cordova gabbro (I5.31)

H. Feinberg, A. Galdeano, M.G. Moreau, J.P. Pozzi: Paleomagnetic results from the Gibraltar arc: The contact zone between Alboran block and the Northern African margin (I5.32).

H.J. Mauritsch, M. Becke: Palaeomagnetic data from the upper Permian of the Southern Alps (N. Italy) (I5.33).

H.J. Mauritsch, M. Becke: Palaeomagnetism of the Border zone Eastern Alps-Pannonian realm (I5.34).

G.S. Murthy: Paleomagnetism of the Clam Bank Formation, Western Newfoundland and tectonic implication of the results (I5.35).

H. Perroud, N. Bonhommet, R. Van der Voo: Geographic extent and Paleozoic evolution of the Armorica plate on the basis of paleomagnetic data (I5.36).

K.M. Storetvedt: Pre-drift palaeogeography of the Central Atlantic (I5.37).

K.M. Storetvedt, T.H. Torsvik: The postulated great glen fault transcurrence; further palaeomagnetic evidence (I5.38).

R. Van der Voo, R.J. Johnson, C. Scotese: Paleomagnetic results and paleozoic evolution of the Avalon displaced terrane in Nova Scotia, Canada (I5.39).

D. Veljovic, T. Bicskei: Paleomagnetic characteristics of some Mesozoic rocks from Yugoslavia (I5.40).

This symposium was very well attended both in the numbers of papers submitted (enough that we had to start at 8:30 and cut our lunch break to an hour) and in attandance at the sessions. The audience seldom dropped below 50, and was commonly more than 70. Of the 39 papers listed in the program, 7 were cancelled including two by the co-convenor, Dr. Khramov, who was unfortunately unable to attend. The gaps in the program were, however, easily filled with both new and extended presentations.

Even though the title of the symposium was very broad, it had to be stretched a little to encompass all the titles. Paleomagnetism of the Moon by Dr. Runcorn was allowed on the basis that at least one theory says the moon came out of the Pacific basin!

The wide range of papers presented in this symposium reflects well the aims, interests and worries of those working in the field. Among the worries that have recently begun to receive more attention is the problem of reference poles. In the past it has been common practice to use the Apparent Polar Wander paths (APW) generated for the general area being studied. It is now recognized that many of the micro-plates and suspect terranes that form at least the edges of many cratonic blocks have moved large distances, often independently of one another, and therefore care has to be taken to exclude them from reference pole compilations. The magnitudes and timing of the possible terrane motions were also the subjects of several papers in this symposium. Because the microplates and terranes may have been associated with different major plates at different times in their history, a problem arises as to which reference poles to use in reconstructing their paleogrographies. Two papers by C. Harrison and T. Lindh highlighted this problem and pointed out the large discrepancies that exist between the APW curves based on global reconstructions and those for individual cratonic blocks.

In terms of the micro-plate data sets presented in the symposium, perhaps the most fascinating to many of us were those of J.L. Lin and co-authors and those of M. McElhinny and his co-authors for the plates of China. These micro, or perhaps meso-plates are relatively large and together form a significant fraction of Eastern Asia. The development of APW curves for this area is helping to unravel (or perhaps complicate?) our understanding of the tectonic history of the Pacific area.

One theme that came through very clearly in many of the papers presented was the recognition and interpretation of secondary magnetizations and overprints, and it became apparent that studies of these should form an increasingly important part of the paleomagnetic studies.

Many other interesting and informative papers were presented, too many to do them justice here, suffice to mention two very different approaches. J. Rathore presented an interesting data set using susceptibility anisotropy to locate otherwise poorly defined shear zones, and K. Storetvedt questioned what is now the establishment view of the timing of sea-floor spreading in the North Atlantic!

In all it was an interesting and informative symposium, and I thank all who participated and helped organize it. The proceedings of this symposium are currently in press with the Journal of Geodynamics.

(D.B. Stone)

I6. PALEOMAGNETISM AND DYNAMO THEORY (Conveners: R.T. Merrill, D.J. Stevensen)

August 23, Room: D2095

Chairman: R.T. Merrill

P.H. Roberts: Some concerns of geomagnetic dynamo theory today (Invited) (I6.01).
K.A. Hoffman: Paleomagnetic reversal records and implications for the geodynamo (Invited) (I6.02).
P.L. Olson: Polarity reversal mechanisms in α^2-dynamos (Invited) (I6.03).
P.L. McFadden: Geomagnetic reversal sequences and lower mantle convection (invited) (I6.04).
D.J. Stevenson: A mantle-driven geodynamo with implications for paleomagnetism (I6.05).
R.S. Coe, M. Prévot, E.A. Mankinen, C.S. Grommé: Behavior of the complete field vector during the Steens Mountain reversal (I6.06).
F. Theyer, E. Herrero-Bervera: The Williams-Fuller zonal harmonic model: Empirical testing using successive transition records (I6.09).
E. Herrero-Bervera, F. Theyer, S.R. Hammond: The transitional behavior of the geomagnetic field during the last two million years as recorded in the North Pacific (I6.10).
L.J. Pesonen, H. Nevanlinna: Two successive reversal transitions as explained by two-dipole model with standing and varying components (I6.11).
K.A. Anderson: Requirements for an ancient Lunar dynamo (I6.13).
L.O. Nicolaysen: On the origin of the long quiet epochs and noisy epochs of the geomagnetic polarity time scale (I6.14).

Chairman: D.J. Stevenson

M.W. McElhinny: Aspects of the time-averaged paleomagnetic field (Intvited) (I6.16).
T.C. Rolph, J. Shaw: The magnitude of the Carboniferous palaeomagnetic field using a modified technique (Invited) (I6.17).
C.E. Barton: Paleogeomagnetism - Extension of observatory records using palaeomagnetic techniques (Invited) (I6.18).
E.H. Levy: Polarity asymmetries in the geomagnetic field: Implications for the state of the Earth's dynamo (I6.19).
R.A. Livermore, A.G. Smith, E.J. Vine: The average geomagnetic field in post palaeozoic time (I6.21).
R. Merrill, P. McFadden, M. McElhinny: Secular variation from paleomagnetism and dynamo theory (I6.23).
H. Tanaka, M. Kono: Intensity variation of the geomagnetic field in Japan during the last 30,000 years (I6.24).
L. Kristjansson: Further statistical results of the late Tertiary paleomagnetic field in Iceland (I6.25).
C.M. Carmichael, J.S. Mothersill: A record of the last 10,000 years of the Earth's magnetic field in Central North America from sediments in Lakes Ontario and Erie (I6.26).
O.-Y. Wei, M.J. Aitken: Geomangetic intensity variation over past 5000 years: Comparison between China and the Near East (I6.27).

The session was well attended and generally considered to be very successful. Theoreticians were able to convey the fundamental physical constraints on paleomagnetic phenomena as well as indicate the flexibility and large uncertainties in dynamo modeling. Paleomagneticians presented data which increasing challenge dynamo concepts, but also discussed phenomenological models which attempt to bridge the gap between the generalities of dynamo theory and the specifics of observations. In his opening summary of the status of dynamo theory, Roberts emphasized a lack of consensus concerning the nature of the geodynamo: whether it is a weak field dynamo (Lorentz force unimportant) or a strong field dynamo (Lorentz force comparable to Coriolis force) — the latter including, as a sub-class, the Z-model of Braginsky. The modeling of such phenomena as reversals, the nature of the transition field and asymmetries between fields of opposite polarity are bound to be controversial when fundamental issues such as the manitude and topology of the core field remain uncertain. The session focussed on these phenomena, nevertheless, in the hope that their characteristics may help delineate between dynamo models and perhaps even establish a paradigm.

Reversals and Transition Fields: Hoffman noted that the existing paleomagnetic direction data are insufficient to demonstrate any systematic changes in direction during a polarity transition. The best case for systematic changes is at the onset of a transition, when the field is possibly more axisymmetric. The possibility of near-axisymmetry at initiation is interesting because it may be related to Cowling's theorem and the likelihood (but not absolute requirement) that such a field cannot be sustained by a dynamo and would therfore decay. Coe reinforced Hoffman's assessment and showed an example of a complex field, quite unlike that predicted by any existing simple models. He indicated a difficulty in generalizations of field reversal patterns; he also presented data indicating a very large changes of the earth's magnetic field, which could occur over just a few years. Some of the other presentations were more optimistic about the presence of systematic changes during polarity transitions. Theyer gave a partial support for the Williams-Fuller zonal harmonic model in which the dipole "energy"is redistributed into the g_2^0, g_3^0 and g_4^0 multipoles. Herrero-Bervera demonstrated a general consistency with the flooding model of Hoffman, and indications of a high degree of axisymmetry. Pesonen discussed two successive transitions ~6.5 ma bp which he modeled using an axial geocentric dipole which decays and then reverses, and an axial offset dipole located at the core-mantle boundary. Kristjansson pointed out the possibility of additional short reversal events not yet detected in the seafloor record. In his paper on α^2-dynamo Olson discussed that the cyclonic turbulence could be more vigorous near the inner core at some times and more vigorous near the core-mantle boundary at other times; this can change the sign of α and hence the sign of the poloidal field generated from the toroidal field.

Field Asymmetries between Normal and Reversed Polarities: McElhinny reiterated the evidence for a difference in the geometry of the geomagnetic field between normal and reversed states. This difference is best expressed as different values for g_2^0, the reversed polarity value being about twice as large as the normal polarity value and of the same sign. This continues to be a major puzzle for dynamo theory. Merrill pointed out that the space-time average magnetic field might exhibit the observed asymmetries because of some imposed magnetic field which is external to the core. However, because such a hypothetical field would likely be distorted and magnified by core convection processes, it would probably not produce systematic direction changes during polarity transitions, contrary to what has been commonly believed by paleomagnetists. Levy actually produced theoretical $\alpha\omega$ models in which great amplification of small, externally imposed magnetic field of constant magnitude could produce the observed asymmetries. In his model, the presence of an external or non-dynamo field removes the degeneracy between dynamo eigen-

modes for the normal and reversed states so that these modes have different geometry and different critical Dynamo numbers (in the language of Parker's $\alpha\omega$-dynamo theory. Since the theory is essentially kinematic, the implications for dynamos in which the non-dynamo field is very small (e.g. Earth) are difficult to assess and require more work. It would also be important to identify the likely origin of the non-dynamo field. (Thermoelectric? Thermomagnetic?) Nevertheless, Levy's work illustrates that the puzzling asymmetry might be explainable without major modifications to our current ideas of dynamo behavior. McFadden pointed out one statistical aspect of the normal and reversed states which can no longer be regarded as support for different behaviors. He showed that the k-index in a Gamma distribution was very unstable with respect to minor changes in the reversal chronology, such as the introduction of a single short reversal event during the entire Cenozoic. He developed a robust procedure to show that the stability of the two polarity states would be identical.

Dynamo Models with Implications for Paleomagnetism: Stevenson described an $\alpha\omega$-dynamo model in which the α-effect is concentrated at "anti-ridges"; places where sheets of cold mantle material reach the core-mantle boundary. Since these linear belts of enhanced dynamo generation are mobile and time-dependent in ways dictated by the complexities of mantle convection, the model suggests that many aspects of the geodynamo should vary on the mantle convection time scale. This model also suggests ways of understanding dipole tilt and the spatial spectrum of the field. Nicolaysen presented a provocative model which also seeks to relate core phenomena to dynamic processes in the Earth's mantle. In his case, the relevant driver for field changes is pressure changes associated with episodic mantle degassing. This ambitious model requires more qualification before it can be adequately assessed. Anderson discussed the requirements for an ancient lunar dynamo. Although far removed from the specific issues addressed elsewhere in the session, this paper served to remind participants of the great importance of a planetary perspective.

History of the Geomagnetic Field: Most papers of this subject dealt with how the Earth's magnetic field has varied in geometry and magnitude on time scales ranging from 10^3-10^9 years. Barton's review empasized the shorter time scales, merging with the extremely limited observatory records that extend back only 200 years. Carmichael Kono, and Wei dealt with particular aspects of recent ($\lesssim 10^4$ yr bp) field variations in their respective localities. Shaw concluded that much of the data suggests a field amplitude of around 5-10% the present strength at 335-340 m yr bp. Lengthy period of low field like this are an intriguing suggestion of a strong influence of the mantle on core dynamics. Livermore pointed out (as did McElhinny in his talk) that the ratio g_2^0/g_1^0 has changed on a $\sim 10^8$ year time scale and was opposite in sign to its present value about 90 m yr bp.

Concluding Comments: Dynamo theoreticians and paleomagneticians have a number of problems and challenges confronting them. Although many of these problems and challenges must be met within their respective scientific communities, some of the issues benefit greatly from improved communication and the type of combined session held in Hamburg. In particular, we believe dynamo theoreticians should try harder to meet the challenge of relevance: the need to construct models which can be related to the real world and which incorporate, albeit in probably oversimplified ways, the temporal and spatial complexity that the data demand. For their part, paleomagnetists should endevor to place their data in the context of phenomenological models which have a sound magnetohydrodynamical basis. For example, ideas of frozen flux deserve wider understanding and models involving assemblages of point dipole should be acknowledged as being mathematically acceptable but physically empty.

(D.J. Stevenson and R. Merrill)

I7. BASIC THEORY AND EXPERIMENTS ON THE MAGNETIC PROPERTIES OF OXIDES AND SULPHIDES (Conveners: S.K. Banerjee, V.P. Shcherbakov)

August 16, p.m., Room: D2095

Chairmen: D.J. Dunlop, S.K. Banerjee

G.M. Smith: A new approach to the theory of single domain TRM (I7.02).
M. McClelland Brown: Experiments of TRM intensity dependence on cooling rate (I7.03).
K.S. Argyle, D.J. Dunlop: Theoretical domain structure in multidomain magnetite particles (I7.04).
R.J. Veitch: Calculated ideal magnetization curves for spherical two domain magnetite particles (I7.05).
D.J. Dunlop: Demagnetizing factors and hysteresis of multidomain grains (I7.06).
E. Appel, H.C. Soffel: A model for the domain state of titanomagnetites of low crystal anisotropy (I7.07).
J.R. Boyd, M. Fuller, S. Halgedahl: Role of domain wall nucleation in the control of the magnetic behaviour of fine particle carriers of the paleomagnetic record (I7.08).
J.S. Rathore: Magnetic calibration of strained rocks (I7.10).

August 17, a.m., Room: D2095

Chairman: H.C. Soffel

D. Walton: The magnetic viscosity of single domain grains (I7.12).
H. Sporer: VRM experiments on natural and synthetic rock samples (I7.13)
B. Smith: An investigation of the viscous magnetization of some doleritic basalts from the oceanic crust (I7.14).
P.V. Sharma: Controlled studies of magnetic viscosity in rocks and synthetic samples (I7.15).
L. Tauxe, D.V. Kent: Properties of DRM and P-DRM in hematite (I7.16).
R. Løvlie, T. Torsvik: Evidence for DRM modified by currents in Devonian redbeds from Spitsbergen (I7.17).
G.M. Smith, S.K. Banerjee: Magnetic methods for the detection of chemical remanence in igneous and metamorphic rocks (I7.18).
Ö. Özdemir, S.K. Banerjee: High temperature stability of maghemite (γ-Fe_2O_3) (I7.20).
H.-U. Worm, S.K. Banerjee: The necessary conditions for aqueous low temperature oxidation of titanomagnetite (I7.22).
S.J. Beske-Diehl, W.L. Soroka: Changes in magnetic properties within small distances in variably oxidized oceanic pillows (I7.23).

August 17, p.m. Room: D2095

Chairmen: M. Fuller, F. Heller

P.J. Wasilewski: Magnetic properties of terrestrial rocks (I7.24).
D.A. Clark, P.W. Schmidt: Hysteresis properties of sized monoclinic pyrrhotite grains (I7.25)
M. Jelenska, S.A. Vincenz: Origin of magnetization of Permo-Carboniferous sediments of Svalvard (I7.27).

R. Freeman, F. Heller, G. Rogenmoser: A stable reversed remanence carried by greigite in Pliocene marls from Balerno, Switzerland (I7.28).

Ö. Özdemir, E.R. Deutsch: Contribution of oölitic hematite, chamosite and siderite to the magnetic properties of iron ore from Bell Island, Newfoundland (I7.30).

P.J. Wasilewski: Development of magnetization contrasts in the deep crust: The xenolith record (I7.31).

J.U. Fucugauchi, C. Radhakrishnamurty: Magnetic properties of a columnar basalt from Central Mexico (I7.32).

T. Torsvik, R. Løvlie: Formation of magnetic minerals(s) during laboratory heating of devonian redbeds (Spitsbergen): palaeomagnetic implications (I7.33).

C.A. Lawson, G.L. Nord: Remanent magnetization of "paramagnetic" compositions in the Ilm-Hem solid solution series (I7.34).

H. Boysen, E. Schmidbauer: Neutron diffraction study of titanomagnetites (I7.35).

K.A. Hoffman, P.N. Shive: Self-reversal of natural Ti-rich titanomagnetites by low temperature oxidation (I7.36).

H.J. Mauritsch, M. Becke: DRM and/or CRM in Permian red beds (I7.T1).

The purpose of this session was an unabashed and critical discussion of theories and experiments that form the core of today's rock magnetic knowledge. At the same time, it was planned to know where we should be going 5-10 years from now. Hence we encouraged the submission of papers dealing with some or other application of "old" rock magnetic knowledge to paleomagnetic problems, and also those dealing with new models, new theories and new observations in grain-size dependent properties and in all types of remanent magnetizations. The session was in practice separated into three subdivisions, i.e. on "TRM, Magnetic Domains and Stress Effects", "VRM, DRM, and Oxidation Studies", and "Sources of NRM". The session was well attended, and the useful discussion was held on various urgent subjects to be attacked in the coming years. Sixteen papers presented at this session have been published as a special issue of Geophysical Research Letters (Guest Editor: S.K. Banerjee), Vol. 11, No. 3, March 1984.

(S.K. Banerjee)

GI. GENERAL CONTRIBUTIONS TO DIVISION I ON INTERNAL MAGNETIC FIELDS (Convener: D.I. Gough)

August 26 Room: D01

Chairman: D.I. Gough

J. Urrutia Fucugauchi, D.A. Valencio: Middle Jurassic geomagnetic polarity sequence from the Tecomazuchil Formation, Southern Mexico (GI.01).

J. Urrutia Fucugauchi: Palaeomagnetism and rock-magnetism of the Acapulco granite, Southern Mexico (GI.02).

M.S. D'Agrella, I.G. Pacca: Paleomagnetism of the Cambrian Campo Alegre Formation, Southern Brazil (GI.03).

W.D. Parkinson, C.D. Barnes: In situ determination of Koenigsberger ratio (GI.04).
S.K. Runcorn: Lunar palaeomagnetism, polar wandering and the existence of primeval lunar satellites (GI.05).
F. Heller, T.S. Liu: Magnetism of Chinese loess deposits (GI.06).
B. Henry, L. Daly: The quantitative analysis of magnetic anisotropy: A prospect of finite strain calibration (GI.07).
P.M. Davis: Tectonomagnetic observation (GI.08).
J. Shaw, J. Rogers: An automatic superconducting magnetometer and demagnetising system (GI.09).
F. Freeman, P. Wägli: SEM observations of the magnetic mineralogy of some pelagic limestones (GI.10).
R. Freeman, F. Heller, W. Lowrie: Rock magnetic investigation of the Cretaceous-Tertiary boundary clay from Gubbio, Italy (GI.11).
K.A. Hoffman: A method for the display and analysis of intermediate paleomagnetic data (GI.12).
G.J. Wu, R. Gao: A study of deep crustal structures in eastern China on the basis of aeromagnetic anomaly axes.

The purpose of this session was to provide a forum for those papers of high quality dealing with the earth's internal magnetic field but which were not suitable accommodated in any of the seven specialized sessions of IAGA Division I. As the readers will see in the above list of papers actually presented, the subjects cover a wide range of reasearch field for the solid-earth geomagnetism, all of which are important and deserve further study.

(D.I. Gough)

2I. IONOSPHERIC MODIFICATION (Convener: P. Stubbe)

August 22, a.m., p.m. Room D2095

Chairman: P. Stubbe

J.B. Reagan, W.L. Imhof, H.D. Voss, E.E. Gaines, R.A. Helliwell, U.S. Inan, J. Katsufrakis, R.G. Joiner: Modification of the lower ionosphere by transmitter-induced electron precipitation (2I.01).
R.A. Goldberg, S.A. Curtis, J.R. Barcus: Rocket detection of magnetospheric electron precipitation induced by injected VLF waves (2I.02).
R. Barr, M.T. Rietveld, H. Kopka, P. Stubbe, E. Nielsen, R.L. Dowden: The radiation of ELF and VLF radio waves from a moving patch of heated auroral ionosphere (2I.04).
M.T. Rietveld, H. Kopka, E. Nielsen, P. Stubbe, R.L. Dowden: Polarization of VLF signals from modulated heating in the auroral ionosphere (2I.05).

F.H. Hibberd, E. Nielsen, P. Stubbe, H. Kopka, M.T. Rietveld: Observations of auroral zone E-region irregularities produced by powerful HF heating (2I.06).

M.J. Keskinen, P.K. Chaturvedi: Parametric excitation and suppression of convective plasma instabilities in the high latitude ionosphere (2I.11)

F.T. Djuth, R.J. Jost, A.J. Coster, W.E. Gordon: Production of short-scale irregularities in the ionosphere by a powerful HF wave (2I.07).

S. Basu, S. Basu, S. Ganguly, W.E. Gordon: VHF field-aligned scattering and UHF scintillations from a heated ionospheric volume (2I.08).

A. Frey: Simultaneous observation of HF-enhanced plasma waves and HF-wave self-focusing (2I.09).

M.C. Lee, S.P. Kuo: Artificial geomagnetic fluctuations caused by high-frequency electromagnetic waves (2I.10).

E. Mjølhus: Tneory of small-scale striations in ionospheric radio heating experiments (2I.12).

T.B. Jones, T. Robinson, P. Stubbe, H. Kopka: HF diagnostic studies of growth and structure on field-aligned irregularities produced by heating (2I.13).

Å. Hedberg, G. Hamberg, H. Derblom, B. Thidé, C. Hanuise, P. Stubbe, H. Kopka: Intensity of HF backscatter from irregularities created by ionospheric heating at different power levels (2I.14).

G. Hamberg, C. Hanuise, Å. Hedberg, H. Kopka, P. Stubbe: Electric field measurements by HF back-scatter from irregularities induced by the heating experiment (2I.15).

H. Kohl, H. Kopka, P. Stubbe: Parametric instabilities induced in the ionosphere by strong HF-waves (2I.16).

R.L. Showen, M.P. Sulzer, J.A. Fejer: Observations of plasma instabilities in a dual frequency ionospheric heating experiment: Complete ion and plasma line spectra (2I.17).

B. Thidé, Å. Hedberg, H. Derblom, P. Stubbe, H. Kopka: Electromagnetic emissions stimulated in the ionosphere by a strong high-frequency radio wave (2I.18).

G. Rose, B. Grandal, E. Neske, W. Ott, K. Spenner, J. Trøim- J. Holtet, K. Måseide, H. Kopka, P. Stubbe: First results of in situ measurements of the HERO heating rocket campaign

S.P. Kuo, M.C. Lee: Mechanisms of producing energetic electrons in the ionospheric heating experiments (2I.19).

E. Mjølhus, T. Flå: Direct access to plasma resonance in ionospheric radio heating experiments (2L.20).

G. Haerendel, A. Valenzuela, H. Föppl, C. La Hoz, E. Rieger, S. Cakir, O. Bauer: Initiation of equatorial spread F (2I.21).

The major emphasis of this session was placed on ionospheric modification caused by powerful radio waves. The session ran with the papers shown in the above list, with a slight change in the order of paper presentation. The session contained the following subdivision of topics, i.e., VLF wave injection (papers 2I.01 and 2I.02); HF waves: Generation of ELF/VLF waves by current modulation (2I.04, 2I.05); HF waves: Generation of field-aligned irregularities (2I.06 - 2I.15); HF waves: Excitation of parametric decay instability (2I.16 - 2I.18 and Rose et al.); HF waves: Production of energetic electrons (2I.19); HF waves: Direct conversion to electrostatic waves (2I.20); and Chemical releases (2I.21). The session was well attended and a number of new significant experimental data were presented, which will surely contribute to the better understanding of "ionospheric modification" by various causes.

(P. Stubbe)

2Q. EQUATORIAL IONOSPHERIC IRREGULARITIES (Convener: R. Raghavarao)

August 26, a.m. Room: D2098

Chairman: H. Rishbeth

S.L. Ossakow, M.J. Keskinen, S.T. Zalesak: A review of equatorial spread F irregularities (Invited) (2Q.01).

R. Raghavarao, J.N. Desai, B.G. Anandarao, R. Narayanan, R. Sekar, R. Gupta, V.V. Babu, V. Sudhakar: Preliminary results of barium releases from SHAR during the onset time of equatorial spread-F (2Q.03).

J.N. Desai, T.N. Rajaraman, R. Raghavarao: Nighttime F-region temperatures measured by Doppler width of 6300A night airglow line over Mt. Abu (15.0°N geomagnetic) (2Q.04).

W.R. Hoegy, S.A. Curtis, L.H. Brace, N.C. Maynard, R.A. Heelis: DE-2 observations of equatorial spread-F (2Q.05).

R. Raghavarao, J.N. Desai, J.H. Sastry: Equatorial spread-F - A review (2Q.06).

S. Basu, H.E. Whitney, R.C. Livingston, J.P. McClure: Multifrequency amplitude and phase scintillation structure and associated in-situ density structure in the equatorial region (2Q.08).

V.V. Somayajulu, B.V. Krishnamurthy, K.S.V. Subbarao: On the occurrence of equatorial spread-F during magnetic storms (2Q.09).

O. Royrvik: Coherent VHF scattering in the equatorial E-region (2Q.12).

Y.-N. Huang: Ionospheric electron content depletion associated with amplitude scintillations at the equatorial anomaly crest region (2Q.13).

Z. Tan, X, Huang, S. Wang: Ionospheric Es-S over Wuchang, China (2Q.14).

Invited reviews were given on the mose recent advances in numerical simulations (by Keskinen) and experimental work (by Raghavarao)in our understanding of the equatorial spread-F irregularities. The latter included the first barium release experiment in India, for the presence of large-scale spatial gradients of electric field around 190 km at the onset time of the equatorial spread-F. These electric field gradients and the resulting divergent flow of the plasma were suggested to be responsible for the generation of large plasma depletions (holes).

Paper 2Q.03 showed a very strong correlation of enhanced temperatures over 15.0° geomagnetic latitude and the occurrence of equatorial spread-F. The presence of rapid changes in neutral wind velocity and its one-to-one correspondence with the changes in h'F2 brings out a possible role of neutral dynamics around 300 km height in the triggering of the equatorial spread-F.

Results of studies from coordinated satellite measurements reveal that the observed zonal and vertical ion drifts exhibit strong shears centered on the plasma bubbles, the depth of the latter being related to the strength of the shear in ion velocity. DC electric field shows a remarkable correlation with electron density structure while the ac field variations occur in two distinct wavelength ranges, consistent with the low frequency drift and lower hybrid drift instabilities (2Q.05). Another coordinated attempt to study the phase and amplitude scintillation structure and associated in-situ density structure revealed that the weak amplitude scintillation spectrum of the microwave (C-band) signal is found to be consistent with the in-situ spectral index at scale length <1 km. Refractive scattering and strong scattering from dual slope in-situ irregularity spectra have been shown to be responsible for strong L-band and VHF scintillation spectra, while phase scintillation variations were shown to track the large-scale ($\sim$10 km) irregurality spectral intensity (2Q.08).

One possible cause of equatorial spread-F during magnetic storms was shown to be the fluctuating electric fields communicated from auroral regions. The fluctuating electric fields are generated due to the interaction of the intense substorms with the Sq current system by way of return currents (2Q.09). There was an unscheduled talk by R.G. Rastogi on the different aspects of range and frequency spread in ionograms.

(R. Raghavarao)

G2. GENERAL CONTRIBUTIONS TO DIVISION II ON AERONOMIC PHENOMENA (Convener: H. Rishbeth)

August 17, a.m. Room: D02

Chairman: H. Rishbeth

D. Lal, M.N. Tao: Clues to the composition of atmospheric constituents on Venus and Mars (G2.02).

T.Hsiao, S.-L. Zhang, J.-Q. Zou: Some features of the ionospheric absorptions of radio waves in the years of 1981-1983 at Beijing (G2.04).

E.O. Olatunji: The frequency law in ionospheric absorption, and applications to mapping (G2.05).

C. Mazaudier: Ionospheric electric currents above St Santin (G2.06).

T. Yonezawa: Semi-annual variation in aeronomic and other phenomena (G2.07).

P. Vila: The solar annular eclipse of December 4 1983: A rare opportunity for intertropical ionosphere physics in Africa (G2.09).

R.S. Reddy, B.K. Mukherjee, Bh.V. Ramana Murty: Geomagnetic activity responses to solar proton events (G2.11).

August 24, a.m. Room: D02

Chairman: M.H. Rees

P. Rothwell, M. Hapgood, B. Lanchester: Small scale structure of the high latitude ionosphere during auroral activity (G2.15).

R.R. Vondrak, D.J. Gorney, P.F. Mizera, R.M. Robinson: Simultaneous Chatanika radar and DMSP X-ray measurements of the atmospheric effects of auroral electron precipitation (G2.16).

K. Henriksen, N.I. Fedorova, G.F. Totunova, C.S. Deehr, G.J. Romick, G.G. Sivjee: Hydrogen emissions in the polar cusp (G2.17).

A. Vallance Jones, R.L. Gattinger: High resolution spectra of electron and proton aurora (G2.18).

M.R. Torr, R.W. Basedow D.G. Torr: A study of a midlatitude aurora (G2.21).

W. Benesch: Intersystem collisional transfer of excitation in the aurora (G2.22).

B.A. Tinsley, R.P. Rohrbaugh, Y. Sahai: Observations of optical emissions from precipitation of energetic neutral atoms and ions from the ring current (G2.23).

August 24, p.m. Room: D02

Chairmen: H. Rishbeth, P. Bauer

A.S. Rodger: Stable auroral red arcs - The cause of spread-F at magnetic mid-latitudes? (G2.25).

G. Crowley, J.R. Dudeney, A.S. Rodger, T.B. Jones: Large simultaneous disturbances (LSDs) in the Antarctic atmosphere (G2.26).

R.E. Horita, H.G. James: Some spectral characteristics of VLF saucers (G2.28).

M.K. Wallis: Deuterium enrichment on Venus (G2.29).

J.M. Ajello, D.E. Shemansky: N_2 fluorescence in the EUV by electron impact: Laboratory study and application to Voyager Titan observations (G2.30).

R. Raghavarao, R. Sridharan: On the variation of neutral composition in the lower thermosphere (G2.31).

D.G. Torr, P.G. Richards, W. Abdou, M.R. Torr, H. Waite, M.O. Chandler: Experimental and theoretical study of F region ion composition (G2.32).

T.J. Fuller-Rowell, D. Rees, H. Rishbeth, M.F. Smith: Changes of thermospheric composition at midlatitudes produced by geomagnetic substorms (G2.33).

C. Mazaudier, R. Bernard: Meridional neutral winds disturbances in the E region above Saint Santin during substorms (G2.34).

R. Prange, C. Emerich, G. Thuillier: Evidence of the coupling of the neutral and ionized atmosphere at the exobase. Effect on the neutral temeprature and density distributions (G2.35).

V.J. Abreu, J.W. Meriwether, Jr.: Atmospheric scattering effects on ground-based Fabry-Perot measurements of thermospheric winds (G2.39).

J.W. Meriwether, Jr., P.B. Hays, A.F. Nagy: First results from the Sondrestrom Fabry-Perot interferometer (G2.40).

M.A. Biondi, J.W. Meriwether, Jr., C.A. Tepley: Observations of equatorial thermospheric dynamics from the Pitts/Mao Observatory in Arequipa, Peru (G2.41).

R.G. Burnside, J.C.G. Walker, R.A. Behnke, C. Gonzales: Polarization electric in the nighttime F-layer at Arecibo (G2.42).

The General Contributions to Division II on Aeronomic Phenomena were interesting and varied, and the programme was nominally very full, reflecting the scientific activity of IAGA Division II. In the event it did not fulfil all its promise owing to the large number of withdrawals, mainly due to funding difficulties in the Soviet Union and India. It was gratifying that authors from a wide range of countries were able to participate.

(H. Rishbeth)

PE. ELECTRODYNAMICS OF THE POLAR ATMOSPHERE AND MAGNETOSPHERE (Conveners: M.H. Rees, R.A. Greenwald)

August 25, a.m. Room: D02

Chairman: M.H. Rees

R.W. Schunk: Electrodynamics of the high latitude ionosphere (Invited) (PE.01).

K. Schlegel: A possible effect of magnetospheric convection on ionospheric conductivities (PE.02).

S. Perraut, N. Bjørnå, A. Brekke, M. Baron: Experimental evidence of non-Maxwellian ion distributions in auroral ionosphere observed by EISCAT (PE.03).

A. Huuskonen, J. Oksman: The influence of an electric field on the electron density and conductivity profiles of a particle E-layer (PE.04).

D. Fontaine, M. Blanc, L. Reinhart, R. Glowinski: Modelling of the effects of electron precipitation on large-scale magnetospheric convection (PE.05).

V. Vasyliunas: Magnetosphere-ionosphere coupling: 14 years later (Invited) (PE.07).

P.J. Christiansen, C.T. Dum, R.L. Lysak: Dynamical model of magnetosphere-ionosphere coupling (PE.08).

S.S. Prasad, D.J. Strickland, Y.T. Chiu: Auroral electron interaction with the atmosphere in the presence of conjugate field-aligned electrostatic potentials (PE.09).

L. Girard, M. Blanc: Magnetosphere-ionosphere coupling at the scale of the arcs (PE.10).

M.S. Gussenhoven, D.A. Hardy, E.G. Mullen: Comparison of geosynchronous particle populations with low altitude precipitating electrons (PE.11).

D.A. Hardy, M.S. Gussenhoven, E. Holeman: Statistical models of auroral electron precipitation, ionospheric conductivities and currents (PE.12).

August 25, p.m. Room: D02

Chairman: R.A. Greenwald

J. Untiedt, W. Baumjohann: Auroral zone electrodynamics according to combined Scandinavian magnetometer array and backscatter observations (Invited) (PE.15).

H.J. Opgenoorth, J. Oksman, K.U. Kaila, E. Nielsen, W. Baumjohann: Three-dimensional current system associated with eastward drifting omega bands in the morning sector of the auroral oval (PE.16).

G. Marklund: Auroral arc classification scheme based on the observed arc associated electric field pattern (PE.17).

V.B. Wickwar, J.D. Kelly, O. de la Beaujardière: First 24-hour observations with the very high latitude radar at Sondrestorm, Greenland (PE.18).

J.M. Holt, J.V. Evans, W.L. Oliver, R.H. Wand: Average Millstone Hill high latitude convection patterns - Variations with Kp, IMF and season (PE.19).

J.A. Waldock, T.B. Jones, E. Nielsen: SABRE observations of storm-time convection flow (PE.20).

C. Hanuise, G. Caudal, J.P. Villain: High-latitude electric fields: A preliminary comparison between the Doppler motion of F-region small-scale irregularities and incoherent scatter measurements (PE.21).

August 26, a.m. Room: D02

Poster Session

J.D. Kelly: Polar cusp F-region characteristics: Preliminary radar results (PE.22).

J.G. Vickrey, J.D. Kelly: Incoherent-scatter measurements of the latitude-local-time patterns of electron density structure and ion convection above Sondre Stromfjord, Greenland (PE.23).

C.R. Clauer, P.M. Banks, V.B. Wickwar, J.D. Kelly, O. de la Beaujardière, J.R. Doupnik, J.C. Foster, T. Stockflet-Jorgensen, E. Friis-Christensen, T. Araki: Coordinated observations of the polar cusp (PE.24).

R.M. Robinson, R.R. Vondrak, D.M. Klumpar: Penetration of the evening sector, Region 2 field-aligned current sheet equatorward of the diffuse aurora (PE.25).

J.A. Gledhill, R. Haggard: Electron precipitation during the magnetospheric substorm of 27 July 1979 (PE.26).

J.M. Bosqued, J.A. Sauvaud, H. Rème, D. Roux, Y.I. Galperin, R.A. Kovrazhkin, V.A. Gladyshev: Aureol-3 charged particle measurements in the polar cusp (PE.27).

J.A. Sauvaud, J.M. Bosqued, H. Rème, A. Berthelier, J.J. Berthelier, F. Lefeuvre, Yu.I. Galperin, R.A. Kovrazhkin, M.M. Mogilevsky, E.E. Titova: Initial Aureol-3 results on the distribution of electrons, ions, field-aligned currents and waves in the morning sector of the diffuse auroral zone (PE.28).

K. Stamnes, M.H. Rees, B.A. Emery, R.G. Roble: Calculations of high-latitude ionospheric parameters and spectroscopic emissions susceptible to incoherent scatter radar probing and optical measurements (PE.30).

R.L. Gattinger, F.R. Harris, A. Vallance Jones: Characteristics of electron energy spectra in transient low altitude aurora (PE.31).

S. Basu, E. Mackenzie, W.R. Coley, W.B. Hanson, C.S. Lin: Variation of Atmosphere Explorer-D electron density, electric field and energetic particle structure with type of auroral luminosity from DMSP (PE.32).

A. Ranta: DMSP-satellite and ground observations of a pre-substorm phase (PE.33).

R.W. Smith, K. Henriksen, C.S. Deehr, D. Rees, F.G. McCormac, G.G. Sivjee, M.F. Smith: Thermospheric winds in the cusp and cleft: Dependence on the latitude of the cusp (PE.34).

D. Rees, P.J. Charleton, N. Lloyd, R.W. Smith, A. Steen, R. Gordon, M.F. Smith: Characteristics of the three-dimensional thermospheric wind response to geomagnetic storms: A combined experimental and theoretical study (PE.35).

R.H. Wiens, G.G. Shepherd: Observations of the transport of metastable $N(^2D)$ in the polar atmosphere (PE.36).

E.E. Timofeev, A.G. Yahnin, T.V. Kozelova, E.P. Vasilyev, M.K. Vallinkoski, R.J. Pellinen: Experimental study of arc-assocaited electric field depending on physical conditions in the ionosphere (PE.37).

J. Oksman: Electric fields in the trough region (PE.38).

W. Baumjohann, T. Kunkel, R.A. Greenwald: Electric fields and currents in the Harang discontinuity (PE.39).

D. Alcaydé, J. Fontanari, C. Lathuillière: Ion composition changes and thermospheric structure inferred from incoherent scatter observations at the EISCAT observatory (PE.43).

C. Lathuillere, V. Kofman, G. Lejeune: Ion composition variation in the auroral ionosphere (PE.44).

M.L. Duboin, W. Kofman, C. Lathuillere: First results of heating rate determination from EISCAT measurements (PE.45).

D. Fontaine, L. Barouch, G. Caudal, L. Girard: Electrodynamic properties of auroral arcs as seen by EISCAT (PE.46).

D. Alcaydé, G. Caudal, M.L. Duboin, C. Mazaudier, C. Senior: Determination of electrodynamical parameters from EISCAT incoherent scatter measurements (PE.47).

C.G. Maclennan, L.J. Lanzerotti, T.J. Rosenberg, D.L. Detrick, D.L. Carpenter, W.B. Gail: Studies of the magnetosphere cusp and south pole station (PE.48).

T. Nagata, H. Yamagishi: Simultaneous observation of auroral zone X-ray and VLF emissions - Microburst and pulsating phenomena (PE.49).

T. Oguti, J.H. Meek, K. Hayashi: Multiple correlation between auroral and magnetic pulsations (PE.50).

T.J. Rosenberg, J.R. Dudeney, E.A. Bering, J.R. Benbrook: Penetration of the dayside cusp to $L \leq 4$ (PE.51).

A.S. Rodger, J.R. Dudeney: Studies of sporadic-E layers at high latitudes using an advanced ionospheric sounder (PE.52).

C.R. Wilson: Infrasonic waves from an ionospheric source within the polar cap (PE.53).

G. Beghin, J.C. Cerisier, F. Lefeuvre, J.J. Berthelier, R. Debrie, O.A. Moltchanov: Ionospheric irregularities and their effect on the structure of ELF hiss observed by the satellite Aureol-3 (PE.54).

A. Berthelier, C. Machard, J.J. Berthelier, J.C. Cerisier, Yu.I. Galperin, M. Moglievsky: ULF magnetic turbulence in the auroral ionosphere and the associated field-aligned current pattern (PR.55).

J.J. Berthelier, F. Lefeuvre, J.L. Rausch, J.M. Bosqued, J.A. Sauvaud, Yu.I Galperin, O.A. Moltchanov: Observation of EM wave emissions near 1/2 fH+ and harmonics and correlated particle measurements in the morning sector of the auroral oval (PE.56).

C.H. Hanuise, J.P. Villain: Radar study of 5-10m wavelength irregularities in the auroral electrojet (PE.58).

J.P. Villain, C.H. Hanuise: Radar study of 10m wavelength irregularities in the auroral and polar ionospheric F region (PE.59).

E.E. Titova, V.I. Di, V.E. Yurov, O.M. Raspopov, V.Yu. Trakhtengertz, F. Jiřícek, P. Tříska: Monochromatic VLF waves interaction with the irregular ionosphere (PE.60).

N.G. Kleimenova, O.V. Kozyreva, J.A. Holtet: Dayside polar latitude ELF bursts and IMF (PE.61).

E. Nielsen, C.I. Haldoupis, B.G. Fejer, H.M. Ierkic: Directional and dynamic variations of auroral power spectra related to the ionospheric electron drift velocity (PE.62).

C.I. Haldoupis, E. Nielsen: Results on the relative strength of one-meter (140 MHz) radio auroral irregularities (PE.63).

F.H. Hibberd, E. Nielsen, P. Stubbe, H. Kopka, M.T. Rietveld: Observations of auroral zone E-region irregularities produced by powerful HF heating (PE.64).

P. Høeg, E. Nielsen: Height-integrated Joule heating rates in the auroral regions deduced from STARE measurements (PE.65).

A.C. Das, U.N. Das: Generation of ionospheric irregularities by thermal source - A new mechanism (PE.66).

P. Satyanarayana, S.L. Ossakow: Effects of velocity shear on the current convective instability (PE.67).

K.S. Hwang, E.G. Fontheim, R.S.B. Ong: Ion acoustic and electrostatic ion cyclotron wave emission and instability thresholds by two models of field-aligned current sheets of finite width (PE.68).

M. Sugiura, R.A. Hoffman, T. Iyemori, N.C. Maynard, J.L. Burch, J.D. Winningham: Relations between field-aligned currents, electric fields and particle precipitation as observed by DE 2 (PE.R1).

August 26, p.m. Room: D02

Chairmen: H. Rishbeth, G.G. Shepherd

G. Rostoker: Personal synopsis of the poster session (Invited) (PE.70).

R.W. Smith: Dynamics of the polar atmosphere (PE.71).

J.A. Holtet, P.-E. Sandholt, B. Lybekk, K. Svenes, A. Egeland, V.A. Troitskaya: Dynamics of the dayside polar cusp region (PE.72).

L. Häggström, J. Murdin, D. Rees: Determination of the thermospheric neutral wind from incoherent scatter radar measurements (PE.73).

D. Rees, P.J. Charleton, N. Lloyd, R.W. Smith, A. Steen, R. Gordon, M.F. Smith: The generation and propagation of thermospheric winds of extreme magnitude (PE.74).

G. Caudel, M. Blanc, C. Senior: Large scale patterns of high-latitude plasma convection from the EISCAT incoherent scatter radar (PE.75).

D. Alcaydé, P. Bauer, O. de la Beaujardière, J. Fontanari, V. Wickwar: High latitude observations of thermospheric temperature and atomic oxygen concentration during MITHRAS operations (PE.76).

O.de la Beaujardière, V.B. Wickwar, D. Alcaydé, P. Bauer, W. Oliver, T. Killeen, G. Carignan, P. Hays, N. Spencer: Thermospheric parameters measured on 18 November 1981 using Chatanika, EISCAT, Millstone Hill, and DE-B (PE.77).

S.A. Curtis, W.R. Hoegy, L.H. Brace, J.D. Winningham: DE-2 observations of energy transport in the cusp (PE.78).

W.L. Oliver, J.M. Holt: Latitudinal variation of exospheric temperature as measured from Millstone Hill (PE.79).

G. Hernandez, V.B. Wickwar, R.T. Tsunoda: Lower thermosphere dynamics in the auroral region near Fairbanks, Alaska (PE.81)

This session was devoted to the dynamic behaviour of the thermosphere and magnetosphere (~80 to 1000 km) in the polar region in response to electric fields and energetic particles and on the dynamic coupling that exists between the iononsphere and magnetosphere. The IUGG General Assembly in Hamburg commemorated the 100-year anniversary of the First International Polar Year 1882-83, and an interdisciplinary symposium was held on "Geophysics of the Polar Regions" with an invited talk from each Association. IAGA scientists study a number of important problems for the polar upper atmosphere, especially in association with the interaction of solar wind with the earth's magnetosphere and its influence down to the ionosphere and the middle atmosphere. Hence the PE session was planned for the Hamburg Assembly as a contribution from IAGA to the anniversary of the International Polar Years and Geophysical Year, even though the scientific significance of polar-region electrodynamics has gained the attantion only since the beginning of the space age. The response to the call of papers was so great that most papers were presented in a poster session, which was very successful in demonstrating important new findings by means of new facilities and techniques.

(M.H. Rees)

PA. COMPARATIVE STUDY OF PLANETARY MAGNETOSPHERES, IONOSPHERES, AND ATMOSPHERES (Conveners: T.W. Hill, D.M. Hunten)

August 23, a.m. and p.m. Room D2098

Chairmen: S.K. Atreya, J.C. McConnell, T.W. Hill

R.R. Hodges, B.A. Tinsley: Charge exchange hydrogen sources in the exospheres of Earth and Venus (PA.01).

J.C. McConnell: Comparison of the aeronomy of Jupiter, Saturn and Titan (Invited) (PA.02).

T.E. Cravens: Vibrationally excited H_2 in the upper atmospheres of the major planets (PA.03).

D.E. Shemansky, G.R. Smith: High altitude energy deposition in the atmospheres of Jupiter and Saturn (PA.04).
S.K. Atreya: Comparative ionospheres of Uranus and the other major planets (Invited) (PA.05).
Y.V. Somayajulu. B.C.N. Rao: On the importance of electrodynamics in the ionospheres of Earth, Jupiter and Saturn: A comparative study (PA.06).
T.E. Cravens, H. Shinagawa, A.F. Nagy, J.G. Luhmann, C.T. Russell, R.C. Elphic, L.H. Brace: Theoretical models of the ionospheres of Venus, Mars, and comets; Implications for the solar wind-ionosphere interaction (PA.07).
M.I. Vergin, K.I. Gringauz, N.F. Ness: Comparison of induced magnetospheres at Venus and Titan (summary presented by T. Gombosi) (PA.08).
J.G. Luhmann, C.T. Russell: The magnetization of the ionospheres of planets and satellites without intrinsic fields (PA.09).
M.K. Wallis, A.D. Johnstone: Ion dynamics in draped magnetic field (PA.10).
M.L. Kaiser: Non-thermal radio emissions from the planets (Invited) (PA.11).
H.O. Rucker, M.D. Desch: External control of planetary radio emission (PA.12).
D. Jones: Plasma distribution in Saturn's magnetosphere as deduced from Saturnian myriametric radiation (PA.13).
A.J. Dessler (presented by T.W. Hill): Magnetospheric power sources (Invited) (PA.14).
R.D. Zwickl, D.N. Baker: A comparison of energetic particle phenomena observed in the upstream regions of Jupiter and Earth (PA.15).
L.J. Lanzerotti, C.G. Maclennan, R.P. Lepping: Comparative planetary magnetopauses: Jupiter and Saturn (PA.16).
G.-H. Voigt: Analogies between Earth's and Uranus' magnetospheric equilibrium configurations (PA.17).
V.M. Vasyliunas: Electric fields and current systems in planetary magnetospheres (Invited) (PA.18).
V.M. Vasyliunas: Magnetic field line merging processes in the magnetospheres of Earth, Jupiter, and Saturn (PA.19).
R.J. Walker, C.T. Russell: Dayside reconnection at Jupiter and the Earth (PA.20).
J. Berchem, C.T. Russell: Flux transfer events at the Earth and Jupiter (PA.21).
A. Nishida: Magnetic reconnection in the Jovian magnetodisc and in the Earth's magnetotail (PA.22).
L.A. Reinleitner, W.S. Kurth, D.A. Gurnett: Whistler mode induced electrostatic bursts in three magnetospheres (PA.23).
U.S. Inan, R.A. Helliwell, W.S. Kurth: Terrestrial and Jovian chorus: A comparative study of wave-particle interactions (PA.24).
R.M. Thorne: Excitation of ion-cyclotron waves in multi-ionic magnetospheres (PA.25).

This symposium seems to have achieved the primary purpose of fostering comparative magnetospheric and aeronomic studies involving more than one planet. It had the secondary beneficial effect of exposing areas of overlapping interest between aeronomic and magnetospheric studies of a given planet or group of planets.

Six papers were devoted primarily to aeronomic topics. The role of charge-exchange chemistry was emphasized insofar as it affects the loss of atomic hydrogen from the exospheres of Earth and Venus and of protons from the topside ionospheres of Jupiter and Saturn. Precipitation of magnetospheric electrons is evidently responsible for elevated thermospheric and exospheric temperatures at Jupiter and Saturn, although the role of thermospheric winds in spreading the auroral energy to low latitudes remains unresolved.

Four papers dealt with the interaction of flowing plasmas with the atmospheres of unmagnetized obstacles. The solar-wind interaction with Venus, for which extensive in situ data exist, serves as a conceptual model for comets,

for which no such data exist, and for Mars, for which data are relatively scarce and difficult to interpret. The satellites Io and Titan exhibit analogous interactions, albeit with sub-magnetoacoustic magnetospheric plasmas rather than with the super-magnetoacoustic solar wind.

The remaining fifteen papers dealt with intrinsic magnetospheres. The magnetosphere of Mercury was not discussed beyond the observation that it is barely larger than the planet, and hence under-developed, and has, in any case, only been summarily observed. This leaves the magnetophseres of Earth, Jupiter, and Saturn, which have been observed both remotely and in situ albeit to widely varying extents, and that of Uranus, whose existence has been inferred from remote observation of its ultraviolet emissions.

It is recognized that Jupiter's magnetosphere differs fundamentally from Earth's in having predominantly internal sources of energy (derived from planetary rotation) and of plasma (derived from the satellite Io). Saturn's magnetosphere is widely considered to be intermediate in this respect. Despite this fundamental difference in plasma and energy sources and in the resultant large-scale dynamics, the various magnetospheres evidently share many local plasma processes in common, including superthermal radio emissions, upstream particles and waves, magnetic field merging, auroral emissions, and resonant wave-particle interactions. The symposium provided ample evidence that the study of these phenomena in Earth's magnetosphere aids their understanding in other magnetospheres, and vice-versa.

(T.W. Hill)

PP. ROLE OF IONOSPHERIC PLASMA IN THE PLASMASPHERE AND MAGNETOSPHERE (Conveners: D.T. Young, C.R. Chappell)

August 17, a.m. and p.m. Room: D2101

J.J. Sojka, R.W. Schunk: Pertinent characteristics of the topside ionosphere in its role as a source of magnetospheric plasma (PP.01).

P.G. Richards, D.G. Torr, R.W. Schunk: The applicability of the low speed formulation to the refilling of magnetic flux tubes (PP.02).

A. Best, C.-U. Wagner, H.-R. Lehmann: Storm-time variations of the charactristics of the thermal electron gas in the trough region and medium latitudes (PP.03).

Ch. Farrugia, J. Geiss, H. Balsiger, D.T. Young: Studies on the plasmaspheric thermal population from the ion composition experiment on GEOS-1 (PP.04).

H.J. Hansen, M.W.J. Scourfield, J.P.S. Rash: Whistler duct lifetimes (PP.05).

T.E. Moore: Polar wind and ion acceleration (Invited) (PP.06).

M. Lockwood: Field-aligned O^+ ion flows in the topside high-latitude ionosphere during geomagnetic storms (PP.07).

J.B. Cladis, W.E. Francis: Transport of ions from the auroral ionosphere to the inner magnetosphere during stormtime conditions (PP.08).

R.G. Johnson, H.L. Collin: Mass dependent features in high latitude ion conics (PP.09).

T.W. Hill, P.H. Reiff: The heavy-ion polar wind (PP.10).
D.N. Baker, E.W. Hones, Jr., D.T. Young, J. Birn: The possible role of ionospheric oxygen in the initiation and location of plasma sheet instabilities (PP.11).
F.M. Ipavich, G. Cloeckler, A.B. Galvin, D. Hovestadt, M. Scholer, B. Klecker: Energetic (> 100 keV) O^+ ions in the Earth's plasma sheet (PP.12).
R.A. Wolf: Convective transport of plasmasphere ions (Invited) (PP.13).
Y. Corcuff, P. Corcuff, J. Lemaire: Dynamical plasmapause positions during the magnetic storm of July 29, 1977: A comparison of observations and time-dependent model calculations (PP.14).
A. Roux: Acceleration of ionospheric ions and electrons via low frequency turbulence (Invited) (PP.15).
B.J. Fraser, R.L. McPherron: Heavy ion concentrations at synchronous orbit determined from Pc 1-2 pulsation wave spectra (PP.16).
J. Büchner, C.-U. Wagner: Influence of thermal heavy ions on the generation of ion-cyclotron waves in the ring current - plasmasphere overlapping region (PP.17).
C. de Villedary, A. Roux: Amplification of ion cyclotron waves in a He^+-rich plasma: convective and absolute instability calculations (PP.18).

The papers submitted to this session dealt with several aspects of ionospheric plasma at very high altitudes, including transport from the ionosphere, effects on the ionosphere, transport at high altitude, effects on the magnetosphere, and acceleration of ionospheric ions to very high energies. Both direct ion heating and ion acceleration via electron heating were advocated as mechanisms for enhancing the outflow of ionospheric heavy ions. Several interesting effects were shown to result from the presence of heavy ions in the magnetospheric plasma, including plasma wave growth and dispersion modifications. In several cases, publications based on these papers have subsequently appeared in the space plasma physics literature.

(T. Moore)

3H. THEORY AND MODELLING OF HYDROMAGNETIC WAVES (Convener: A.D.M. Walker)

August 22, a.m. Room: D02

Chairman: B.J. Fraser

A.D.M. Walker: Opening Remarks
K. Takahashi, R.L. McPherron: Standing hydromagnetic waves in the magnetosphere (Invited review) (3H.01).
Z.-Y. Pu, M.G. Kivelson: The Kelvin-Helmholtz instability as a source of hydromagnetic waves in the magnetosphere (Invited review) (3H.02).
C.K. Goertz: Kinetic Alfvén waves in the magnetosphere (Invited review) (3H.03).

August 22, p.m. Room: D02

Chairmen: O.M. Raspopov, H.J. Singer

T. Tamao: Interaction of energetic particles with hydromagnetic waves : A Review (Invited) (3H.04).
A. Korth: Wave-particle interaction in the ULF range observed onboard GEOS 1 and 2 (Invited review) (3H.05).
W. Baumjohann, K.H. Glassmeier: The transient response mechanism and Pi 2 pulsations at substorm onset (Invited review) (3H.06).
W.J. Hughes: Review of the posters (Invited) (3H.07).

Poster Papers Room: D03

O.H. Bauer, H. Junginger, G. Haerendel, F. Melzner, A. Roux, S. Perrault: Comparison of ULF-wave parameters measured with the electron beam experiment and the magnetic ULF experiment on GEOS-2 (3H.08).
T. Nagata, H. Fukunishi: Dynamic spectral structures of Pc 3-5 pulsations observed at high latitude (3H.10).
L,J. Lanzerotti, C.G. Maclennan, A. Meloni, A. Wolfe, J. Bamber, D. Venkatesan: Variations in hydromagnetic wave frequencies at low geomagnetic latitudes (3H.11).
J. Taylor, A.D.M. Wlker: Standing hydromagnetic waves (3H.12).
B.J. Fraser, I.A. Ansari: Spatial characteristics of low latitude pc 3 geomagnetic pulsations (3H.15).
D.P. Smits: Pulsations at low latitudes (3H.16).
K. Takahashi, R.L. McPherron: Multiple spacecraft observations of the harmonic structure of Pc 3-4 pulsations (3H.17).
H. Gough, O. Hillebrand, R.L. McPherron: A Pc 4 pulsation observed over a large longitudinal separation on the ground and in space (3H.18).
W.J. Hughes, R.A. Daly: Modification of the plasmapause boundary by hydromagnetic waves (3H.20).
L.J. Lanzerotti, C.G. Maclennan, T.J. Rosenberg, A. Wolfe: Plasmasphere density structure deduced from a hydromagnetic field line resonance and particle modulation event (3H.21).
D. Orr: Surface waves at the plasmapause (3H.22).
O. Saka, M. Itonaga, T. Kitamura: Effects of ionosphere non-uniformity on polarization of low latitude micropulsations (3H.23).
T. Tamao, S. Fujita: Effects of the anisotropic conducting ionosphere on localized HM-waves in the magnetosphere (3H.24).
H. Gough, D. Orr: The effect of ionospheric damping on the latitudinal variation of geomagnetic pulsation phase for 1st and 2nd harmonic field line resonances (3H.25).
K.H. Glassmeier: On the influence of non-uniform ionospheric conductivity distributions on the propagation of MHD waves in the Pc 4-5 range (3H.26).
C. Lathuillere, F. Glangeaud, M. Lambert: Magnetic pulsations correlation between ground and ionosphere with EISCAT system (3H.27).
M.G. Kivelson, D.J. Southwood: Generation mechanisms for long-period compressional waves on the dayside magnetosphere: Case studies (3H.29).
V.L. Patel, P.H. Ng: Drift-wave model for geomagnetic pulsations in a high-β plasma (3H.30).
A.D.M. Walker : Compressional waves in the magnetosphere (3H.31).
L.J. Lanzerotti, L.V. Medford, A. Hasegawa, D.L. Lin: Large-amplitude ion bounce wave in the magnetosphere near L=3 (3H.32).

J.G. Luhmann, C.T. Russell, M. Tatrallyay, D. Winterhalter: Convected magnetosheath turbulence as a source of hydromagnetic waves: Models versus observations (3H.33).

G. Rostoker, J.C. Samson: A causal relationship between Pc 5 pulsations and magnetospheric substorms (3H.34).

W. Seboldt: Non-local analysis of low-frequency-wave in the plasma sheet (3H.35).

A. Wolfe, A. Meloni, L.J. Lanzerotti, C.G. Mclennan: Dependence of hydromagnetic energy spectra near L=2 and L=3 on upstream solar wind quantities (3H.35a).

L.J. Lanzerotti, T.J. Rosenberg: Impulsive particle precipitation and concurrent magnetic field changes observed in conjugate areas near L=4 (3H.36).

T. Bösinger, U. Wedeken: Comparison of PilB-type magnetic pulsations simultaneously observed at high- and mid-latitudes (3H.37).

M. Kuwashima: Wave characteristics of Pi2 - Observation and theoretical interpretation (3H.38).

J.C. Samson: Large scale ground-based studies of the polarization-states of Pi2's (3H.39).

H.J. Singer, W.J. Hughes, P. Fougere, D. Knecht: Global observations of Pi 2 pulsations (3H.40).

W.J. Hughes, H.J. Singer, M. Lester: Pi 2 pulsations and the substorm current system (3H.41).

M. Kuwashima, S. Tsunomura, H. Fukunishi: SSC associated hydromagnetic variations at the geosynchronous altitude and on the ground (3H.42).

N. Maltseva, V. Troitskaya, L. Afanasieva, H. Ranta, A. Ranta, J. Kangas, T. Pikkarainen: Radial movement of the source region of IPDP and riometric absorption bays (3H.43).

M. Kuwashima, T. Toya, M. Kawamura, H. Fukunishi: Propagation and generation mechanisms of the periodic emission (Pc 1) (3H.44).

B.J. Fraser, R.L. McPherron: Heavy ion concentrations at synchronous orbit determined from Pc 1-2 pulsation wave spectra (3H.45).

N. Cornilleau, M. Tixier: Relations between ULF and VLF waves recorded aboard GEOS 1 and on the ground at L=6. Experimental results (3H.46).

W.J. Kemp, B.J. Fraser: Pc1 pulsation ionospheric source regions and elliptical wave front determination (3H.R2).

This session was planned with its focus on the latest advances in the understanding of the hydromagnetic waves associated with magnetospheric ULF pulsations. The session was well attended by about 100 participants. The poster format for the contributed papers was successful, provoking prolonged and enthusiastic discussion.

The framework for the symposium were provided by the reviews. The authors who presented them were (3H01) K. Takahashi, (3H02) M.G. Kivelson, (3H03) C.K. Goertz, (3H04) T. Tamao, (3H05) A. Korth, and (3H06) W. Baumjohann.

The major results brought out by the posters were surveyed by W.J. Hughes (3H07).

The editor of Planetary and Space Science agreed to publish the invited review papers subject to the usual refereeing process; they appeared in PSS, 32, 1333-1406 (1984).

(A.D.M. Walker)

G3. GENERAL CONTRIBUTIONS TO DIVISION III ON MAGNETOSPHERIC PHENOMENA (Convener: A. Nishida)

August 17, p.m. Room: D02

Chairmen: A. Nishida, S.W.H. Cowley

V.N. Lutsenko, S. Fischer, K. Kudela: The directionality of protons ($E_p \geq 12$ keV) in the low latitude magnetosheath (G3.01).

D.J. Southwood, M.A. Saunders, R.P. Rijnbeek, S.W.H. Cowley, C.T. Russell: Studies of magnetic flux transfer events at the earth's dayside magnetopause (G3.02).

G. Paschmann, I Papamastorakis, N. Sckopke, B.U.Ö. Sonnerup, S.J. Bame, C.T. Russell: Energy balance during magnetopause reconnection (G3.03).

S.W.H. Cowley, D.J. Southwood, M.A. Saunders: Interpretation of magnetic field perturbations in the earth's magnetopause boundary layers (G3.04).

J.G. Luhmann, R.J. Walker, C.T. Russell, N.U. Crooker, J.R. Spreiter, S.S. Stahara: Reconnection patterns on the magnetopause (G3.05).

R. Lundin, E. Dubinin: Solar wind energy transfer regions inside the dayside magnetopause (G3.06).

M. Hoshino, A. Nishida: Numerical simulation of dayside reconnection (G3.07).

V.S. Semenov, I.V. Kubyshkin, M.F. Heyn: Asymptotic theory of the magnetic field line reconnection (G3.08).

N. Cornilleau-Wehrilin, J. Etcheto: E/VLF waves at the magnetopause (G3.09).

B.T. Tsurutani, E.J. Smith, R.R. Anderson, R.M. Thorne: Near-magnetopause plasma waves and consequential wave-particle interactions (G3.10).

W. Stüdemann, B. Wilken, D.N. Baker, P.R. Higbie, R.D. Belian, T.A. Fritz: The solar flare event of 13 July 1982: detailed multispacecraft energetic particle and magnetic field measurements of the compressed magnetopause at 6.6 R_E (G3.11).

R. Lundin, E. Dubinin: Accelerated plasmaspheric ions as tracers for MHD-processes in the dayside boundary layer (G3.R1).

L.F. Bargatze, D.N. Baker, R.L. McPherron, E.W. Hones, Jr.: Magnetospheric impulse response for many levels of geomagnetic activity (G3.13).

A. Munk, S. Vennerstrøm, E. Friis-Christensen: Intensity and latitude of polar cap currents and the response to variations in the IMF and in AE (G3.14).

E. Friis-Christensen, Y. Kamide, A.D. Richmond, S. Matsushita: Interplanetary magnetic field control of high-latitude electric fields and currents determined from Greenland magnetometer data (G3.15).

V.O. Papitashvili, A.N. Zaitzev: Geomagnetic variations and field-aligned currents at southern polar cap and their relation to the interplanetary magnetic field (G3.16).

M. Candidi, C.-I. Meng: Magnetospheric cusp electrons and solar wind parameters (G3.17).

P. Ochabová: Supply of energy to the magnetosphere during the main phase of magnetic storms (G3.19).

S. Minami, S. Tsutsumi: Coupling of the interplanetary magnetic field into the simulated magnetosphere (G3.20).

August 19, a.m. Room: D02

Chairmen: D.N. Baker, C.-I. Meng

B. Aparicio, R. Lundin: The ring current ion composition: A synoptic study based on Prognoz-7 ion density ratios (G3.21).

J.B. Blake, J.F. Fennell, D.N. Baker, R.D. Belian, P.R. Higbie: Determination of the charge state and composition of energetic magnetospheric ions by observation of drift echoes (G3.22).

E. Ungstrup, R.D. Sharp, C.A. Cattell, R.R. Anderson, R.J. Fitzenreiter, D.S. Evans, D.N. Baker: Particle and wave observations at a discontinuity in the magnetosphere associated with a westward travelling surge (G3.23).

S. Perraut, A. Roux, P. Robert, G. Kremser, A. Korth, A. Pedersen: Relationships between localized field-aligned current structures, electric field spikes and energetic particle boundaries at the geostationary orbit (G3.24).

C.-I. Meng, B.H. Mauk: Quiet-time, geostationary spatial boundaries as a manifestation of dynamical injection (G3.25).

S.N. Kuznetsov, I. Kimák, K. Kudela: The effect of geomagnetic storm on trapped protons $E_p>1$ MeV at low altitudes (G3.27).

V.M. Vasyliunas: Topology of electric currents in the magnetosphere (G3.28).

K.D. Cole: Meridional ionospheric electric field caused by curvature current in the magnetosphere (G3.29).

K.A. Pfitzer, W.P. Olson: Quantitative modeling of induced magnetospheric electric fields and plasma response (G3.30).

A.R.W. Hughes: The temperature of plasmasphere (G3.31).

P.W. Daly, T.R. Sanderson, K.-P. Wenzel: Observations of the plasma sheet with the low energy (>35 keV) proton experiment on ISEE-3 (G3.32).

E. Möbius, M. Scholer, D. Hovestadt, G. Paschmann, G. Gloeckler: Energetic particles in the vicinity of a possible neutral line in the plasma sheet (G3.33).

J. Etcheto, A. Saint-Marc: Evidence for the presence of cold plasma in the plasma sheet boundary layer (G3.34).

D.N. Baker, S.J. Bame, R.D. Belian, W.C. Feldman, J.T. Cosling, P.R. Higbie, E.W. Hones, Jr., D.J. McComas, R.D. Zwickl: Substorm dynamical effects in the earth's magnetotail: Correlations of observations at $r=6.6\ R_E$ and $r\gtrsim 70\ R_E$ (G3.35).

L.A. Frank, J.D. Craven, J.L. Burch, J.D. Winningham: Properties of theta auroras and implications for magnetotail dynamics (G3.36).

J. Chen, P. Palmadesso: Tearing-mode stability properties of a collisionless anisotropic plasma layer (G3.37).

V.S. Semenov, I.V. Kubyshkin, M.F. Heyn, H. Biernat: Time-dependent field line reconnection (G3.38).

August 19, p.m. Room: D02

Chairmen: L.R. Lyons, J. Etcheto

L.H. Brace, S.A. Curtis, R.C. Elphic, C.T. Russell: The wavelike structure of the ionosphere and magnetic fields in the low altitude post terminator ionosphere of Venus (G3.40).

S. Grzędzielski, W. Macek, J. Ziemkiewicz: A model of the long Jovian magnetospheric tail based on Voyager observations (G3.41).

S.M. Krimigis, B.H. Mauk: Diamagnetic effects of energetic oxygen ions in Saturn's magnetosphere (G3.42).

G.-H. Voigt: Does Uranus' rotation affect its magnetosphere? (G3.43).

U. Samir, N.H. Stone: The expansion of ionospheric, magnetospheric and solar wind plasmas into a vacuum (G3.44).

W.P. Olson, K.A. Pfitzer: Low energy particle entry into a magnetically closed magnetosphere (G3.45).

P.B. Dusenbery, L.R. Lyons: Theory of harmonic auroral kilometric radiation (G3.46).

L.R. Lyons, P.B. Dusenbery: A simple expression for kilometric radiation frowth rates (G3.47).

P.J. Christiansen, J. Etcheto, M.P. Gough, K. Rönnmark: Can non-linear coalescence processes generate the observed magnetosphere electromagnetic radiation? (G3.48).

J.P. Matthews: A theory of diffuse emissions triggered by coherent VLF signals propagating parallel to the geomagnetic field (G3.49).

J. Solomon: Theoretical equilibrium differential flux of the energetic electrons in the presence of ELF waves (G3.50).

M.P. Gough, P.J. Christiansen: Non-linear wave-wave interactions observed by GEOS: Natural and stimulated (G3.51).

P. Canu, G. Belmont: Electrostatic waves detected on board GEOS 2: Effect of multitemperature "cold" plasma (G3.52).

F. Lefeuvre, M. Parrot, D. Jones: The cross-spectral phase signature of banded VLF chorus observed on spacecraft (G3.53).

U.S. Inan, R.A. Helliwell: Dynamics explorer observations of waves in the vicinity of the plasmapause (G3.54).

D. Jones, A.J. Smith, D.A. Carpenter, S.D. Shawhan: Whistler mode wave propagation in the magnetosphere near L=4 (G3.55).

S.R. Church, R.M. Thorne: On the origin of plasmaspheric hiss: Ray path integrated amplification (G3.56).

D. Jones, A.J. Smith, K. Yearby: The cross-spectral phase of VLF signals recorded at Halley, Antarctica (G3.R7).

Poster Displays Room: D03

T. Bösinger, S. Juntunen: The properties of vortex structures in the ionospheric differential equivalent current fields derived from a ring current model (G3.57).

C.-I. Meng, K. Makita: Configuration of the auroral oval of the quiescent magnetosphere (G3.64).

F.R. Harris, F. Creutzberg, R.L. Gattinger, A. Vallance Jones: Detailed morphology and particle energies in substorm surges and expansive phases (G3.65).

W.L. Imhof, J.B. Reagan, H.D. Voss, E.E. Gaines, J. Mobilia: Coordinated satellite measurements of particle precipitation during the storm of July 13, 1982 (G3.67).

P. Tanskanen, J. Kangas, J. Bjordal, K. Brønstad, J. Stadsnes, S. Ullaland, A.Korth, G. Kremser, W. Riedler, K. Torkar, I.B. Iversen, M.M. Madsen, L.P. Block: Observations of particles and fields during the period preceding the auroral breakup (G3.68).

K.M. Torkar, J. Bjordal, L.P. Block, K. Brønstad, I.B. Iversen, J. Kangas, A. Korth, G. Kremser, M.M. Madsen, J. Niskanen, W. Riedler, P. Tanskanen, S. Ullaland: Simultaneous balloon and satellite measurements of X-ray precipitation and equatorial electrons in the morning sector (G3.69).

G. Kremser, A. Korth, S. Ullaland, J. Stadsnes, W. Baumjohann, L. Block, K.M. Torkar, W. Riedler, B. Aparicio, J. Niskanen, I.B. Iversen: Energetic electron precipitation mechanisms inferred from coordinated balloon-satellite observations (G3.70).

J.R. Dudeney, T.J. Rosenberg: A ground-based technique for estimating the pitch angle diffusion coefficient (G3.72).

N.G. Kleimenova, V.A. Troitskaya, O.V. Bolshakova, E. Friis-Christensen: Long period geomagnetic pulsations near equatorial border of dayside polar cusp (G3.75).

K. Hayashi, S. Kokubun, T. Oguti, T. Kitamura, O. Saka, T. Watanabe: Substorm associated Pc 1 emission in morning sub-cleft latitudes (G3.76).

T. Oguti, J.H. Meek, K. Hayashi: Multiple correlation between auroral and magnetic pulsations (G3.77).
T. Nagata, N. Sato: Short-period magnetic pulsations associated with periodic VLF emissions (T $\sim$ 5.6 sec) (G3.78)
N. Cornilleau, M. Tixier: Relations between ULF and VLF waves recorded aboard GEOS 1 and on the ground at L=6. Experimental results (G3.79).
O.M. Raspopov, A.B. Pashin: On the influence of movement of the source on geomagnetic pulsation characteristics observed on the ground (G3.81).
D. Orr, J.A. Waldock: Pc 5 geomagnetic pulsations correlation with the plasmapause (G3.82).

The G3 session was divided into six oral sessions and one poster session. Altogether as many as 90 papers were scheduled. This number clearly reflected the high level of activity in the field of magnetospheric physics, and a need to allocate more time to G3 was acutely felt.

Magnetosphere Boundary Region : All the papers presented in this subsession were concerned with the effect of the southward IMF polarity on the structure of the magnetopshere boundary region. Features observed by both field and particle measurements are generally accountable by the reconnection model. It was confirmed that the flux transfer events are observed only when the IMF polarity was southward, and thus their interpretation in terms of the transient reconnection received essential support. Attempts to improve the Levy-Petschek-Siscoe model of the dayside reconnection by incorporating the compressibility were made both analytically and numerically. (A. Nishida)

Solar Wind Magnetosphere Interactions : At this session eleven papers were presented on various aspects of solar wind interaction with the Earth's magnetosphere. Four papers continued the discussion of the first session on the dayside magnetopause boundary region. GEOS and ISEE wave data were discussed by Cornilleau-Wehrlin and Etcheto, and Tsurutani et al., respectively. It was shown in the latter work that the average wave spectrum is independent of location at the magnetopause on the ISEE orbit, but depends on IMF B_z, being stronger for southward fields. Lulndin and Dubinin using Prognoz data showed that accelerated ionospheric ion species in the magnetopause boundary layer have thermal velocities equal to their drift speed. Studemann et al. discussed the magnetopause compression observed by several geostationary spececraft on 13 July 1982.

Two papers were presented on the relationship between geomagnetic disturbances and solar wind-IMF conditions. Ochabova investigated the energy input to the ring current during the main phase of storms, while Bargata et al. considered the response of the AL index to two interplanetary parameters, vB_s and ε, dividing the AL data into two groups according to the mean level of activity. For the lower level it was found that the AL response has peaks at $\sim$20 and $\sim$60 min delay, while at the higher level the response is broad but has only one peak at $\sim$20 min. It was suggested that the latter corresponds to the 'directly driven' magnetospheric response, while the $\sim$60 min peak corresponds to substorm 'unloading' of magnetic energy in the tail.

Papitashvili and Zaitzev, Munk et al. and Friis-Christensen et al. presented papers on ionospheric currents deduced from ground magnetograms. The first of these paper presented a first extensive analysis of high latitude data from the southern hemisphere, while the other two focussed Oparticularly on IMF B_y-dependent dayside currents. It was shown that the latter do not depend strongly on IMF B_z. However, a related paper by Candidi et al. showed that electrons precipitate in the cusp region are enhances when B_z is negative.

Finally, Minami and Tsutsumi discussed an investigation of the magnetic field in a laboratory terella experiment, using a small plasma discharge source to trace the field lines. (S.W.H. Cowley)

Middle Magnetosphere : This session consisted of a mixture of observational and theoretical papers generally dealing with the region from the outer part of the earth's plasmasphere into the near-earth portion of the plasma sheet. Of eleven scheduled contributed papers, effectively all of the talks were given. One of the scheduled speakers was not present and thus the paper G3.26 was combined with the preceding paper to form a single ∿20 min contribution.

Several contributions dealt with the topic of the ring current, its composition, and the nature of the impulsive injection of the particles which form the middle magnetosphere ion population. Direct observational results from PROGNOZ-7, for example, were cited to show an asymmetric occurrence of the dominance of ionospheric ions (O^+, He^+), in the few keV energy range, essentially out to the magnetopause on the dayside. By way of contrast, very high energy results from SCATHA and several other geostationary orbit spacecraft reveal that the energetic heavy ions are primarily of high charge state suggestive of a solar wind source.

Upflowing ions from the ionosphere, directly associated (for perhaps the first time) with a globally-observed westward traveling surge, show quite clearly how the strong density gradients (discontinuities) associated with the WTS can accelerate ions very strongly and directly (i.e., with short time delay). Considerable observational evidence was presented in several papers concerning the wave and plasma characteristics at geostationary orbit near magnetospheric substorm injection boundaries. Geomagnetic storm particle effects at high-energies seen by instruments on the Intercosmos satellite at low altitude were also described.

Theoretical discussions of electric field distributions and large-scale magnetospheric currents were given from several points of view. These problems were treated both by fundamental analytical work and by the use of computer models. The implications of these field-aligned current and induced electric field results in terms of observable magnetic signatures were predicted and directly compared. (D.N. Baker)

Magnetotail : There were eight papers scheduled for this session with another three papers on reserve. Due to the overrun of the middle magnetosphere contributions, our session started late by about 15 minutes. The number of attendances varied drastically from about 150 people to less than 20. It peaked in the middel of the session near 1200 noon and decreased to the minumum during the last two talks. In order to keep the session on schedule, the assigned 12-minutes per talk was closely observed. However, one speaker with slides and a movie overran by nearly 10 minutes and ignored the repeated warnings from the chairman. This talk was well attended and clearly let the speaker finish his presentation without a follow-on discussion. One scheduled paper (G3.39 by Yahnin et al.) did not show up in the meeting. The first reserved paper (G3.R4) was called to fill up the slot, but the speaker was absent. I decided to adjourn the meeting instead of calling other reserved papers (my own) based on two reasons: (1) it was one o'clock in the afternoon and 10 minutes past the allowed time, and (2) the number of attendees dropped to a very low level of barely over 10.

In this session, it is clear that theoretical-type papers do no draw too many audiences. Possibly it is very difficult for the speaker to convey details of a theory or a mathematical model in a 10 minutes presentation. For the audience, it is equally difficult to comprehend within a short presentation in a series of others. Therefore the interest, based on the number of attendees, to theoretical type of papers was not overwhelming in many IAGA sessions. In order to improve this situation, I would like to suggest that these papers are ideal for a poster session since the readers can digest the material at their own pace and more communications can be achieved between presenter and presentee. This will also relieve some of the problems on overflow of Division III contributed papers. Form the variation of the audience in this session and others,

it is obvious to me that only new observation type papers can draw many people.

In this session, the most popular papers were two new observations, on the distant tail substorm dynamics and a movie of auroral dynamics observed by the DE satellite. Both of them are rather unique in terms of observation; however, in terms of science or physics their contributions and/or interpretation are questionable. By arranging both of them in the middle of the session, it did have a large audience. However, it had a quantum drop immediately afterwards, and a large outflow of people somewhat interrupted the progress of the session and was embarrassing to the next speaker.

Overall, this session was a well-organized one, like the other Division III sessions. (C.-I. Meng)

Planetary Magnetospheres : This waa a short, but highly varied session. Six talks were presented, five concerning five different planets covering general solar system plasmas. One talk covered observation of wavelike structure in the ionospheric plasma and magnetic field of Venus. A model of the Jovian magnetosphere was presented and its predictions were directly compared with spacecraft observations. Observations within Saturn's magnetosphere were interpreted as showing a significant diamagnetic effect from energetic oxygen ions. Possible effects of Uranus' rotation on its magnetosphere and current system were discussed, and calculations showing that low-energy plasma can penetrate a magnetically closed magnetosphere were presented for the case of the earth. Also, a general evaluation of plasma expansion into a vacuum as appled to the wave behind moving spacecraft was discussed. (L.R. Lyons)

Wave-particle interactions : The first remark I wish to make about this session is that twelve minutes, including discussion, is not enough for the speakers to present properly a paper, especially if it corresponds to a fair amount of work - therefore it would be disirable to lengthen the time allocated at least to some of the speakers. It would also help the audience listening to the papers which has to switch subject every twelve minutes and assimilate a very dense information. This could be achieved by decreasing the length or the number of specialized symposia and keep more time of the general contributions, which can be organized in subject oriented sessions after receiving the abstracts. Magnetospheric physics is a field very alive at the moment and it is difficult to foresee long in advance which subjects will arouse much interest. Another solution, would be to select the papers, but it would probably be difficult in practice.

All the papers foreseen in this session have been presented and the session was very intersting. Whistler mode waves are subject to several studies from various points of view: - propagation, using sophisticated data analysis method of satellite data, either natural or man made. These studies answered some questions (Landau damping of VLF chorus at $f_{ce}/2$) and raised others (low index of man made emission). - generation: in which a very interesting study of spatial growth has been presented
-quasilinear particle diffusion: elaborated computations and detailed comparisons between theory and experiment were shown.

Woing to these very careful and detailed studies, the physics of whistler mode waves in the magnetosphere is now well understood.

Conversely, the electrostatic waves' characteristics are far from being understood and it has been shown that one has to use the dispersion relation in a non-Maxwellian plasma for any study of these waves.

The generation mechanism of TKR emissions is still under investigation, only the synchrotron maser mechanism has been presented.

At last there have been presentations about the possibility of non linear wave-wave interactions: parametric instability of man-made signals, non-linear coalescence of natural noise at the upper and lower hybrid frequency.

Scientists are still very active in the field of wave-particle interactions and the level of the works presented was high. The new generation of sophisticated experiment and refined theory has renewed the interest for this field and has enabled scientists to go one step further in the understanding of the physics of these phenomena. (J.M. Etcheto).

Auroral Phenomena and pulsations : As many as 27 papers that dealt with the above subject were directed to the poster session of Gs, but 15 among them were actually presented. Since the number of the papers were so large we can report only some highlights. A comparison of the satellite observation of energetic electrons ($\gtrsim$20 keV) with the precipitation revealed that the duration of a precipitation event is intimately related to the fall-off the electron pitch angle anisotropy at high altitudes to the stable trapping limit. At lower energies the electron anisotropy was below the stable trapping limit from the beginning of the flux enhancement, suggesting that low and high energy electron populations have different origins. A clear correspondence was detected between QP emission at the near-geosynchronous altitude and on the ground. Spectral range and dispersion were very similar at these two sites, presenting an intriguing theoretical question on the mechanism of the QP emission. Extensive observations of the auroral X-rays confirmed that precipitation is enhanced before the onset of the substorm expansion phase. Westward drift of electrons has to be assumed to explain the sequence of observations, but the precipitation may in fact have been patchy. From a comparison of the auroral X-ray intensity at two locations having the same L value but different magnetic field strengths, a pitch angle diffusion coefficient was derived which agree fairly well with the other estimates. New types of pulsations were detected at the equatorial border of the polar cusp both in long period ($T \sim 4$ to 8 min) and short period (0.8 Hz) ranges. Clear correlation was found between auroral luminosity pulsations and magnetic pulsations within a 1 sec accuracy, and hence it was inferred that these magnetic pulsations are mostly the results of conductivity variations produced by precipitating electrons. (A Nishida)

4L. LARGE-SCALE SOLAR-INTERPLANETARY RELATIONS (Conveners: R. Schwenn, N.R. Sheeley)

August 19, a.m. Room: D2101

Chairman: R. Schwenn

S.T. Suess, M. Dryer, J.M. Wilcox, T. Hoeksema, H. Henning: Boundary conditions for a predictive numerical model of the large scale structure in the interplanetary medium (4L.01).

M.K. Bird, H. Volland, B.L. Seidel, C.T. Stelzried: Solar cycle variation of coronal Farady rotation (4L.03).

G. Noci, A. Porri: Models of the solar wind acceleration region (4L.04).

G.E. Brueckner: Observations of high energetic jets in the quiet sun, the acceleration of the solar wind at the solar surface and a could model of the solar wind (4L.05).

F.M. Ipavich, A.B. Galvin, G. Cloeckler, D. Hovestadt, M. Scholer, B. Klecker: Solar wind Fe charge states in a coronal hole-associated high spped stream (4L.06).

A.B. Galvin, F.M. Ipavich, G. Gloeckler, D. Hovestadt, B. Klecker, M. Scholer: Coronal equilibrium temperatures inferred from the charge state analysis of energetic particles (4L.07).

B. Rompolt: Eruption of huge magnetic systems from the sun (4L.08).

R. Woo, J.W. Armstrong, N.R. Sheeley, Jr., R.A. Howard, M.J. Koomen, D.J. Michels: Radio scattering measurements of interplanetary transients (4L.09).

D.F. Smart, M.A. Shea, M. Dryer: Solar flare initiated shock waves; blast waves riding on the solar wind (4L.14).

H. Goldstein, R. Schwenn, K.U. Denskat: Helios observations of magnetic clouds (4L.15).

R.G. Marsden, T.R. Sanderson, R. Reinhard, K.-P. Wenzel: A survey of ISEE-3 observations of low energy proton bidirectional anisotropies (4L.16).

J.A. Joselyn: The association between solar disparition brusques and geomagnetic activity (4L.17).

August 19, p.m. Room: D2101

Chairman: N.R. Sheeley, Jr.

A.J. Lazarus, P.R. Gazis: The radial evolution of the solar wind, 1-10 AU (4L.19).

J. Feynman, K.G. Narayana, A. Barnes: Comment on observations of solar wind heating by interstellar hydrogen (4L.20).

S. Grzędzielski, Ratkiewicz-Landowska: Plasma mixing at the heliosphere boundary due to Rayleigh-Taylor and Kelvin-Helmholtz Instabilities (4L.21).

H.J. Fahr, W. Neutsch: Plasma flow configurations in the outer heliosphere and the heliopause geometry (4L.22).

J.L. Bertaux, A. Callement, V.G. Kurt, E.N. Mironova: Solar wind anisotropy observed with Prognoz satellite by its ionization of interplanetary -interstellar neutral hydrogen (4L.22a).

L.F. Burlaga: Magnetic fields between 1 AU and 10 AU (4L.25).

P. Simon, J.P. Legrand: Solar cycle, shock waves, stable and transitory wind streams, from 1868 to 1982 (4L.26).

G. Wibberenz: Radial variation of the interplanetary mean free path obtained from solar events measured on Helios 1 and 2 (4L.27).

J.T. Hoeksema, J.M. Wilcox: The structure of the heliospheric current sheet: 1976-1982 (4L.30).

This session had to cover several very different topics such as solar wind generation, solar transients and their effects on the interplanetary medium, solar wind expansion into the outer heliosphere, the boundary of the heliosphere. This diversity appeared to be an advantage, since the audience followed the presentations very attentively and entered lively discussions after each talk. It should be noted that there was in fact ample time for the discussions, due to the otherwise regrettable absence of nearly all Eastern-European and all Chinese speakers.

(R. Schwenn)

4T. TURBULENCE AND KINETIC PHYSICS IN THE SOLAR WIND (Conveners: W.C. Feldman, E. Marsch)

August 18, a.m. and p.m. Room: D2101

Chairmen: E. Marsch, S. Schwartz

T.J. Kelly, J.L. Phillips, J.G. Luhmann, C.T. Russell: Pioneer Venus observations of unusual current sheet signatures in the solar wind (4T.01).

S.J. Schwartz, E. Marsch: Radial evolution of a solar wind plasma parcel (4T.03).

E. Marsch, T. Chang: Electromagnetic lower hybrid waves in the solar wind (4T.04).

R.D. Zwickl, R. Steinitz, W.C. Feldman, S.J. Bame: The temperature ratio T_α/T_p of α particles to protons in the solar wind (4T.05).

R. Bruno, M. Dobrowolny: Measurement of magnetic energy and magnetic helicity spectra between 0.29 and 0.87 AU (4T.07).

M. Dobrowolny, G. Torricelli: Dissipations of Alfvénic turbulence in the solar wind (4T.09).

L.M. Celnikier, C.C. Harvey, R. Jegou, M. Kemp, P. Moricet: A determination of the electron density fluctuation spectrum in the solar wind, using the ISEE propagation experiment (4T.11).

K. Kikuchi, D.A. Gurnett, R.R. Anderson, E. Keppler, A.K. Richter, R. Schwenn, E. Marsch, K. Richter, H. Rosenbauer: Solar radio bursts and electron plasma oscillations associated with interplanetary shock waves and energetic protons (4T.13).

M. Tatrallyay, C.T. Russell, J.G. Luhmann: On the determination of the proper Mach number and ratio of specific heats appropriate for modeling collisionless shocks (4T. 14).

C.S. Wu, D. Winske, M. Tanaka: Microturbulent heating at the Earth's bow shock due to cross-field instabilities (4T.15).

W.A. Livesey, C.T. Russell, C.F. Kennel: Magnetic ramp thickness of quasi-perpendicular bow shocks: ISEE-1 and -2 observations (4T.16).

M.M. Leroy, A. Mangeney, D. Winske: Backstreaming ions from oblique Earth bow shock (4T.17).

D. Burgess, S.J. Schwartz: The reflection of solar wind protons at the Earth's bow shock (4T.18).

C. Bonifazi, K.H. Alfsen: Flux of field-aligned proton beams upstream of the Earth's bow shock; ISEE-2 observations (4T.19).

K.A. Anderson, W.K. Levedahl, R.P. Lin, G.K. Parks: Observations of energetic ions upstream from Earth's bow shock (4T.20).

R.J. Fitzenreiter, A.J. Klimas, J.D. Scudder, K.W. Ogilvie: Evidence for the velocity dispersion model of the upstream foreshock boundary (4T.21).

M.B. Bavassano-Cattaneo, C. Bonifazi, M. Dobrowolny, G. Moreno, C.T. Russell: Spatial distribution of MHD turbulence and properties of backstreaming protons in the foreshock region (4T.22).

J. Etcheto, M. Faucheux: Detailed study of plasma waves upstream of the Earth's bow shock (4T.23).

C.T. Russell: Multiple spacecraft observations of interplanetary shocks: Characteristics of the precursor waves (4T.25).

T.A. Croft: Strong 3-hour fluctuations of solar wind turbulence within 5 degrees of the Sun (4T.27).

This session was held with the presentation of 20 papers listed above. The major thrust of this session was to report recent measurements of particle velocity distribution functions, MHD and plasma waves in the solar wind and to present theoretical work on these topics. The session was well attended,

and all the presented papers were interesting. These papers are a significant contribution to the study of the solar wind structure, especially that associated with its interaction with the earth's magnetosphere.

(E. Marsch)

4S. SOLAR MAXIMUM TRANSITION (Conveners: F.M. Neubauer, D.M. Rust)

August 17, a.m., Room: D01

Chairman: F.M. Neubauer

J.A. Slavin, E.J. Smith, B.T. Thomas: The IMF during solar cycle 20 and 21 maxima (4S.01).
B. Bavassano: Helios observations of solar cycle variations of IMF fluctuations (4S.02)
J.W. Freeman: Color images of solar wind and IMF composite datasets (4S.04).
E.J. Smith, B.T. Thomas, J.A. Slavin: The recent solar maximum: Interplanetary magnetic field observations (4S.07).
H.R. Rugge, D.L. McKenzie: Evolution of coronal active regions near solar maximum using X-ray spectroscopy (4S.08).
R.M. Volkmer, F.M. Neubauer: Properties of shock waves in the solar wind, their radial dependence and change with the solar cycle as observed by Helios 1 and 2 from 1975 to 1980 (4S.09).

This session dealt with the variation of solar wind parameters from the mid-sixties or seventies to 1982. Smith et al. (4S.01) demonstrated the secular variation of the IMF magnitude for 1966-1981. At the times of solar polarity reversals relative minima were found and an overall maximum around the last sunspot maximum. This behaviour was seen both at 1 AU and in the same way in the Helios data normalized to 1 AU. Smaller normalized fields were found at Pioneers 10 and 11 at some epochs, due possibly to the development of meridional flow. Bavassano (4S.02) showed IMF fluctuations using Helios data, and various variances were computed for 3-day intervals. The Pythagorean mean rms component variances were shown to increase from December 1974 to June 1981. Vette and Freeman (4S.04) presented a colour coded illustration of plasma and magnetic field data by Helios 1 and 2, Mariner 10, Pioneer 10 and 11. Smith et al. (4S.07) discussed several aspects of the sector structure using ISEE-3 and Pioneer 10, 11 data, and reiterated the non-exact antiparallelism of magnetic field vectors on both sides of the heliospheric current sheet. Also the reversal of the overall solar magnetic field was discussed and the time of reversal was noted to be at about Bartels' rotation 1997 in the second half of 1979. Rugge and McKenzie (4S.08) introduced the X-ray observations by the U.S. Air Force satellite P78-1, which provide us with the electron density information in non-flaring active regions of the corona. Among other results electron densities of about $2\text{-}3\cdot10^9$ cm^{-3} were given. The session was concluded by a statistical study of the properties of more than 150 shocks observed by Helios-1 and -2 between 1975 and 1980, presented by Volkmer and Neubauer (4S.09). The shock velocity in the rest frame of the unperturbed plasma was found to vary statistically like $r^{-1/2}$. The association between flares and shocks was also studied.

(F.M. Neubauer)

4C. PROBLEMS RELATED TO SOLAR-WIND COMPOSITION (Convener: K.W. Ogilvie, O. Vaisberg)

August 16, p.m. Room D01

Chairman: K.W. Ogilvie

J. Geiss: Causes of variations in solar wind composition (4C.01).
A. Bürgi: Dynamics and ionization balance of minor ions in the corona and solar wind (4C.02).
W.K.H. Schmidt: ISEE-1 results on heavy minor ions in the solar wind (4C.04).
S. Kunz, P. Bochsler, J. Geiss: Abundances of He, C, O, and Ne-ions in the solar wind (4C.05).
N.F. Pissarenko, E.M. Dubinin, A.V. Zaharov, E. Yu. Budnik, R. Lundin, B. Hultgvist: He^+ ions in the solar wind (4C.06).
K.W. Ogilvie: Interpretation of ^3He variations in the solar wind (4C.08).
P.A. Isenberg: Resonant cyclotron acceleration and heating of anisotropic solar wind ions (4C.09).
R. Steinitz, R.D. Zwickl: Amodel Alfvén speed (4C.10).
W.K. Peterson, E.G. Shelley, W.K.H. Schmidt, P. Bochsler, H. Balsiger: Correlated measurements of minor ions in the solar wind and dayside cusp (4C.12).

This session demonstrated that progress is beginning to be made in the measurement and interpretation of solar wind abundances and their variation. Geiss, for example, emphasized that, although fractionation processes, governed by Coulomb drag, occur in the corona, ion-neutral processes also produce fractionation which depends upon the ionization rate. Bürgi presented solutions of the coupled differential equations governing acceleration and ionization balance of minor ion species, including the effect of Alfvén waves in competition with thermal diffusion, showing that ^4He and Si ions lag in velocity. Isenberg, in a further extension of work on explaining the velocity lag of the ions, relaxed the assumptions of thermal isotropy and nondispersion, and found that ion cyclotron waves could produce a velocity difference. However, it is still very difficult to produce the large velocity differences observed at 0.3 AU, as the waves do not provide enough energy in the appropriate frequency range. Experimentally, Zwickl presented data on ^4He from the large Imp data set which shows a marked change in the character of the observations at about 400 kms^{-1}. At low speeds the temperature ratio is $\sim$4 and velocity difference zero; at higher speeds the temperature ratio approaches 6, and the velocity difference increases rapidly. However, V/V_A is always less than unity. Bochsler described results from the use of a least-squares fitting technique on 953 M/Q spectra obtained in low speed, moderate temperature, solar wind by ISEE-3. He found that the oxygen and He fluxes correlate at the 0.8 level, and that $He/O = 82 \pm 25$; $He/Ne = 500 \pm 200$ and $N/O = 0.17 \pm 0.04$. The ion C^{5+} was observed to be enhanced in abundance above the expected value. Discussing ion temperatures, Schmidt indicated that ISEE-1 measurements show that, at high temperatures, Oxygen temperatures tend to be higher than sixteen times (M(O)) the proton temperature; similarly the differential speeds (with respect to protons) are equal for oxygen and He; but Fe ions appear to move faster. Discussing ^3He, Ogilvie indicated that there is very good agreement between direct and indirect (foil) measurements of the abundance, and that some observed fluctuations in abundance ratio are physical. Examination of one such case at magnetic sector boundaries shows that the ratio may be higher in slow than in fast solar wind. Lundin discussed the Prognos observations of anomalously high He^+ in the solar wind, suggesting that it is present of order 40% of the time

his observations were made, in quantities of 0.3-3%. Finally, as an application of composition measurements, Petersen discussed the measurements of the entry of solar wind and ionospheric ions into the magnetotail, leading to an estimate of the Bow shock potential drop using the ratio He^{++} to O^{+}.

(K.W. Ogilvie)

G4. GENERAL CONTRIBUTION TO DIVISION IV ON SOLAR WIND AND INTERPLANETARY MAGNETIC FIELDS (Convener: L.F. Burlaga)

August 16, evening Room: D01

Chairman: L.F. Burlaga

M.H.A. Hassan, M.K. Wallis: Stochastic diffusion of dust grains by the interplanetary magnetic field (G4.02).
C.T. Russell, J.G. Luhman, J.R. Spreiter, S.S. Stahara: Comparison of Mars-3 magnetometer data with the predictions of the gas dynamic code (G4.03).
J.G. Luhman, C.T. Russell, J.R. Spreiter, S.S. Stahara: Magnetosheath fields: Models and observations (G4.04).

Hassan (G4.02) discussed "Stochastic Diffusion of Dust Grains by the Interplanetary Magnetic Field". Starting with the Fokker-Planck equation a diffusion equation was derived, making use of constants of the motion. A solution was obtained describing the extent of the scattering as a function of distance. Using a gas-dynamic model with the magnetic field frozen-into the flow but exerting no pressure, Russell et al. (G4.03) simulated the Mars-3 observations. The measurements could be described by assuming an interaction of the solar wind with the ionopause. Using the same fluid model Luhmann et al. (G4.04) modeled magnetic field configurations in the magnetosheath of Venus, for various orientations of the interplanetary magnetic field. Good agreement with observations was found.

(L.F. Burlaga)

VW. WORKSHOP ON GEOMAGNETIC OBSERVATORY AND SURVEY PRACTICE (Conveners: W.F. Stuart, G. Fischer)

August 23, a.m. and p.m. Room: D01

Chairmen: D.R. Barraclough, D. Voppel, G. Fischer, W.F. Stuart

S.-M. Ma, Q.-L. Liu: The effect of data points distribution on analysis (VW.01).
G. Schulz, M. Beblo: On the reduction of time variations for geomagnetic repeat station measurements (VW.02).

F.S. Barker: Results of Project Magnet's repeat long baseline surveys in the Mid-Atlantic (VW.04).

S. Utashiro, S. Oshima, T. Kaneko: Aeromagnetic surveys in the adjacent seas of Japan in 1980 (VW.05).

J. Podsklan: Magnetic mapping of Slovakia for the epoch 1980.5 (VW.06).

V. Pochtarev, A. Karasik, B. Tsutskarev, L. Kasjanenko, C. Sucksdorff: Results of marine three-component magnetic survey of the Gulf of Finland and parts of the Baltic Sea in summer 1982 (VW.07).

Poster Papers Room: D03

H. Lühr, St. Thürey, N. Klöcker: The EISCAT magnetometer cross-operational aspects, first results (VW.08).

J. Jankowski, J. Marianiuk, A. Ruta, C. Sucksdorff, M. Kivinen: Experience on long term stability of magnetometers based on torsion and photo-electric elements (VW.09).

T. Bergmark: Experience of geomagnetic field recording with a fluxgate magnetometer having a bridge sensor (VW.10).

V. Auster, H.-J. Linthe, D. Lenners: Acquisition and primary processing of geomagnetic pulsations in real-time operation by microcomputer (VW.11).

G. Clerc, J.P. Décriaud, G. Doyen, M. Halbwachs, M. Henrotte, J. Rémy, X-C. Zhang: Telesurveillance of volcano Momotombo (Nicaragua) by an automatic audio-M-T equipment, controlled by microprocessor (VW.12).

F.S. Barker: Compensation for platform induced noise in the U.S. Navy's Geomagnetic Airborne Survey System (VW.13).

B.J. Fraser, P.W. McNabb: The recording of Pc 1-2 geomagnetic pulsations using a microcomputer preprocessing system (VW.14).

J. Bitterly, J.M. Cantin, R. Schlich, D. Gilbert, J. Folques: Magnetometre theodolite portable a vanne de flux pour la mesure des elements du champ magnetique terrestre (VW.15).

A.J. Forbes, J.C. Riddick: The digital data system operated at the UK observatories (VW.18).

L. Hegymegi, L. Drimusz: An intelligent digital magnetic recording system (DIMARS) (VW.19).

G. Schulz: Experience with a digitally recording magnetometer system at Wingst Observatory (VW.20).

M. Kawamura, Y. Sano, K. Ochi, M. Kuwashima, S. Fujita: Improved Kakioka Automatic Standard Magnetometer (KASMMER) (VW.21).

A.N. Zaitzev, A.S. Amiantov, V.I. Odintzov: The experience of using the new Soviet digital magnetometers (VW.22).

V. Auster, K. Lengning: Comparison of standard and digital observation at the geomagnetic Adolf Schmidt Observatory in Niemegk (VW.23).

V. Auster: Geomagnetic absolute measurements with a nuclear resonance theodolite at the Adolf Schmidt Observatory in Niemegk (VW.24).

A. Meloni, A. De Santis, F. Molina, P. Palangio, Q. Taccetti: Discussion on the use of a proton vector magnetometer for automatic digital recording of geomagnetic elements (VW.25).

E. Kring Lauridsen: Absolute measurement of D by means of a proton magnetometer (VW.26).

Twenty-three papers, ranging in subject from new instrumentation and the application of digital data to index preparation, to surveys by land and sea, and the prediction of magnetic activity, were presented orally and in poster form. Poster papers were on view for several days in a hall close to the Session lecture room and one session was given over to reviews of the poster papers. Excellent summaries of the work on show were made by A.J. Forbes and T. Bergmark who presided over subsequent discussion of the subject material.

All contributions to the session were subsequently published as a special edition of Geophysical Surveys (Vol. 6, Nos. 3/4, July/October 1984) and as a hardback volume Geomagnetic Observatory and Survey Practice, Ed W.F. Stuart by De Reedel (Holland).

(W.F. Stuart)

GV. GENERAL CONTRIBUTIONS TO DIVISION V ON OBSERVATORIES, INSTRUMENTS, INDICES AND DATA (Convener:C.G. Sucksdorff)

August 23, a.m. Room: D01

Chairman: C. Sucksdorff

D.A. Simmons: The difficulties of making magnetic measurements on the moving ice shelf at Halley, Antarctica (GV.02).
J.A. Joselyn: Proposed major format change to geomagnetic activity reports and forecasts produced by the SESC, Boulder, Colorado, USA (GV.03).
A. Lundbak: About digital alternative to Kp-indices (GV.05).
W.F. Stuart, J.C. Riddick: Computer generated 'Quasi K-indices' (GV.06).
J.O. Cardus: Control of K standards at Spanish observatories (GV.07).

This session was immediately preceding the VW session on magnetic observatory and survey practice. One paper dealt with the magnetic observation on the moving ice shelf, and all other papers discussed possible modifications for reporting geomagnetic activity indices due to new methods of index derivation or other practical reasons.

(C. Sucksdorff)

HE. HISTORICAL EVENTS OR PEOPLE (Convener s: H.B. Garrett, W. Schröder)

August 17, a.m., and p.m. Room: D2098

Chairman: W. Schröder

M. Nicolet: People and facts related to IGY (Invited) (HE.01).
W. Dieminger: Radio wave propagation and solar-terrestrial physics (Invited) (HE.02).
P.H. Liang, S. Wang: Radio wave propagation and ionospheric studies at Wuhan University, China (HE.03).
L. Biermann: On the history of the solar wind concept (Invited) (HE.04).
K. Bretterbauer: J. Payer, C. Weyprecht, H. Wilczek - The promoters of International Polar Research (HE.05).
H.K. Paetzold: Erich Regener, a pioneer of geophysical research (HE.06).
J.E. Kennedy, E.J. Llewellyn, K.V. Paulson: Balfour Currie and the Second International Polar Year (HE.07).
K.H. Wiederkehr: The magnetic association of Göttingen and the Antarctic Expedition of J.Cl. Ross (1839-1843) (HE.08).
S. Débarbat, Th. Weimer: Gauss et l'astronomie geodesique ou le succes differe de la methode des hauteurs égales (HE.09).
D. Baker, G. Romick, A. Vallance-Jones, O. Harang: History of auroral optical spectrometry (HE.10).

K. Wienert: Johann von Lamont (1805-1879) (HE.12).
N. Fukushima: Commencement of hourly geomagnetic observation in Japan during the First International Polar Year (Invited) (HE.13).
Q.-L. Liu: People of major importance in the development of geomagnetism in China (HE.14).
A. Brekke: The Haldde Observatory - The cradle of modern auroral research (Invited) (HE.15).
E.G. Forbes: The Ben Venis Observers - A centenary tribute (HE.16).
M. Fahim: Prof. Mohamed Reda Madwar (1893-1975) (HE.17).

This session was attended by about 60-80 audience. The presentation of papers and the following discussion were very good. There is a general interest of geophysicists in the progress of historical studies. Most papers presented to this session were summarized in a book entitled "Historical events and people in geosciences", edited by W. Schröder, published by Verlag Peter Lang, Bern, Switzerland.

(W. Schröder)

HR. THE USE OF HISTORICAL RECORDS IN THE STUDY OF GEOMAGNETISM AND HISTORY (Convener: H.B. Garrett, J. Feynman)

August 16, p.m. Room D2098

Chairman: J. Feynman

J. Bloxham, D.R. Barraclough: The use of historical magnetic observations in studies of the Earth's Core (HR.01)
D.J. Schove: Sunspots and aurorae before AD 1700 (HR.03)
M.P. Pavese, G.P. Gregori: Historical geophysical records in Italy: Data from the Upper Po Valley from XII through XVII Century (HR.04)
J.L. Counil, J.L. Le Mouel, M. Menvielle: Study of the daily variations of the magnetotelluric field using historical recordings (HR.06).
D.R. Barraclough: Helley's Atlantic magnetic surveys (HR.07).
J. Feynman, P.F. Fougere: Eighty-eight year periodicity in solar-terrestrial phenomena confirmed (HR.08)
N. Fukushima: Study of geomagnetic secular variation in historic time with the aid of archaeo-aurora records (Invited) (HR.09).
M. Gadsden: The earliest observations of noctilucent clouds (HR.10).
W. Schröder: Krakatoa and the twilight phenomena 1883/1884 (HR.11).
B.M. Hamilton: An eyewitness account of the eruption of Krakatoa (HR.12)

This session was planned to foster interest in the utilization of preserved historical records, especially for the study of long term geophysical phenomena. The session in Hamburg was successful with the presentation of a number of papers for various important subjects, as will be seen in the above list of all presented papers, in which the effective use of historical data was well demonstrated.

(J. Feynman)

EO. ORIGIN AND COMPARISON OF Sq AND L VARIATIONS (Conveners: S. Matsushita, D.E. Winch, J.C. Gupta)

August 24, p.m. Room: D2098

Chairmen: S. Matsushita, D.E. Winch

O. Schneider: Recent progress (Invited) (EO.01).
S. Matsushita, W.-Y. Xu: Equivalent current systems representing the solar and lunar daily geomagnetic variation fields (Invited) (EO.02).
D.M. Schlapp, R.J. Mann: The spatial scale of correlation of the day-to-day variability of Sq (EO.03).
G.P. Gregori, C. Valenti, B. Alessandrini, A. Meloni, L.J. Lanzeroti: An 18-month sequence of planetary-scale monthly-averaged determinations of the external origin geomagnetic field evaluated by canonical GDS techniques (EO.04).
R.G. Rastogi, B.R. Arora, D.R.K. Rao: Behaviour of Sq and L at low latitudes (Invited) (EO.05).
C.A. Reddy: Latitudinal interactions (Invited) (EO.06).
D.E. Winch: (2,2) and (2,4) modal wind velocities from semi-diurnal spherical harmonic coefficients of Sq and L for the IGY (Invited) (EO.07).
A.D. Richmond, R.G. Roble: Modeling the ionospheric wind dynamo (Invited) (EO.08).
W.-Y. Xu: L current system in a multi-layer ionospheric model (EO.09).
W.H. Campbell: A description of the external and internal quiet daily variation currents at North American locations for a quiet-sun year (Invited) (EO.10).
W.H. Campbell, R.S. Anderssen: Conductivity of the subcontinental upper mantle: An analysis using quiet-day geomagnetic records of North America (EO.11).
J.F. Hermance: The internal contribution to Sq current systems (Invited) (EO.12).

Poster Presentations

G.L.M. Scheepers: The Sq variation at Hermanus - a statistical analysis (EO.13).
G.L.M. Scheepers: Morphology of the solar cycle dependence of Sq (EO.14).

The purpose of this session was to bring together research on the notable differences between the solar and lunar magnetic variations, especially their different dependence upon relative sunspot number and upon season. The papers presented dealt with new analyses of solar and lunar data, representations of the daily variability of Sq, and comparison of Sq and L current systems and seasonal averages at low latitudes.

Models of the ionospheric dynamo play an important part in the interpretation of differences between Sq and L, and even those papers not specifically on this topic referred to a number of possible ionospheric dynamo models. Conductivity models of the upper mantle were also included in the discussion. The review papers were well received, and provided a good "background" for the presentation of the papers on more specific aspects of the problem.

(D.E. Winch)

ES. SEPARATION OF THE OBSERVED MAGNETIC FIELD INTO MAIN, IONOSPHERIC AND MAGNETOSPHERIC CONTRIBUTIONS (Conveners: W.P. Olson, S. Matsushita, B.P. Singh)

August 25, a.m. Room: D2098

Chairman: W.P. Olson

S.V. Venkateswaran: Ionospheric winds, currents and electric fields (Invited) (ES.01).

W.P. Olson: The contribution of magnetospheric currents to the earth's surface magnetic field (Invited) (ES.02).

S. Matsushita: Field-aligned currents related to the solar daily geomagnetic variation field - A review (Invited) (ES.03).

F.H. Hibberd: An annual north-south variation of the latitude of the ring current (ES.04).

J.F. Hermance: Internal/external and ionospheric/magnetospheric current systems (ES.05).

J.E.P. Connerney, M.H. Acuña, N.F. Ness: Jupiter's magnetic field: internal/external field separation (ES.06).

R.A. Langel: Separation of MAGSAT data by source (Invited) (ES.07).

T. Sato, T. Hayashi, R.J. Walker, M. Ashour-Abdalla: Neutral sheet current interruption and field-aligned current generation in the magnetotail (ES.08).

T. Tamao: Contributions of ionospheric currents and oblique field-aligned currents to localized magnetic variations on the ground (ES.09).

K.S. Viswanathan, V.V. Somayajulu, C.A. Reddy: Ionospheric and magnetospheric current contribution to the storm-time surface geomagnetic field variations (ES.10).

For several scientific and practical reasons, it is important to be able to separate the observed magnetic field into its internal, ionospheric, and magnetospheric sources. Our current understanding of the formation of current systems (and their associated magnetic fields) in the ionosphere and magnetosphere were reviewed. Several papers on observations of the magnetic field (both at the earth's surface and at satellite altitudes) were presented. They offered abundant evidence for the existence of both ionospheric and magnetospheric currents. The field-aligned (or Birkeland) currents tie the magnetospheric and ionospheric regions as the entire circuit flows across field lines in the ionosphere and along field lines out into the magnetosphere. The relative contributions of the ionosphere and magnetosphere to the earth's surface magnetic field remains an open issue despite the availability of quantitative models of some of the current systems. There is some consensus for the statement that the magnetosphere is responsible for much of the day-to-day variability in the S_q field. The magnetospheric contribution to the average S_q field, however, remains a subject of some controversy, with the magnetospheric fraction of total S_q field reported to be from less than 10% to over 30%. The study of planetary magnetic fields is clearly useful to the detailed determination of contributions to the total field observed on or near the earth. We note with sadness that this was the last session that Professor Matsushita helped organize. He remained through his career interested in understanding the sources of the observed magnetic field.

(W.P. Olson)

EI. EXTERNAL AND INTERNAL MAGNETIC FIELD SEPARATION DURING IMS (Conveners: W.H. Campbell, K.-K. Tschu)

August 25, p.m. Room: D2098

Chairman: W.H. Campbell

J.C. Cain: MAGSAT detection of external fields (Invited) (EI.01).
R.A. Langel, R.H. Estes: Isolation of the spherically symmetric external field and its dependence on the Dst Index as determined from MAGSAT (EI.02).
A.D. Richmond, W. Baumjohann: Error determination and minimization in external-internal field separations with magnetometer array data (EI.03).
S. Matsushita: Cautions with spherical harmonic data analyses for the estimation of equivalent current systems (EI.04).
V.G. Petrov, A.N. Zitzev: Modelling of the Earth's induction effects for auroral electrojet investigations (EI.05).

In this session Cain presented some MAGSAT measurements of the field-aligned F-region, ionospheric currents through which the spacecraft had flown and of the horizontal, E-region ionospheric currents below the satellite orbit. Langel gave the details of a dependence of MAGSAT spherical harmonic coefficients upon the Dst index. Richmond showed that errors in excess of 40% may be obtained for the determination of the internal components of fields when attempts are made to separate the external and internal contributions using regional magnetometer array data. Matsushita discussed the effects of series truncation in spherical harmonic analysis. Zaitzev demonstrated the effects of induction (obtained from Earth layer models) upon electrojet current position computations.

(W.H. Campbell)

EE. EQUATORIAL ELECTROJET AND COUNTER ELECTROJET (Conveners: R.G. Rastogi, E. Oni)

August 26, p.m. Room: D2098

Chairmen: E. Oni, R.G. Rastogi

R.G. Rastogi: Overview of equatorial electrojet and counter electrojet currents (Invited) (EE.01).
A.D. Richmond: Theory of equatorial electrojet currents (Invited) (EE.02).
C.A. Onwumechili, P.C. Ozoemena: The latitudinal extent of the equatorial electrojet (EE.03).
P. Vila: Sources of Sq system destabilization (EE.05).
A. Patil, B.R. Arora, R.G. Rastogi: The signatures of equatorial counter-electrojet on low and mid-latitude geomagnetic field variations (EE.06).
C.A. Reddy: Neutral wind effects on the equatorial current system (Invited) (EE.08).
D. Hesse: Features of equatorial electrojet studies from magnetic surveys (Invited) (EE.09).
E. Oni, I.O. Ayeni: The application of the upward continuity concept to the induced effect of the equatorial electrojet at Ibadan (EE.10).
K.S. Viswanathan, B.T. Vikram Kumar, C.A. Reddy: Drift velocity profiles of the small scale irregularities using the backscatter radar (EE.12).

R. Raghavarao, R. Sridharan, R. Suhasini: The importance of vertical ion currents on the nighttime ionisation in the equatorial electrojet (EE.15).
C.A. Onwumechili: Satellite measurements of equatorial electrojet: past and future (EE.16).
E. Oni: Currents induced by equatorial electrojet (EE.17).

The symposium discussed some of the fundamental problems of the ionospheric currents at low latitudes: (i) the heights of maximum currents from rocket borne experiments are significantly higher than the theoretically computer values, (ii) the difficulties in completing the current system for counter electrojet, (iii) the identification of the processes of couplings between equatorial currents and magnetospheric solar wind interactions. Effects of neutral winds, induction due to subsurface conductivity anomalies and due to return currents at low latitudes were discussed. It was concluded that a properly coordinated experiments are needed to identify the multiple low latitude current systems and their sources.

(R.G. Rastogi)

GE. GENERAL CONTRIBUTIONS ON INTERNAL/EXTERNAL EFFECTS (Conveners: S.R.C. Malin, J.C. Gupta)

August 19, p.m. Room: D2091

Chairman: S.R.C. Malin

J.C. Kosik: A time dependent magnetic field model of the earth's magnetosphere (GE.01).
M.A. Shea, D.F. Smart, J.E. Humble: Use of the IGRF 1980.0 model to calculate updated cosmic ray cutoff rigidities (GE.02).
D.-Y. Chen: The effect of magnetospheric disturbance on solar proton cut-off rigidities at the synchronous altitude
H. Nevanlinna: The 1977-1979 secular variation impulse: Its induction effect and dependence on magnetic activity (GE.04).
A.A. Ashour, F.M. Hassan: The harmonic expansion of the scalar and vector potentials of a magnetic dipole (GE.05).
G.P. Gregori, B. Alessandrini, L.J. Lanzerotti: Tectonic implications of the electrical conductivity structure of the Earth from canonical GDS applied to Sq and L fields (GE.06).
N.J. Skinner, E. Shah: The boundary between the northern and southern Sq current loops over the African continent (GE.09).
G.M. Brown, T.M. Dutton: Experimental studies of electromagnetic induction in the Earth and the oceans (GE.10).

The meeting was well attended and proved very stimulating. As befits a general session, the subjects covered were very wide ranging, from the purely mathematical to the observational, from the Earth's core to the magnetosphere, and from the magnetic equator to the auroral oval. Despite the continuing activity in this subject, there remains a large gap between theory and observation, and future work should be directed towards bridging this gap.

(S.R.C. Malin)

SYMPOSIUM ON MIDDLE ATMOSPHERE SCIENCE (MAS)
Dates: 20 and 22-26 August 1983

Sponsors: International Commission on Meteorology of the Upper Atmosphere (ICMUA) of IAMAP, International Association of Geomagnetism and Aeronomy

Co-convenors: A. Ebel (ICMUA/IAMAP), P.C. Simon (IAGA)

Co-sponsors: International Commission on Atmospheric Chemistry and Global Polution (ICACGP); International Commission on Atmospheric Electricity (ICAE); International Commission on Dynamic Meteorology (ICDM); International Ozone Commission (IOC); International Radiation Commission (IRC); Committee for Space Research (COSPAR); Scientific Committee on Solar-Terrestrial Physics (SCOSTEP).

Program Committee: P. Crutzen (IXACGPO, J. C. Gille (IRC), L. Ruhnke (ICAE), A.P. Mitra (COSPAR), J.D. Mahlman (ICDM), I, Horota (SCOSTEP), C.D. Walshaw (IOC).

IAMAP: F. Arnold, O. Avaste, J.R. Bates, J. Chang, D.H. Ehhalt, M. Geller, B.G. Hunt, K. Labitzke, D. Spänkuch, H. Volland.

IAGA: M. Ackerman, E. Arijs, D. Cunnold, A.D. Danilov, J. Forbes, J.E. Frederick, M. Gadsen, R.A. Goldberg, G.C. Reid, A.L. Schmeltekopf, R. Woodman.

SUMMARY REPORT

This joint sympoisum was cosponsored also by SCOSTEP, COSPAR and by the following IAMAP Commissions: ICACCP, IOC and IRC. The large number of contributions about 160 papers presented in 11 half-day sessions, reflects the increasing activity in middle atmosphere research and the growing interest of scientists from many nations, including the developing countries, in efficient communications in this field. The sessions contained contributions about (1) solar UV flux, photochemical processes, and related chemistry; (2) remote sensing; (3) dynamics, including troposphere coupling; (4) the strato-meso-thermosphere system and solar-terrestrial relationships; (5) climatology of the middle atmosphere; (6) gravity waves, turbulence, and related transport; (7) modelling, including the radiation budget; (8) trace species; (9) ions and aerosols; (10) electrodynamics; and (11) aeronomic phenomena in the mesopause region, including noctilucent clouds. It is of course difficult to evaluate all contributions to the large sysmposium on the limited space available for this report. The reader might like to refer to a more detailed review published in EOS, Vol. 65, p. 168-169, 1984. Here a few highlights of the sessions are extracted from the review in EOS.

Some papers of the first session were concerned with recent results about the variability of the ultraviolet solar irradiance. A revision of O_2 and O_3 cross-sections relevant for the photochemistry of the middle atmosphere and possible consequences for atmospheric composition were discussed. In the session on remote sensing studies using various ground-based and satellite techniques were presented. The dynamics session was introduced by an evaluation of the role of breaking gravity waves for the mean circulation of the middle atmosphere. The phenomenon of breaking planetary waves and its great importance for middle atmosphere dynamics was demonstrated in another talk. It was shown that downward transport of nitric oxide may significantly contribute to the coupling of the strato-meso-thermosphere system through photochemical processes. Indications of solar-induced 27-day modulations of the circulation in the lower part of the middle atmosphere were discussed.

In the climatology session studies of the mean circulation between 10 and 100 km altitude, ozone measurements from the SME satellite and temporal and

spatial changes of gravity wave activity were presented. The subsequent session was devoted to investigations of transport processes related to gravity waves and turbulence and included some papers about measurements of gravity waves (e.g. by Lidar, MST). Reasons for the "universality" of atmospheric turbulence spectra were also considered. The session on middle atmosphere modelling focussed on studies of stratospheric warmings and their modification through various dynamical effects and, in part, through the concept of modelling.

A respectively large number of papers presented as posters and verbally were submitted to the sessions on trace species in the middle atmosphere. They mainly concentrated on new measurements of various trace gases by in situ and satellite experiments. The discussion of the results, of course, included theoretical and numerical simulation problems and was frequently extended to considerations of the interaction of chemistry, energetics, and dynamics of the middle atmosphere. Nitric oxide was extensively measured by LIMS, SAGE, and SME. For example, the LIMS data demonstrated the variability of NO_2 at high latitude, with an increase of mesospheric nitric oxide into the polar night. The SAGE data illustrated the "Noxon Cliff," and SME provided daily density profiles from 28 to 40 km showing, in particular, large oscillations in NO_2 column density above 28 km correlated with air transport originating at high latitude at the minima and from sunlit lower latitudes at the maxima. In addition, the first night-time detection of NO_2 by lidar was reported. HO_2 and NO_2 balloon measurements by matrix isolation and ESR spectroscopy were presented and discussed.

During the session on aerosols, important features of nucleation processes have been stressed. The results on ion-induced nucleation of some model calculations draw attention on the possible role of ions in nucleation processes. The SAGE data demonstrated the seasonal and latitudinal variations of aerosol sizes. The most recent results of the SAM II satellite observations and their relation to recent volcanic eruptions were presented. An overview of a 4-year aerosol climatology was given. The session on ions in the middle atmosphere started with a talk about the modelling of positive ions. It was outlined that the results critically depend on the knowledge of the vertical distribution of acetonitrile. Several papers on new measurements of stratospheric ions were presented. During the session on electrodynamics, some coordinated measurements by rocket techniques to study middle atmosphere electrodynamics were discussed. The nature of high latitude auroral radiations was treated and the importance of relativistic electrons as a frequently occurring source was emphasized. Measurements of ion conductivity, mobility, and density showed how these parameters are altered by auroral energy deposition.

The session on aeronomic phenomena stressed problems of the physics of noctilucent clouds and the polar mesosphere scattering layer (cloud)forming over the summer pole. The discussion was based on observations from the Salyut spacecraft and the Solar Mesosphere Explorer (SME). SME data on nitric oxide in the lower thermosphere were also presented. Ground-based observations of the mesopause region using lidar and interferometer techniques were treated.

A considerable part of the papers was shown in two poster sessions accompanying the sessions with oral presentations. The broad spectrum of topics treated by middle atmosphere science and addressed by the program of the symposium attracted a remarkably large audience and resulted in many stimulating discussions between scientists from an equally broad spectrum of disciplines. IAGA and IAMAP plan the continuation of this discussion in joint scientific session during the IAGA Assembly 1985 in Prague.

(A. Ebel and P.C. Smion, Conveners)

The abstracts of the following papers appeared in the IAMAP Programme and Abstracts booklet, pp. 165-366; the reprint was provided to all IAGA registrants, as an Appendix to the IAGA Programme and Abstracts.

Solar UV Flux, Photochemical Processes and Related Chemistry

G.J. Rottman: Solar ultraviolet and its variability (Invited).

M. Nicloet, L. Bossy: Trends in the Lyman-alpha solar flux measurements and solar activity effects.

J.L. Lean, G.J. Rottman: Comparison of Calculated and observed solar ultraviolet irradiance variability.

D.E. Freeman, K. Yoshino, W.H. Parkinson: High resolution ultraviolet absorption cross section measurements of O_2 and O_3.

A.J. Blake, D.G. McCoy, S.T. Gibson: Modeling atmospheric absorption in the Schumann-Runge region.

M. Nicloet: Mesospheric photodissociation of molecular oxygen.

D.E. Anderson, R.R. Meier, K. Stamnes: The scattered solar radiation in the stratosphere between 190-320 nm.

G.P. Anderson, L.A. Hall: In-situ determination of stratospheric O_2 photodissociation rate coefficients.

G. Brasseur: Uncertainties in middle atmosphere chemistry: divergences between model calculations and observations (Invited).

D.J. Wuebbles, P.S. Connell: On the relationship between stratospheric trace gas measurements and photochemical theory.

M. Bucchia, G. Megie, M. Nicolet: Atmospheric transmittance in the 200 $\pm$ 20 nm spectral region and stratospheric photodissociation of O_2.

L. Froidevaux, Y.L. Yung: Modeling of stratospheric species: 1) sensitivity to O_2 absorption near 200 nm; 2) Rayleigh scattering in spherical shell atmospheres.

M.P. Nicoli, G. Visconti: The effects of multiple scattering on the atmospheric lifetime of CF-11 and CF-12.

D.E. Anderson, Jr., R.R. Meier, M. Nicolet: Multiple scattering and albedo effects on photodissociation rates at wavelengths greater than 300 nm.

Remote Sensing, Part A

H. Fischer, F. Fergg, H. Oelhaf, D. Rabus, W. Völker, P. Burkert: Simultaneous detection of trace constituents in the middle atmosphere with a small, high resolution Michelson interferometer (MIPAS).

J.E. Lovill, J.S. Ellis: Correlative studies of satellite ozone sensor measurements.

E. Lobsiger, K.F. Funzi, H.U. Dütsch: Accuracy of atmospheric ozone profiles measured with a ground-based microwave sensor.

J.J. Olivero, R.M. Bevilacqua, P.R. Schwartz, D.L. Thacker: Ground based microwave measurements of mesospheric water vapor: an update.

W.G. Planet, M.L. Hill: Comparisons of stratospheric ozone determinations from LIMS, SAGE and Dobson Umkehr observations.

Y.-J. Wang: Evaluation of two methods for determining middle atmosphere composition from the ground.

Dynamics, Including Troposphere Coupling

J.R. Holton: The role of gravity wave induced drag and diffusion in the general circulation of the mesosphere (Invited).

M.E. McIntyre, T.N. Palmer: Observations of breaking planetary waves in the stratosphere.

A.K. Smith, J.C. Gille, L.V. Lyjak: Interactions among planetary waves in the winter stratosphere.

R.A. Madden: Time variations in heat and momentum transport by the large-scale waves.

C.B. Leovy, M.H. Hitchman: Satellite evidence for Kelvin waves and possible inertial instability in the middle atmosphere.

H. Volland , G. Becker: A new type of Rossby-Haurwitz waves existing in a latitude dependent zonally averaged circulation.

C. Sun: Ultralong solitary waves in middle atmosphere.

B.K. Mukherjee, K. Indira, Bh.V. Ramana Murty: A report on high-level warmings over tropics during winter 1981-82 and summer 1982.

C.R. Trepte: Sightings of cirrus in the lower tropical stratosphere by SAGE.

W.A. Chapman, T. Miles: Comparison of planetary-scale diagnostics derived from separate satellite and radiosonde temperature fields.

D.N. Al-Ajmi, R.S. Harwood, T. Miles: Eulerian and Lagrangian diagnostics for a southern hemisphere stratospheric warming event.

D.L. Hartmann, C.R. Mechoso, K. Yamasaki: Observations of wave-mean flow interaction in the Southern Hemisphere.

R. Reiter, K. Munzert, H.-J. Kanter, K. Pötzl: Contribution to the knowledge of coupling between stratosphere and troposphere through recording of cosmogenic radionuclides over 12 years at 3 km asl.

I.A. Shcherba, V.G. Kidiyarova, B.N. Trubnikov: On the nature of planetary waves in the summer stratosphere.

Remote Sensing, Part B

J. Taubenheim, E.A. Lauter, G. von Cossart: Monitoring middle atmosphere processes by means of low-frequency radio wave sounding of the D region (Invited).

K.S. Gage: MST radar studies of wind and turbulence in the middle atmosphere (Invited).

R. Rüster, P. Czechowsky, G. Schmidt: VHF-radar measurements during the stratospheric warming from January 26 to February 9, 1983.

G. Cevolani, A. Dardi: Meteor wind radar observations at Bologna, Italy, during midwinter stratospheric warmings.

K.S. Gage, G.D. Nastrom: Vertical wind variability and turbulence as seen by the Poker Flat, Alaska MST radar.

W. Kofman, F. Bertin, A. Cremieu, J. Roettger, P.J.S. Williams: The EISCAT mesospheric measurements during the Camp Campaign.

Strato-Meso-Thermosphere System Including Solar-Terestrial Relationships

S. Solomon: Chemical coupling of the strato-meso-thermosphere system (Invited (Invited).

J.-C.M.C. Gérard, E.J.-F. Deneye: Variability of the nitric oxide transport from the lower thermosphere.

J.E. Frederick: Absorption of solar radiation by nitric oxide: a mechanism for coupling thermospheric variability to the middle atmosphere.

G. von Cossart, G. Entzian, J. Taubenheim: Spring changeover phenomena in the middle atmosphere.

J.L. Fellous, M. Massebeuf, A.H. Manson, C.E. Meek: Winds oscillations (∿6h-6d) in the mesosphere and lower thermosphere at Monpazier (France, 45°N, 1°E) and Saskatoon (Canada, 52°N, 107°W) in 1979-1980.

R. Johnson, J.G. Luhmann, B.B. Balsley, A.C. Riddle: Neutral wind spectra at the mesopause: Geomagnetic effect?
K.D. Cole: Possible effects of solar variability on the middle atmosphere (Invited).
W.G. Elford, R.L. Craig: The variability of winds at 90 km during one solar cycle.
A. Ebel, J.L. Lean, B. Schwister: Solar UV flux changes and variations of 30-mbar temperature and height.
S. Chandra: Solar induced oscillations in the stratosphere: a myth or reality.
J.C. Gille, C.M. Smythe: Response of stratospheric ozone to solar UV variation.
L.B. Callis, J.C. Alpert: An assessment of thermal, wind and planetary wave changes in the middle and lower atmosphere due to 11-year UV flux variations.

Climatology of the Middle Atmosphere

Yu.P. Koshelkov: Climatoloty of the middle atmosphere of the Southern Hemisphere (Invited).
F.G. Finger, M.E. Gelman, A.J. Miller, K.W. Johnson, R.M. Nagatani: Stratospheric climatology 1979 to the present.
M.A. Geller, M.-F. Wu, M.E. Gelman: Troposphere-stratosphere (surface-55 km) monthly winter general circulation statistics for the Northern Hemisphere--four year averages and interannual variability.
H. Kanzawa: Quasi-semiannual oscillation of static stability in the upper stratosphere revealed by Nimbus 5 SCR.
A.J. Kantor: Variability of atmospheric density in the middle atmosphere.
C. Raghava Reddi, C.A. Reddy, K.G. Mohan Kumar, M.N. Sasi: Characteristics of the wind field in the equatorial stratosphere over India.
I. Hirota: Climatology of gravity waves in the middle atmosphere (Invited).

G.J. Fraser: Summer circulation in the mesosphere at 44°S and 78°S.
Yu.I. Portnyagin: Main features of global circulation in mesopause-lower thermosphere region.
A.H. Manson, C.E. Meek, M.J. Smith, G.J. Fraser: The climatology of the upper middle atmosphere (60-110 km) from M.F. radar observations for 1978-1980 at Saskatoon (52°N, 107°W) and Christchurch (44°S, 173°E).
F.J. Schmidlin: A summary of temperature, density, and wind variations observed in the middle atmosphere.
R.J. Thomas, G.E. Thomas, L.E. Clemens: Ozone in the upper mesosphere--one year of global observations.

Gravity Waves, Turbulence, and Related Transport in the Middle Atmosphere

A. Ebel: Gravity waves--sources of momentum, heat and turbulent kinetic energy in the middle atmosphere.
H.J. Jakobs, A. Ebel, P. Speth: Turbulent heating and cooling of the mesopause region.
S.K. Avery, B.B. Balsley: Vertical energy fluxes of gravity waves and tides observed by the Poker Flat, Alaska MST radar.
A.H. Manson, C.E. Meek: Gravity wave characteristics, and their interaction with the background flow: M.F. radar observations at Saskatoon (52°N, 107°W) from 1976-1983.
T.E. VanZandt, R.A. Vincent: Implications of a universal spectrum of gravity waves on the dynamics of the middle atmosphere.
G.D. Nastrom, K.S. Gage: Wavenumber spectra of winds and temperatures from GASP data.

M.L. Chanin, A. Hauchecorne: Characteristics of gravity waves in the middle atmosphere obtained at middle latitude from lidar sounding.

J. Barat, F. Bertin: In situ measurements of stratosphere turbulence, application to radar measurements.

Modeling of the Middle Atmosphere, Including Radiation Budget

M.A. Geller: Modeling the middle atmosphere circulation (Invited paper).

K. Rose: On the difference of wave 1 and wave 2 dominated sudden warmings in a primitive equation model for the stratosphere.

H.R. Schneider, M.A. Geller: Modeled stratospheric warmings and their associated mass transports.

M. Scholl, K. Petzoldt: Numerical simulation of the precondition and development for an observed stratospheric warming in the winter 1979/80.

J.S. Frederiksen: Wave instability of the distorted stratospheric polar vortex at the onset of the sudden warming.

A. O'Neill: The response of the upper atmosphere to local disturbances in the troposphere.

R.B. Rood: A possible explanation of the large-scale annual variation of ozone.

W.L. Grose, B. Boville: The role of radiative-dynamical processes in the maintenance of the zonal mean circulation in the lower stratosphere.

B.A. Boville: The role of radiative damping of eddies in the circulation of the winter stratosphere.

V. Gärtner: Computation of the zonally averaged circulation driven by heating due to radiation and turbulence.

G. Pitari, G. Visconti: A two-dimensional model for the distribution of trace species in the stratosphere employing a residual mean meridional circulation and a conservative eddy diffusion.

I.L. Karol, A.A. Kiselev, Ye.V. Rozanov, V.A. Frolkis: Model studies of photochemistry, radiation and dynamics interactions of trace gases in the atmosphere.

Trace Species in the Middle Atmosphere

M. Helten, W. Patz, D. Mihelcic, M. Trainer, D. Knapska, D.H. Ehhalt: Mesurements on stratospheric HO_2 and NO_2 by matrix isolation and ESR Spectroscopy.

W.E. Sharp, S. Soloman, D.W. Rusch: Simultaneous measurements of [H], [O_3], and [O] in the upper mesosphere.

M. Bucchia, G. Megie: Ground based active remote sensing of the nighttime stratospheric nitrogen dioxide.

W.P. Chu: Satellite observations of stratospheric NO_2 by SAGE.

W.A. Sedlacek, E.J. Mroz: Behavior of stratospheric nitric acid: 1971-1982.

M.M. Abbas, I. Nolt: Inversion of balloon based far infrared stratospheric measurements.

G.H. Mount, J.F. Noxon, J.M. Zawodny, D.W. Rusch: Stratospheric NO_2 during winter 1982: analysis of air flow and its relation of NO_2 densities.

J.M. Russell III, L.L. Gordley, E.E. Remsberg, L.B. Callis: The variability of NO_2 in the polar winter night observed by LIMS.

W.A. Matthews: Nitrogen dioxide column content measurements made from an aircraft between 5°N and 82°N.

J. Rudolph, D.H. Ehhalt: Vertical profiles of acetylene in the troposphere and stratosphere.

Th. Bührke, F. Arnold: Active chemical ionisation mass spectrometry--a new method for stratospheric trace gas detection.

D.H. Ehhalt, E.P. Röth, U. Schmidt: On the variance of stratospheric trace gas concentrations.
K. Mauersberger: Mass spectrometer measurements of ozone isotopic ratios.
J.C. Gille, L.V. Lyjak, A.K. Smith: Ozone transports in the stratosphere and mesosphere derived from LIMS data.
D.W. Rusch, C.A. Barth, G.H. Mount: Solar Mesosphere Explorer measurements of ozone spatial and temporal variations near the stratopause.
S. Solomon, G. Reid, D. Rusch, R. Thomas: Comparisons between model calculations and mesospheric ozone observations from the Solar Mesosphere Explorer (SME) satellite.
G.M. Keating, J.J. Barnett, W.J. Borucki, J.J. Pyle, M.C. Pitts, J.Y. Nicholson III, D.F. Young: High sensitivities of ozone to temperature near stratopause.
E.E. Remsberg, L.L. Gordley, J.M. Russell III : A nighttime secondary ozone maximum observed in the mesosphere from LIMS data.

Physics and Chemistry of Ions and Aerosols In the Middle Atmosphere: AEROSOLS

R.P. Turco, O.B. Toon, R.C. Whitten, P. Hamill: Aerosol processes in the middle atmosphere (Invited).
F. Arnold: Ion-induced mucleation--a potential source for stratospheric aerosols.
G.K. Yue, A. Deepak: Characteristics of stratospheric aerosols inferred from the atmospheric extinction of solar radiation at two wavelengths measured by SAGE experiment.
G.S. Kent: The climatology of stratospheric aerosols, 1979-1981 as measured by the SAGE satellite sensor.
D.J. Hofmann, J.M. Rosen: Production of sulphuric acid condensation nuclei in the polar stratosphere from volcanic vapours.
M.P. McCormick: Stratospheric aerosol climatology in the polar regions as observed by SAM II.

Physics and Chemistry of Ions and Aerosols In the Middle Atmosphere: IONS

G. Brasseur, E. Arijs: Modeling of positive ions in the stratosphere.
J. Ingels, D. Nevejans, E. Arijs: Fractional abundances of stratospheric positive ions from 25 to 45 km.
H. Schlager, F. Arnold: Improved stratospheric positive ion composition measurements.
H. Böhringer, D.W. Fahey, F.C. Fehsenfeld, E.E. Ferguson: Flowing afterglow studies of stratospheric cluster ion chemisty.
Y.V. Somayajulu, A. Banerjee, P. Subramanyam: Balloon borne Langmuir probe measurement of stratospheric ions in low latitudes.
N.C. Varshneya: Middle atmosphere electrodynamics and its tropospheric influences.

Electrodynamics of the Middle Atmosphere

G.C. Reid: Electrical structure of the middle atmosphere (Invited).
R.A. Goldberg, C.H. Jackman, J.R. Barcus, F. Soraas: Nighttime auroral energy deposition in the middle atmosphere.
J.D. Mitchell, P.J. Bertalan, R.A. Goldberg: Auroral ionization effects on middle-atmosphere electrical parameters.

L.C. Hale, C.L. Croskey, J.D. Mitchell, N.C. Maynard, F.J. Schmidlin: Large mesospheric electric fields.
R. Markson: Dual aircraft investigation of spatial and temporal variations of ionospheric potential.
A.A. Few, A.J. Weinheimer: Errors in balloon measurements of the air-earth current.

Aeronomic Phenomena in the Mesopause Region, Including Noctilucent Clouds

G. Witt: Noctilucent clouds-- facts and belief (Invited).

O.A. Avaste, O.B. Vasilyev, Ch.I. Willmann, A.I. Lazarev: Investigation of noctilucent clouds according to the Soviet National Programme MAP (Invited).
M. Gadsden: Eighteen years of NLC observations from Western Europe.
M.J. Taylor, M.A. Hapgood, D.A.R. Simons: The effect of atmospheric screening on the visible border of noctilucent clouds.
O.B. Vasilyev, Ch.J. Willmann: Optical characteristics of noctilucent clouds from space observations.
K.U. Grossmann, R. Henning, D. Offermann: Mesospheric temperatures deduced from the carbon dioxide 15 μm band emissions.
G.E. Thomas: Satellite measurements of noctilucent clouds (Invited).
C.A. Barth: Satellite measurements of nitric oxide in the middle atmosphere during 1982.
K.M. Torkar, D. Beran, M. Friedrich, S. Lal. B.H. Subbaraya, A. Jayaraman: Measurement of nitric oxide in the equatorial D-region and other relevant parameters.
J. Lastovicka, J. Boska: Nitric oxide concentration near the mesopause as deduced from radio-wave absorption.
J.P. Jegou, C. Granier: Detection of the neutral calcium layer in the upper atmosphere.
R.P. Lowe, K.L. Gilbert, R.J. Niciejewski, D.N. Turnbull: Atomic hydrogen concentration near the mesopause deduced from the hydroxyl twilight airglow.

POSTER SESSIONS: 22-23 August (for topics 1-5) and 24-26 August (for topic 6-11)

1. Solar Flux, 2. Remote Sensing, 3. Dynamics, 4. Strato-Meso-Thermosphere system 5. Climatology, 6. Gravity Waves and Turbulence, 7. Modeling, 8. Trace Species, 9. Ions and Aerosols, 11. Mesopause and Noctilucent Clouds

J. London, G.J. Rottman, G.G. Bjarnason: 18 months of UV irradiance observations from the Solar Mesosphere Explorer (1.1)
L. Bossy, M. Nicloet: Solar radio flux models for the study of trends in UV irradiances (1.2).
J.J. Carroll: Effects of stratospheric aerosol on solar radiation incident at the ground (1.3).
H. Oelhaf, H. Fischer: Measurements of minor constitutents by IR limb sounding: some problems (2.1).
A.T. Waterman, T.-z. Hu, P. Czechowski: Measurement of anisotropic permittivity structure of upper troposphere with clear-air radar (2.2).
I. Hirota, T. Hirooka: Normal mode Rossby waves observed in the upper stratosphere (3.1).

J.C. Alpert, M.A. Geller, S.K. Avery: The response of stationary planetary waves to tropospheric forcing (3.2).

E.S. Kazimirovsky: Studies of the middle atmosphere dynamics in the USSR (3.3).

A. Hauchecorne, M.L. Chanin: Lidar observation of planetary waves in the middle atmosphere during winter and interpretation by use of a model of wave-mean flow interaction (3.4).

R.R. Garcia, M.L. Salby: Kelvin wave response to impulsive latent heat release in the tropics (3.5).

L.R. Rakipova, B.N. Trubnikova, I.A. Shcherba: Penetration of large-scale tropospheric waves into summer mesosphere and the vertical structure of these waves (3.6).

W.L. Grose, E.E. Remsberg, J.M. Russell III, J.P. Gapcynski: Derived dynamical quantities from Nimbus 7 LIMS measurements and application to the study of a sudden stratospheric warming (3.7).

J. Laštovička: Major stratospheric warmings and the winter anomaly in central Europe (3.9).

M. Devarajan, C.A. Reddy, C. Raghava Reddi: Wave-like perturbations in the vertical structure of the stratospheric zonal winds over India (3.10).

B.M.C. Pavesi, G. Fea, G.P. Gregori, B. Pavesi: An investigation on the origin of stratospheric sudden warmings (SW) (3.11).

D.B. Patel, K.M. Kotadia: Relevance of tropospheric disturbances to mesospheric dynamics (4.1).

J.G. Luhmann, R. Johnson, M.J. Baron, B.B. Balsley, A.C. Riddle: Observations of the high latitude ionosphere with the NOAA MST radar: information from simultaneous Chatanika radar measurements (4.2).

H. Schwentek, W. Elling: Dependence of the temperature profile of the stratosphere on the 11-year solar activity cycle? (4.3).

V.M. Feigin, V.A. Lipovetsky, V.F. Tulinov, V.I. Lazarev, B.V. Maryin, M.V. Teltsov: Zonal structure of geoactive corpuscular stream penetrations into the polar atmosphere of Northern and Southern Hemispheres under various geo- and heliophysical conditions (4.4).

V. Bucha: Interactions of the middle atmosphere and troposphere under the influence of corpuscular radiation (4.5).

J.W. Meriwether, Jr., P.B. Hays, A.F. Nagy: First results from the sondrestrom Fabry-Perot interferometer (4.6).

G. Lange, R. Gerndt, D. Offermann, T. Blix, E. Thrane: Latitudinal comparison of mesopause temperatures (5.1).

K.G. Vernekar, B. Mohan, S. Srivastava: Characteristics of stability of upper atmosphere over equatorial stations (5.2).

D.N. Madhusudhana Rao: Gravity wave studies in low latitude middle atmosphere (6.1).

S. Fukao, Y. Maekawa, T. Sato, S. Kato, R.F. Woodman: Inertia-gravity waves observed by the Arecibo radar (6.2).

A.M. Selvam, A.S.R. Murty, Bh.V. Ramana Murty: A new gravity wave feedback mechanism for troposphere - ionosphere coupling (6.3).

H. Hass, A. Ebel: Time and length scales from radiance measurements and eddy transport parameterization (6.4).

L.B. Callis, M. Natarajan, J.M. Russell III: Analysis of the stratospheric odd nitrogen budget using LIMS data (7.1).

G. Brasseur, A. De Rudder, C. Tricot: Chemical and thermal response of the middle atmosphere to coupled man-made perturbations (7.2).

A.J. Owens, C.H. Hales, D.L. Filkin, C. Miller, A. Yokozeki, J.M. Steed, J.P. Jesson: Thermal and chemical feedbacks of potential stratospheric perturbations (7.3).

D.J. Wuebbles , F.M. Luther: Anthropogenic influences on stratospheric chemistry and temperature (7.4).

D.L. Hartmann: Barotropic instability in the stratosphere (7.5).

B. Goretzki: The development of a global, travelling Rossby wave under solstice conditions (7.5)

M. Memmesheimer: The influence of dissipating gravity waves in a zonally averaged model of the middle atmosphere (7.7).

B. Rockel: An economic method for computations of infrared cooling rates due to CO_2 absorption in the stratosphere and mesosphere (7.8).

W. Braun, H.U. Dütsch: The origin of ozone-rich air in the middle stratosphere observed over Europe at the end of January 1979 (8.1).

S. Solomon, J.M. Russell III: Model calculations and observations of NO_2 abundance in the mesosphere and upper stratosphere (8.2).

J.C. Gille, S.A. Beck, J.M. Russell III: Global mean distribution of nitric acid (8.3).

S. Chandra: Winter oscillations in stratospheric ozone and temperature (8.4).

G.E. Thomas, R.W. Sanders: Satellite measurements of stratospheric water vapor (8.5).

P.Sikka, R. Vijayakumar, A.M. Selvam, Bh.V. Ramana Murty: Measurements of atmospheric total ozone by Chappuis method and comparison with Dobson data (8.6).

M. Schmidt, R. Borchers, P. Fabian, G. Flentje, S. Lal, W.A. Matthews, A. Szabo, W. Seiler, W. Bischof: Trace gas measurements during aircraft flights in the tropopause region over Europe and North Africa (Project SIMOC) (8.7).

S.S. Prasad, E.C. Zipf: Non-biogenic atmospheric sources of nitrous oxide (8.8).

F.X. Meixner: Investigations of the vertical sulfur dioxide distribution at the tropopause level (8.9).

K. Sekihara: On the decomposition of polyatomic molecules in the lower stratosphere due to geomagnetic storms (8.10).

B.H. Subbaraya, A. Jayaraman: Rocket measurements of aerosol size distribution and number densities in the troposphere and stratosphere (9.1).

A.F. Roddy: Effects of increasing atmospheric carbon dioxide concentration on noctilucent clouds (11.1).

P. Schulte, F. Arnold: Possible meteor smoke detection in the upper atmosphere (11.2).

M.J. Taylor, M.A. Hapgood, P. Rothwell: Thunderstorm induced small scale OH airglow structures (11.3).

M.J. Taylor, P. Rothwell, M.A. Hapgood: OH airglow structure and lunar tides--is there a link? (11.4).

P. Muralikrishna, B.H. Subbaraya, S. Prakash: Observation of waves in the mesosphere by photography of OH airglow (11.5).

F. Bertin, A. Cremieu: Is there thermal equilibrium between ions and neutrals in low thermosphere at midlatitude? (11.6).

R.G.H. Greer, D.P. Murtagh, G. Witt, J. Stegman: Rocket induced radiant contamination of airglow measurements in the lower thermosphere (11.7).

D.P. Murtagh, R.G.H. Greer, E.J. Llewllyn: A rocket measurement of the hydroxyl nightglow (8-3) band at 724 nm and the $\Delta v = 2$ progression in the 1.6 μm region (11.8).

W.R. Sheldon, J.R. Benbrook, C.G. Gelpi: Energetic electron precipitation in the middle atmosphere: a diurnal southern hemisphere effect (11.9).

M. Petitdidier, J.L. Fellous: Lower thermosphere dynamics from simultaneous meteor radar winds and green line intensity measurements (11.10).

VRA. WORKSHOP ON THE VENUS INTERNATIONAL REFERENCE ATMOSPHERE (VIRA)

Dates: 24-26 August 1983 Rooms: D2095
Organizer: Committee on Space Research (COSPAR)
Co-sponsors: IAGA, IAMAP, and IAU
Conveners: G.M. Keating (USA), V.I. Moroz (USSR), A.J. Kliore (USA)
Representatives: A. Hedin (IAGA), M.Ya. Marov (IAMAP), G. Hunt (IAU)

In this Workshop, material was presented for potential inclusion in the Venus International Reference Atmosphere (abbreviated to VIRA). VIRA is a handbook of concise information concerning the Venus atmosphere, suitable for use by scientists in many disciplines. VIRA includes information obtained from the Venera and Pioneer Venus programs.

The aim of the workshop was to discuss sets of recent results of Venus exploration with a view of resolving differences and arriving at atmospheric models which will be of general use. The meeting topic included:

Chemical composition below the homopause,
Structure of the lower atmosphere,
Structure of the ionosphere,
Solar and thermal radiation balance,
Neutral atmosphere structure including chemical composition, and
Ionosphere and solar wind interaction.

For each topic listed above, a comprehensive review was presented by one or more representative(s). The scheduled program is shown below.

(G.M. Keating)

G.M. Keating: Welcome to 1983 VIRA Workshop

Structure and Dynamics below 100 km (Chairmen: A. Seiff, V.I. Moroz)

V.V. Kerzhanovich, M.Ya. Marov, V.I. Moroz: The proposals for VIRA (Venus Internal Reference Atmosphere): Structure and dynamics below 100 km (Invited) (VRA.01).

A. Seiff: The structure of Venus' atmosphere below 100 kilometers (Invited) (VRA.02).

A.J. Kliore: The latitude dependence of the thermal structure of the Venus atmosphere and its variability with time (Invited) (VRA.03).

F.W. Taylor: Atmospheric structure in the middle and upper atmosphere (above 60 km) (Invited) (VRA.04).

S.S. Limaye: Venus atmospheric circulation from surface to cloud level (VRA. 05).

L.A. Sromovsky, V.E. Suomi, H.E. Revercomb: Venus atmospheric temperatures inferred from Pioneer Venus small probe net flux radiometer sensor temperatures (Invited) (VRA.06).

F.L. Scarf, C.T. Russell: Measurements of Venus lightning from the Pioneer orbiter (Invited) (VRA.07).

Chemical Composition below Homopause (Chairman: V. von Zahn)

V.I. Moroz, L.M. Mukhin: The proposals for VIRA (Venus International Reference Atmosphere): Chemical composition below homopause (Invited) (VRA.08).

J.H. Hoffman, R.R. Hodges, Jr.: Composition of the lower atmosphere of Venus (Invited) (VRA.09).
L.W. Esposito: Temporal and spatial variations of sulfur dioxide on Venus (VRA.10).
M.N. Rao: Noble gas abundance in Venus atmosphere (VRA.11).
U. von Zahn: Composition of the middle atmosphere of Venus (Invited) (VRA.12).
B. Ragent: Particulate matter in the atmopsphere of Venus (Invited) (VRA.13).
M.Ya. Morov: The proposals for VIRA (Venus International Reference Atmosphere): Particulate matter (Invited) (VRA.14).

Neutral Upper Atmosphere (Chairman: G.M. Keating)

R.R. Hodges: Venus exospheric hydrogen (VRA.16).
G.M. Keating: Reference models of Venus neutral upper atmosphere structure including chemical composition (Invited) (VRA.17).
J.L. Bertaux, V.G. Kurt, A.S. Smirnov: Atomic hydrogen and helium observed in the upper atmosphere of Venus with Venera 11 and Venera 12 EUV spectrometer (Invited) (VRA.17a).

Ionospheric Structure (Chairman: A.J. Kliore)

K.L. Miller, W.C. Knudsen: A model of the Venus ionosphere (Invited) (VRA.18).
T.K. Breus, K.I. Gringauz, M.I. Vergin: The proposals for VIRA (Venus International Reference Atmosphere): Ionosphere (Invited) (VRA.19).
A.J. Kliore: The structure of the Venus ionosphere and its variability with time in the solar cycle (Invited) (VRA.20).
R.F. Theis, L.H. Brace, R.C. Elphic: A new global empirical model of the electron temperature and density of the ionosphere of Venus (VRA.21).

Ionopause and Solar Wind Interaction (Chairman: S.J. Bauer)

S.J. Bauer: Solar control of the Venus ionosphere (Invited) (VRA.22).
J.L. Phillips, C.T. Russell, J.G. Luhmann, L.H. Brace: Magnetic field effects on the Venus (Invited) (VRA.23).
C.T. Russell, J.G. Luhmann: The geometry of the low altitude magnetic belt in the Venus ionosphere (VRA.24).
H. Pérez-de-Tejada: Distribution of plasma and magnetic fluxes in the Venus near wake (VRA.25).

Solar and Thermal Radiation Balance (Chairmen: F.W. Taylor, V.I. Moroz)

V.I. Moroz, B.E. Moshkin, A.P. Ekonomov: The proposals for VIRA (Venus International Reference Atmosphere): Solar and thermal radiation (Invited) (VRA.26).
F.W. Taylor: Solar and thermal radiation balance (Invited) (VRA.27).
M.G. Tomasko, L.R. Doose, P.H. Smith: The absorption of solar energy and the structure of the clouds of Venus (Invited) (VRA.28).
V.E. Suomi, H.E. Revercomb, L.A. Sromovsky: Pioneer Venus thermal flux measurements on the small entry probes: Limits and implications (Invited) (VRA. 29).
W. Döhler, K. Schäfer, D. Spänkuch: Line-by-line gaseous transmittances for Venus standard atmospheres in the 250 cm^{-1} to 1400 cm^{-1} region (VRA.30).
D. Spänkuch, W. Döhler, K. Schäfer, L. Sasova, E. Ustinov: Spectral radiances for Venus standard atmospheres in the 250^{-1} to 1400 cm^{-1} region (VRA. 31).

VIRA WORKING SESSIONS

Wednesday, 24, August, Room: D2091
Informal Workshop meetings (0900-2100^{h})
Thursday, 25 August, Rooms: D2085 and D2091
WORKSHOP I on Structure and Dynamics below 100 km (Conveners: A Seiff and V.I. Moroz)
WORKSHOP II on Chemical Composition below Homopause (Conveners: U. von Zahn and V.I. Moroz)
WORKSHOP III on Particulate Matter in Atmosphere (Convener: B. Ragent)
WORKSHOP IV on Neutral Upper Atmosphere (Convener: G.M. Keating)
WORKSHOP V on Ionosphere (Convener: S.J. Bauer)
WORKSHOP VI on Solar and Thermal Radiation Balance (Conveners: F.W. Taylor and V.I. Moroz)
Friday, 26 August, Rooms: D2085, D2091
WORKSHOP I: Conclusions (A. Seiff and V.I. Moroz)
WORKSHOP II: Conclusions (U. von Zahn and V.I. Moroz)
WORKSHOP III: Conclusions (B. Ragent)
WORKSHOP IV: Conclusions (G.M. Keating and V.A. Krasnopolsky)
WORKSHOP V: Conclusions (S.J. Bauer)
WORKSHOP VI: Conclusions (F.W. Taylor and V.I. Moroz)
General Discussion and Future Plans (Chairman: G.M. Keating)
COSPAR VIRA Working Group Meeting (Conveners: A.J. Kliore and V.I. Moroz)

CDW. INITIAL RESULTS OF COORDINATED DATA ANALYSIS WORKSHOP (CDAW)-6: ENERGY TRANSFER IN NEAR EARTH SPACE (Organized by SCOSTEP; Conveners: R.H. Manka, R.L. McPherron)

August 24 and 26 Room: D2101

The Coordinated Data Analysis Workshop (CDAW) - 6 Analysis Process consists of a series of workshops, analysis meetings, and presentation and publication of papers over a three year period. The scientific goal of CDAW-6 is to better understand:

Energy Transfer in Near-Earth Space (In particular, transfer of energy from the solar wind to the magnetosphere and release associated with the substorms of 22 March and 31 March, 1979.)

About 100 scientists from 15 countries are participating. Approximately 80 data sets from 13 satellites and numerous ground arrays in Europe, the USSR, and North America are included in the data base that has been constructed at the NASA Goddard Space Flight Center. These include data from:

Satellites: ISS-1, ISEE-2. ISEE-3, IMP-8 (high altitude);
ESA GEOS-2, SCATHA, GOES-2, GOES-3, 1977-007, 1976-059 (synchronous);
TIROS-N, P78-1, DMSP-F2 (polar).

Ground Arrays: World Magnetic Observatories, AFGL Magnetometer Chain, IMS Mid-Latitude Chain, IMS Fort Churchill Chain, IMS Alaska Chain, Alberta Magnetometer Network, Scandinavian Magnetometer Network, U.K. Magnetometer Chain, U.S.S.R. 145° Meridian Chain, U.S.S.R. 162° Meridian Chain, STARE and Saint Santin Radars.

An important part of CDAW-6 has been the development of large numerical models, specifically tailored to the CDAW events, including

Rice Convection Model
Olson-Pfitzer Dynamic Magnetic Model
Voigt Tail Magnetic Model
Ionospheric Current System Model (Kamide et al.)

So far, workshops have been held at: Helsigor, Denmark, October 1981, Palo Alto, December 1981, NASA GSFC, February 1982, Darmstadt, September 1982, NASA GSFC, October 1982, before the occasion of the IAGA Assembly, Hamburg, August 1983.

Tha actual program of CDAW-6 meeting in Hamburg is shown below. A part of the scientif results from the CDAW-6 series of workshops appeared in the Journal of Geophysical Research, Volume 90, Number A2, February 1, 1985, pp. 1175-1374. The list of the published papers are also given below.

(R.H. Manka)

CDAW-6 Scientific Overviews and Introductory Comments (Chairman: R.H. Manka)

G. Rostoker: The post-IMS data analysis phase and plans for Graz meeting.
R.H. Manka: Status and plans for CDAW-6.
R.L. McPherron, R. Manka: CDAW-6: An overview of the March 22, 1979 substorm event (Invited) (CDW.01).
W. Baumjohann, G. Haerendel: The 31 March 1979 event - Overview (Invited) (CDW.02).

Magnetospheric Response to Solar Wind (Chairmen: G. Paschmann and A. Pedersen)

B.T. Tsurutani, J.A. Slavin, C.T. Russell, R.D. Zwickl, J.H. King. Y. Kamide: Coupling between the solar wind and the magnetosphere (Invited) (CDW.03).
W.P. Olson, K.A. Pfitzer: Quantitative modeling of the disturbed magnetospheric magnetic field (Invited) (CDW.04).
K.A. Pfitzer, W.P. Olson: The induced electric field during the CDAW events (CDW.05).
K.B. Baker, K. Pfitzer, W. Olson, A. Pedersen, R.A. Greenwald: The effect of induced electric fields on the electric coupling between the magnetosphere and ionosphere (CDW.06).
B. Wilken, D.N. Baker, P.R. Higbie, T.A. Fritz, W.P. Olson, K.A. Pfitzer: Magnetospheric configuration and energetic particle effects associated with the SSC on March 22, 1979 (Invited) (CDW.07).
K. Knott, A. Pedersen: GEOS-2 electric field observations in the dayside geostationary orbit during an SSC and subsequent substorm (22 March 1979) (CDW.08).

SPECIAL CDAW DISCUSSION ON TAIL RECONNECTION

Tail Reconnection I: Invited Panel on Theory and Modeling (Chairman: G. Haerendel)

S.W.H. Cowley: Signatures of reconnection in the geomagnetic tail (CDW.09).
C.K. Goertz: Time variations in reconnection models (CDW.10).
R.J. Walker: Modeling the magnetotail and reconnection (CDW.11).
G. Rostoker: Implications for the plasma flow configuration in the magnetotail of the assumption of the existence of a near earth neutral point (CDW.12).

Tail Reconnection II: Data and Interpretation (Chairman: C.T. Russell)

R.L. McPherron, C.T. Russell: CDAW-6: Changes in the tail magnetic field during the 1055 UT March 22, 1979 substorm (CDW.13).
G. Paschmann, D.H. Fairfield, E.W. Hones, Jr., C. Huang, W. Lennartsson, S. Orsini: Plasma signatures of substorm activity in the magnetotail: ISEE-1 and -2 observations on 22 March 1979 (Invited) (CDW.14).
T.A. Fritz, D.N. Baker: Energetic particle observations during the CDAW 6 substorm event of March 22, 1979 (Invited) (CDW.15).
W.J. Heikkila: The substorm at 1030 and 1055 UT, 22 March, 1979 (CDW.16).
C.Y. Huang, T.E. Eastman, L.A. Frank: Observations of plasma distributions during the CDAW substorms (CDW.17).

Panel Discussion on Reconnection

Energy Storage and Release in the Tail: Storm Effects (Chairman: T.A. Fritz)

D.N. Baker, T.A. Fritz, R.L. McPherron: Evidence for magnetotail energy storage prior to substorms during the CDAW-6 analysis intervals (Invited) (CDW.18).
A. Pedersen, K. Knott, C.A. Cattell, F.S. Mozer, C.-G. Fälthammar, P.-A. Lindqvist: Electric fields in the plasmasheet and plasmasheet boundary layer (Invited) (CDW.19).
W. Lennartsson, R.D. Sharp: Substorm effects on the plasma sheet ion composition on March 22, 1979 (CDW.20).
S. Orsini, E. Amata, M. Candidi, H. Balsiger, M. Stokholm, C. Huang, W. Lennartsson, P.A. Lindqvist, G. Paschmann: Cold ionospheric O^+ beams in the inner plasma sheet during the March 22, 1979 substorms (CDW.21).
M. Stokholm, H. Balsiger, E. Amata, S. Orsini, M. Candidi, A. Pedersen: Simultaneous observations of beam-like ionospheric ions at GEOS and ISEE during the recovery phase of the March 22, 1979 substorms (CDW.22).
J.F. Fennell, D.R. Croley: The 22 March 1979 substorms: Near geostationary orbit plasma results (CDW.23).
A. Korth, G. Kremser, A. Roux, S. Perraut, J.-A. Sauvaud, J.-M. Bosqued, A. Pedersen, B. Aparicio: Drift boundaries and ULF wave generation near noon at geostationary orbit (CDW.24).

Convection, Coupling to Ionosphere and Dissipation (Chairmen: W. Baumjohann and R.L. McPherron)

Y. Kamide: Numerical modeling of ionospheric parameters for the CDAW-6 intervals (Invited) (CDW.25).
E. Friis-Christensen, Y. Kamide, G. Rostoker: Convection currents in the dayside polar cap during the March 22, 1979 substorms (CDW.26).

C.R. Clauer, Y. Kamide: DP1 and DP2 current systems for the March 22, 1979 substorms (CDW.27).

K.H. Glassmeier and the participants of the CDAW 6.2: Observations related to Pi2 associated current vortices as seen by ground magnetometers on 31 March 1979 (CDW.28).

P.H. Reiff, R.W. Spiro, Y. Kamide: Comparison of predicted and inferred polar cap potential drops (CDW.29).

R.W. Spiro, R.A. Wolf: Computer simulation of ring-current injection on March 22, 1979 (Invited) (CDW.30).

C. Taieb: The modeling of the midlatitude ionosphere applied to the 22 March 1979 storm (CDW.31).

V.O. Papitashvili, V.A. Popov, A.N. Zaitzev: The global features of polar geomagnetic disturbances according to the LT-UT diagrammes of AE-index (Invited) (CDW.32).

Papers appeared in J. Geophys. Res., 90, A2 (Feb. 1, 1985)

R.L. McPherron, R.H. Manka: Dynamics of the 1054 UT March 22, 1979, substorm event: CDAW 6.

B.T. Tsurutani, J.A. Slavin, Y. Kamide, R.D. Zwickl, J.H. King, C.T. Russell: Coupling between the solar wind and the magnetosphere: CDAW 6.

D.H. Fairfield: Solar wind control of magnetospheric pressure (CDAW 6).

D.N. Baker, T.A. Fritz, R.L. McPherron, D.H. Fairfield, Y. Kamide, W. Baumjohann: Magnetotail energy storage and release during the CDAW 6 substorm analysis.

G. Paschmann, N. Sckopke, E.W. Hones, Jr.: Magnetotail plasma observations during the 1054 UT substorm on March 22, 1979 (CDAW 6).

A. Pedersen, C.A. Cattell, C.-G. Fälthammar, K. Knott, P.-A. Lidqvist, R.H. Manka, S.F. Mozer: Electric fields in the plasma sheet and plasma sheet boundary layer.

W. Lennartsson, R.D. Sharp, R.D. Zwickl: Substorm effects on the plasma sheet ion composition on March 22, 1979 (CDAW 6).

M. Stockholm, E. Amata, H. Balsiger, M. Candidi, S. Orsini, A. Pedersen: Low energy (130 eV) oxygen ions at the geosynchronous orbit during the CDAW 6 event of March 22, 1979.

F.M. Ipavich, A.B. Galvin, M. Scholer, G. Gloeckler, D. Hovestadt, B. Klecker: Suprathermal O^+ and H^+ ion behavior during the March 22, 1979 (CDAW 6), substorms.

D.N. Baker, T.A. Fritz, W. Lennartsson, B. Wilken, H.W. Kroehl, J. Birn: The role of heavy ionospheric ions in the localization of substorm disturbances on March 22, 1979: CDAW 6.

K. Knott, A. Pedersen, U. Wedeken: GEOS 2 electric field observations during a sudden commencement and subsequent substorms.

J.N. Barfield, C.S. Lin, R.L. McPherron: Observations of magnetic field perturbations at GOES 2 and GOES 3 during the March 22, 1979, substorms: CDAW 6 analysis.

W.J. Hughes, H.J. Singer: Mid-latitude Pi2 pulsations, geosynchronous substorm onset signatures and auroral zone currents on March 22, 1979: CDAW 6.

Y. Kamide, W. Baumjohann: Estimation of electric fields and currents from International Magnetospheric Study magnetometer data for the CDAW 6 intervals: Implications for substorm dynamics.

P.H. Reiff, R.W. Spiro, R.A. Wolf, Y. Kamide, J.H. King: Comparison of polar cap potential drops estimated from solar wind and ground magnetometer data: CDAW 6.

E. Friis-Christensen, Y. Kamide, A.D. Richmond, S. Matsushita: Interplanetary magnetic field control of high-latitude electric fields and currents determined from Greenland magnetometer data.

K.B. Baker, Y. Kamide: A comparison of ionospheric electric fields inferred from Scandinavian Twin Auroral Radar Experiment drift data and from global International Magnetospheric Study magnetometer data.

C.R. Clauer, Y. Kamide: DP 1 and DP 2 current systems for the March 22, 1979 substorms.

C. Mazaudier: Electric currents above Saint-Santin, 3, A preliminary study of disturbances: June 6, 1978; March 22, 1979; March 23, 1979.

H.W. Kroehl, Y. Kamide: High-latitude indices of electric and magnetic variability during the CDAW 6 intervals.

RESOLUTIONS OF THE IAGA HAMBURG ASSEMBLY

(adopted 25.8.1983)

RESOLUTION OF THANKS

IAGA is deeply appreciative of the organization and efforts made by the Local Organizing Committee of IUGG; in particular it commends the excellent arrangement by the Geomagnetism staff of the Deutsches Hydrographisches Institut (Dr. D. Voppel and his colleagues) to make our meeting effective and productive and to help make our stay in Hamburg pleasant and enjoyable.

SCIENTIFIC RESOLUTIONS

1. IAGA welcomes the news that the World Data Centre C2 for Geomagnetism in Kyoto (Japan) has completed the derivation of the Auroral Electrojet (AE) indices for the International Magnetospheric Study Years 1978, 1970 and the first half of 1980; congratulates those responsible for this fruitful and important work involving international cooperation, looking forward to the continuing cooperation of the WDC-C2 for Geomagnetism with the Japanese National Institute of Polar Research and recommends strongly that observatories contribution the data for the AE-index do so in digital form as soon as is practical

2. IAGA notes the scientific importance of Interplanetary Medium data and recommends that such data continue to be recorded for onward transmission to the World Data Centres.

3. IAGA commends the progress being made by the World Data Centres in developing computer-based techniques for data transmission and storage and urges the establishing of compatibility in both hardware and software, including the standardization of data formats.

4. IAGA recognizes that the quality of results from long time series depends on the accuracy and homogeneity of the data sets; notes that K indices from different networks of observatories have been used for many years in deriving planetary activity indices Ap, Am and Aa, and that some observatories are now using digital recording systems and machine data reductions; and recommends (1) that routine derivation of K-indices continues by hand scaling according to the method proposed by Bartels (developed by Mayaud in IAGA Bulletin No. 21); and (2) that new machine derived indices be given distinctly different names to avoid confusion with existing indices.

5. IAGA recognizes the value of the MAGSAT global vector survey in defining the main magnetic field of 1980, the need for knowledge of the secular variation, its contribution to separating internal and external field variations, and the extreme usefulness of satellite observations of the magnetic field in delineating long-wavelength crustal anomalies and in producing magnetic charts; urges that another magnetic vector field satallite survey be carried out, most desirably at an altitude significantly lower than

MAGSAT and preferably before 1990, and notes that a satellite such as the proposed Geopotential Research Mission of the USA would be excelllent for the performance of these tasks.

6. IAGA will issue a revision of the International Geomagnetic Reference Field extending it from 1985 to 1990 and recognizing the crucial importance of recent data on secular variation for the accuracy of the revision asks geomagnetic programme directors to make an extraordinary effort to transmit their most recent data related to secular variation, including magnetic observatory mean values for 1983 and repeat survey results, to the World Data Centres before July 1, 1984.

7. IAGA appreciates the importance of long wavelength anomalies for the investigation of large-scale structures in the deeper parts of the Earth's crust and recommends the compilation of geomagnetic surveys of Europe and other regions in such a way as to allow the preparation of consistent anomaly maps.

8. IAGA notes the immense value to the scientific community of international programs for coordinated data acquisition, analysis and interpretation (e.g., IGY, IQSY, IMS, MAP, SMY) and recognizing the importance, complexity and dynamic nature of the solar-terrestrial interaction, urges member nations to support and to participate in ICSU planning for international programs during the coming decade designed to acquire and to analyze widespread and well-coordinated data for quantitative investigations of the physical and chemical processes involved in the solar-terrestrial interaction.

RESOLUTIONS AIGA DE L'ASSEMBLEE DE HAMBOURG

(adopté 25.8.1983)

RESOLUTION DE REMERCIEMENTS

L'AIGA a apprécié l'organisation et les efforts faits par le Comité d'organisation local ; en particulier il tient à mentionner l'excellent arrangement mis en place par le groupe de Géomagnétisme du Deutsches Hydrographisches Institut (Dr. D. Voppel et ses collègues) qui a permis à la réunion d'être efficace et productive et a contribué à rendre notre séjour à Hambourg très agréable.

RESOLUTIONS SCIENTIFIQUE

1. L'A.I.G.A. accueille la nouvelle que le Centre Mondial de données pour le géomagnétisme WDC-2 situé à Kyoto (Japon) a terminé le calcul des indices de l'Electrojet auroral (AE) pour les années de l'I.M.S., 1978, 1979 et la première moitié de 1980 ; félicite les responsables de ce travail fructueux et précieux qui a fait appel à la coopération internationale, espérant que l'Institut National de Recherche Polaire poursuive cette coopération avec le WDC-C2 pour le géomagnétisme, et recommande fortement que les observatoires contribuant à la fourniture de données pour l'index AE le fasse dès que possible sous forme digitale.

2. L'A.I.G.A. note l'importance scientifique des données sur le milieu interplanétaire et recommande que de telles données continuent à être enregistrées pour être transmises aux Centres Mondiaux de données.

3. L'A.I.G.A. reconnait le progrès qui a été fait par les Centres Mondiaux de données dans l'utilisation d'ordinateurs pour la transmission et l'archivage des données et demande que soient recherchées la compatibilité entre les matériels, les logiciels et la standardisation du format des données.

4. L'A.I.G.A. reconnait que la qualité des résultats des séries de longue durée dépend de la précision et de l'homogénéité des ensembles de données ; note que les indices K des différents réseaux d'observatoires ont été utilisés depuis de nombreuses années en dérivant les indices d'activité planétaire Ap, An et Aa et que quelques observatoires utilisent maintenant des systèmes d'enregistrements digitaux et le traitement des données par ordinateur, et recommande (1) que le calcul systématique des indices K continue de façon manuelle selon la méthode proposée par Bartels (développée par Mayaud dans le Bulletin AIGA N° 21); et (2) que les indices déduits par ordinateur soient affectés de noms différents de façon à éviter une confusion avec les indices existant.

5. L'A.I.G.A. reconnait la valeur de la surveillance par MAGSAT du vecteur global pour définir le champ magnétique principal de 1980, le besoin de connaître la variation séculaire, sa contribution pour séparer les variations du champ interne et externe, et la très grande utilité des observations satellitaires du champ magnétique pour localiser les anomalies crustales de grande longueur d'ondes et pour produire les cartes magnétiques ; demande qu'une autre surveillance par satellite du champ magnétique soit effectuée, si possible à une altitude nettement inférieure à celle de MAGSAT et de préférence avant 1990 et remarque qu'un satellite comme celui de projet "Geopotential Research Mission" des Etats Unis serait excellent pour remplir ces taches.

6. L'A.I.G.A. éditera une version révisée du champ de référence Géomagnétique International s'étendant de 1985 à 1990, et reconnaissant l'importance majeure des données récentes sur la variation séculaire pour la précision de la révision, demande aux directeurs des programmes de géomagnétisme de faire un effort exceptionnel pour transmettre leurs données les plus récentes concernant la variation séculaire, y compris les valeurs moyennes pour 1983 des observatoires magnétiques et les résultats des récentes surveillances, aux Centres Mondiaux de données avant le 1er juillet 1984.

7. L'A.I.G.A. apprécie l'importance de l'étude des anomalies de grande longueur d'onde pour la recherche des structures de grande échelle dans les régions les plus profondes de la croute terrestre et recommande le regroupement des surveillances géomagnétiques d'Europe et d'autres régions de façon à permettre la préparation de cartes d'anomalies complètes.

8. L'A.I.G.A. note le très grand intérêt pour la communauté scientifique des programmes internationaux permettant la coordination de l'acquisition de données, de l'analyse et de l'interprétation (par exemple, IGY, IQSY, IMS, MAP, SMY) et reconnaissant l'importance, la complexité et la nature dynamique de l'interaction Soleil-Terre, demande instamment que les nations membres soutienne et participe aux plans de C.I.U.S. concernant les programmes internationaux pendant la prochaine décade dans le but d'acquérir et d'analyser des données nombreuses et coordonnées devant permettre une étude quantitative des processus physiques et chimiques mis en jeu dans l'interaction Soleil-Terre.

Transactions of the IAGA Hamburg Assembly (IAGA Bulletin No.49)

STATUTES AND BY-LAWS

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY

STATUTES*

I. Objectives, Structure and Membership of the Association

1. The Objectives of the International Association of Geomagnetism and Aeronomy (henceforth IAGA) are:

a) to promote studies of magnetism and aeronomy of the Earth and other bodies of the solar system, and of the interplanetary medium and its interaction with these bodies, where such studies have international interest;

b) to encourage research in the above subjects by individual countries, institutions or persons and to facilitate its international coordination;

c) to provide an opportunity, on an international basis, for discussion and for publication of the results of the researches indicated above;

d) to promote appropriate standardizations of observational programs, data acquisition systems, data analysis and publication.

2. To achieve its objectives, the Association may establish any number of Component Bodies both within the Association and jointly with other Associations of IUGG or components of other ICSU Bodies.

3. The countries which adhere to the IUGG are members of the IAGA and may participate in its activities.

4. Each Member Country shall be represented by a single body (henceforth referred to as IAGA National Body), established in that country by the body that adheres to the IUGG.

II. Administration

5. The work of the Association shall be directed by the Conference of Delegates.

The Conference of Delegates shall consist of the Delegates of the Member Countries, such accreditation having been communicated to the Secretary General prior to the start of the Assembly by the respective IAGA National Bodies. Among the Delegates from each Member Country, one shall be identified by the respective IAGA National Body as Chief Delegate for the purpose of casting that country's votes on administrative and financial matters as stipulated in Articles 14 and 15 of these Statutes.

A Delegate may represent only one Member Country. A member of the Executive Committee (see Article 7) may not be Chief Delegate, except in the case where

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* Adopted by the Extraordinary Assembly of the Association, Seattle, 1977. Modified by the Conference of Delegates in Hamburg in August 1983.

that member is the only one person in attendance from the country in question.

A Conference of Delegates shall be convened during each Assembly of IAGA. An ordinary General Assembly of IAGA shall normally be held in connection with each ordinary General Assembly of IUGG.

The interval elapsing between the end of one ordinary General Assembly and the end of the next one will, for the purposes of the Statutes, be termed one period.

6. Responsibility for the direction of IAGA affairs between meetings of the Conference of Delegates shall be vested in the Executive Committee of the Association elected by the Conference of Delegates. Decisions of the Executive Committee must be reported to the Conference of Delegates. Any decision or recommendation failing to receive the concurrence of the Conference of Delegates may be remitted to the Executive Committee for further study.

7. The Executive Committee shall consist of the President, two Vice-Presidents, the Secretary General, five other Members, and the retiring President, ex officio.

Except for the retiring President all members of the Executive Committee shall be elected by the Conference of Delegates as an administrative matter as stipulated in Article 14 of the Statutes.

The President shall be elected for one period, and may not be reelected to the same office. The Vice-Presidents shall be elected for one period and may be re-elected once. A retiring Vice-President may be elected President. The Secretary General shall be elected for two periods and may be reelected for successive single periods. The five additional Members shall be elected for one period and may be reelected for successive single periods; they may not hold office for more than three consecutive periods. The retiring President is a member ex officio for only one period.

In the event of any vacancy occurring in the membership of the Executive Committee during one period, the Executive Committee shall have the power to fill the vacancy by appointment, until the end of the period. The eligibility for election of a person so appointed shall not be affected by such an appointment. If the vacancy is that of the Presidency, the Executive Committee shall appoint one of the two Vice-Presidents to act as President until the end of the period. With the exception of the Secretary General, no person shall be elected to any position on the IAGA Executive Committee for four periods.

8. The duties of the Executive Committee shall be to administer the affairs of the Association in accordance with these Statutes and By-Laws and with the decisions of the Conference of Delegates.

The Executive Committee shall meet at the beginning and end of an Assembly and at least once more between ordinary General Assemblies.

9. The duties of the Component Bodies within IAGA (See Article 2 of the Statutes) shall be to further the scientific objectives of the IAGA through: a) effective coordination of appropriate scientific researches; b) organizing scientific meetings; c) promoting the exchange of information and data; and d) advising the Executive Committee on the formulation of general policies to guide the scientific work of the Association.

10. The duties of the Bodies that are established jointly with other Associations of IUGG or components of other ICSU bodies (See Article 2 of the Statutes) shall be to deal with, and coordinate, those scientific programs and/or meetings that cover topics of mutual interest.

III. Finance

11. The Secretary Gneral shall prepare, for each period, a budget estimate

of receipts and expenditures during that period. The Secretary General shall lay this before the Executive Commettee during the General Assembly immediately preceding that period and, having received the approval of the Conference of Delegates, may proceed with the disbursement of funds in accordance with that approved budget.

12. At least six months before the opening of an Ordinary Assembly, a Finance Committee shall be appointed by the Executive Committee to examine the accounts and to report the results of their examination to the Conference of Delegates. No Executive Committee member may at the same time be a member of the Finance Committee.

IV. Voting

13. When a vote is taken on a question which is by nature exclusively scientific, each duly accredited Delegate present at a meeting of the Conference of Delegates shall have one vote.

14. On questions of an administrative nature the voting shall be by Member Countries, each Member Country having one vote cast by its Chief Delegate (or that person's representative, in accordance with the By-Laws).

15. On questions of a financial nature, the voting shall be by Member Countries, each Member Country having a number of votes equal to the number of its category of membership in IUGG. Such votes shall be cast by the Chief Delegate of each Member Country (or that person's representative in accordance with the By-Laws).

16. Matters which are partly scientific and partly administrative in character and not involving matters of finance shall be classified as administrative matters.

17. Before a vote, the President shall decide whether the matter under consideration is scientific, administrative or financial in character.

The President's ruling can be challenged only by the Chief Delegate of a Member Country. In the event of such a challenge, the President's ruling can be changed by a two thirds majority of the Chief Delegates present.

18. Voting on matters of an administrative or financial nature may be conducted by correspondence (in accordance with the By-Laws).

19. For the validity of the deliberations of the Conference of Delegates, half at least of the accredited Chief Delegates must be present (or represented in accordance with the By-Laws).

Decisions of the Conference of Delegates shall be taken by a simple majority except as otherwise specified in the present Statutes. If a tie should occur, the decision shall rest with the President. Simple or two thirds majority shall be determined by the proportion of affirmative votes to the sum of the affirmative and negative votes.

V. General

20. These Statutes or any further modifications thereof shall come into force at the close of the General Assembly at which they are adopted, or as otherwise decided by the Conference of Delegates.

21. These Statutes may not be modified except with the approval of at least a two thirds majority of Member Countries who have accredited Delegates to the Assembly, in accordance with articles 5 and 14 of the Statutes.

22. Only Member Countries may propose a change of these Statutes. Any such proposal must reach the Secretary Genral at least six months before the announced date of the General Assembly at which they are to be considered. The Secretary General shall notify all Member Countries of any proposed change, at least four months before the announced date of the General Assembly.

23. The Conference of Delegates shall have the power to adopt By-Laws within the framework of the Statutes of the Association. These By-Laws are adopted or may be modified by a simple majority of Member Countries who have accredited Delegates to the Assembly, in accordance with Articles 5 and 14 of the Statutes. By-Laws or any further modification thereof, shall come into force at the close of the General Assembly at which they are approved unless otherwise decided by the Conference of Delegates.

24. The present Statutes have been prepared in the official languages of the IUGG. The English text shall be authoritative if there is a question of interpretation.

BY-LAWS*

I. Composition

1. The Components of IAGA shall be called Divisions and Interdivisional Bodies (Commissions or Working Groups) as follows:

Division I : Internal Magnetic Fields
Division II : Aeronomic Phenomena
Division III : Magnetospheric Phenomena
Division IV : Solar Wind and Interplanetary Magnetic Field
Division V : Observatories, Instruments, Indices and Data
Interdivisional Commission : Antarctic Research
Interdivisional Commission : History
Interdivisional Commission : Middle Atmosphere
Interdivisional Commission : External/Internal Geomagnetic Relations
Interdivisional Commission : Developing Countries.

2. Each Division or Interdivisional Body shall propose to the Executive Committee its own role, strucutre and modus operandi, which must be approved by the Executive Committee. The role and the effectiveness of each Division and Interdivisional Body shall be reviewed by the Executive Committee at each ordinary General Assembly.

3. The leaders for each Division and Interdivisional Body shall be appointed by the Executive Committee for one period, subject to ratification by the Conference of Delegates. Vacancies occurring in the interim shall be filled by the Executive Committee.

In order that their appointments shall become effective, Division and Interdivisional Body leaders must express in writing to the President their willingness to serve in the functions specified.

4. The leaders of Divisions and Interdivisional Bodies are empowered to appoint for each period reporters, working group leaders, and the leaders of other possible subdivisions.

5. While it is recognized that the prime criteria for the appointments in Articles 3 and 4 of these By-Laws should be the scientific and administrative

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* Adopted by the Extraordinary Assembly of the Association, Seattle, 1977 and modified by the Conference of Delegates, Seattle, 1977; Camberra, December 1979; and Hamburg, August 1983.

competence of the candidates, Executive Committee and Division and Interdivisional Body leaders shall see that, wherever possible, these appointment are made with due respect to adequate geographical representation.

6. The Executive Committee may create Joint Bodies with other IUGG Associations and components of other ICSU Bodies to deal with topics of mutual interest and carries out the responsibilities of IAGA in the appointment of the appropriate leaders, members, or IAGA representatives, as is required.

In its dealing with non-IUGG Bodies, the Executive Committe shall not commit the name of the IUGG, or act on behalf of the IUGG, unless prior approval has been secured from the IUGG Executive Committee.

II. Administration

7. The President may at any time, with the approval of the Executive Committee, call an extraordinary General Assembly.

The President shall be obliged to call such an Assembly at the request of not less than one-half of the Member Countries.

An extraordinary General Assembly shall have the same powers and be subjected to the same rules as an ordinary General Assembly.

Between ordinary General Assemblies of IAGA, Scientific Assemblies may be held in accordance with IUGG By-Laws.

8. Notice of the date and of the place of the meeting of any Assembly shall be sent by the Secretary General to the Member Countries at least nine months before that Assembly.

9. The provisional agenda of the meetings of the Conference of Delegates shall be prepared by the Secreatary General and circulated to IAGA National Bodies at least three months before the opening of an Assembly. The provisional agenda shall include all items which have been submitted by IAGA National Bodies for discussion at the Conference of Delegates, together with questions placed on the provisional agenda by the Executive Committee. Any of which notice has not thus been given may only be discussed with the consent of the Conference of Delegates.

10. The meeting of the Conference of Delegates shall be open to the public. Any non-delegate may be heard in a discussion provided that person has been previously recognized by the President.

The President may, on his own initiative or at the request of a IAGA National Body, invite representatives of scientific bodies or individuals to attend a meeting of the Conference of Delegates in an advisory capacity.

11. A Member Country which is not represented at a meeting of the Conference of Delegates may vote by correspondence on any specific question of the type indicated in Articles 14 and 15 of the Statutes, with the exception of the election of the Executive Committee, provided that the question has been clearly defined in the final agenda distributed in advance to the Member Countries, provided that the substance of the questions has not been changed and provided that the said vote has been received by the Secretary General prior to the meeting.

Before a vote, the President shall decide whether the procedure of voting by correspondence applies. The President's ruling may be challenged as prescribed in Statute 17.

12. A Chief Delegate of a Member Country may designate another delegate from that country to be his representative at all or part of a meeting of the Conference of Delegates or, if he is unable to do this, the duly accredited

Delegates from that Member Country may designate one of their member to be such a representative of the Chief Delegate. In either case, the Secretary General shall be informed prior to the meeting of the Conference of Delegates at which the representative of the Chief Delegate is to act.

13. At least six months before the opening of an Ordinary General Assembly, the President in consultation with the Executive Committee shall appoint a Nominating Committee, consisting of a Chairman and four members. Members of the Executive Committee may not be appointed to the Nominating Committee.

The Nominating Committee is required to present to the Conference of Delegates at least one candidate for each position of the Executive Committee, at least four days prior to the election.

Besides the proposals of the Nominating Committee, a Chief Delegate may make other nominations in writing to the Chairman of the Nominating Committee, at least two days prior to the election. The combined list of candidates must be made public at least one day prior to the election.

In general, the composition of the Executive Committee should reflect adequate geographical and disciplinary balance.

The election of officers shall be by secret ballot. The President shall select two scrutineers from among the Delegates present. The scrutineers shall not be members of the Executive Committee nor of the Nominating Committee nor candidates for elections.

14. The Executive Committee shall be convened by the President.

At a meeting of the Executive Committee, no member can be represented by another person. For the validity of the deliberations of the Executive Committee, at least half of its members must be present. All decisions of the Executive Committee shall be taken by simple majority of the total number of voting members present. In the case of a tie, the decision shall rest with the President.

When the importance and the urgency of a decision warrant it, a vote by correspondence may be organized by the Secretary General at the request of the President. It is subject to the same rules for validity and majority.

The President may, on his own initiative or at the request of another member of the Executive Committee or of an IAGA National Body, invite representatives of scientific bodies or individuals to attend an Executive Committee meeting in an advisory capacity.

15. Proposals concerning the agenda for meetings of the Executive Committee may be submitted by members of that Committee, by Division or Interdivisional Body leaders, or by IAGA National Bodies; they shall be in the hands of the Secretary General at least three months before the meeting. The final agenda after its approval by the President shall be distributed to the members of the Executive Committee at least one month prior to the meeting. Questions that have not been placed on the agenda may not be discussed at a meeting of the Executive Committee, unless a request to that effect has been approved by the Executive Committee.

16. In addition to the duties specified in Articles 6 and 8 of the IAGA Statutes and Articles 2,3 and 6 of these By-Laws, and subject to general or special directives of the Conference of Delegates, the Executive Committee shall have the power to:

a) act as the organizing committee for all IAGA Assemblies, Symposia and Meetings, or delegate such responsibility to other persons by making the necessary appointments;

b) entrust to special commissions or to particular individuals the preparation of reports on subjects within the province of the Association;

c) invite or appoint persons or institutions belonging to countries which are not members of the Association, to be local correspondents to the Association.

17. The duties of the President of the IAGA are:

a) to represent IAGA in the IUGG Executive Committee;

b) to represent IAGA in its dealings with IAGA National Bodies, the other IUGG Associations and other ICSU Bodies;

c) to represent or to appoint a person to represent IAGA at meetings, conferences or celebrations where formal representation is requested or desirable;

d) to convene the Conference of Delegates and the meetings of the Executive Committee and to preside over their meetings; and

e) to submit a report to the ordinary Conference of Delegates at each General Assembly on the scientific work of the Association.

18. The duties of the Vice-Presidents, one or the other as shall be determined by the Executive Committee are to preside at Conferences of Delegates or Executive Committee meetings in case of impediment to the President, and to represent the President in such an event at IUGG Executive Committee Meetings, as specified in Article 11, paragraph 2, of the IUGG By-Laws. The President may designate one of the Vice-Presidents to act on his behalf in any other function, meeting or conference in which formal representation of IAGA is requested or desirable.

19. The duties of the Secretary General are:

a) to serve as secretary of IAGA, to organize the Assemblies according to the instructions of the Executive Committee, to arrange for the meetings of the Executive Committee, to prepare and distribute promptly the agenda and the minutes of the meetings of the Conference of Delegates and of the Executive Committee;

b) to manage the administrative and scientific affairs of the Association, to attend to correspondence, to maintain and preserve the records;

c) to inform members of the Executive Committee, during the interval between its meetings, about any important affair concerning the Association;

d) to advise the President during the meetings of the IUGG Executive Committee;

e) to receive and keep charge of such funds as may be allocated by the IUGG to the Association, or as may be received from any other source, to disburse such funds in accordance with the decisions of the Conference of Delegates or with the instructions of the Executive Committee, to keep the account of all receipts and disbursements and to submit such account, audited by a qualified accountant, for examination by the Finance Committee appointed according to Article 12 of the IAGA Statutes;

f) to prepare and publish the program and the transactions of the General Assembly;

g) to publish an internal Association bulletin (such as IAGA News) containing all information of general interest to the Association;

h) to prepare for each Assembly the list of the Delegates and Chief Delegates; and

i) to perform such other duties as may be assigned by the President or by the Executive Committee.

III. Finances

20. In the estimation of expenditures by the Secretary General and approval thereof by the Executive Committee, mentioned in Article 11 of the IAGA Statutes, provision shall be made to allocate the expected funds to the following items listed in order a), b), c) of decreasing priority:

a) Operation of the Secretariat of the Association, including the administrative arrangements in preparation for Assemblies and Executive Committee

meetings, the publication of IAGA News and IAGA Transactions, and the travel expenses incurred in the representation of IAGA at IUGG Executive Committee meetings.

Meetings of the Executive Committee during General Assemblies, including travel expenses for the Executive Committee members who cannot otherwise obtain support.

Minor administrative expenses requested by those leaders of Joint Bodies, Divisions and Interdivisional Bodies who have expressed in writing that they were unable to obtain the necessary support from the IAGA National Body, if any, of their country, and from their home institution.

b) Meetings of the Executive Committee that are to take place between Assemblies, including travel expenses for the Executive Committee members.

Partial travel expenses to official administrative or IAGA-sponsored scientific meetings for those leaders of Divisions, Interdivisional Bodies and Joint Bodies, and those invited speakers, conveners, or program committee members, whose participation is judged by the Executive Committee to be essential for the success of the meeting, and who have expressed in writing that they were unable to obtain the necessary support from their home institution.

Travel expenses for the President to attend functions as the representative of IAGA.

Assistance as necessary with the regular publication of the international series of Geomagnetic Indices for which IAGA has primary responsibility.

c) Special publications, special administrative expenses, or any other item not mentioned in a) and b) above which is in accordance with the objectives of the Association.

Compte Rendu de l'Assemblée Générale de l'AIGA tenue à Hambourg (Bulletin No. 49 de l'AIGA)

STATUTS ET RÈGLEMENT INTÉRIEUR

ASSOCIATION INTERNATIONALE DE GÉOMAAGNÉTISME ET D'AÉRONOMIE

STATUTS*

I. Buts, Structure et Composition de l'Association

1. Les buts de l'Association Internationale de Géomagnétisme et d'Aéronomie (AIGA) sont:

a) promouvoir les études de magnétisme et d'aéronomie relatives à la Terre et aux autres corps du système solaire et celles du milieu interplanétaire et de son interaction avec ces corps, lorsque ces études ont un intérêt international,

b) encourager les recherches faites indépendamment, dans ces divers domaines par des pays, des institutions ou des personnes et faciliter leur cordination internationale,

c) permettre, sur le plan international, la discussion et la publication des résultats des recherches précédentes,

d) promouvoir une normalisation convenable des programmes d'observation, des dispositifs d'acquisition de données ainsi que de leurs analyses et publications.

2. Pour atteindre ses buts, l'Association peut établir un nombre quelconque d'Organismes, aussi bien à l'intérieur de l'Association qu'en commun avec d'autres Associations de l'UGGI ou avec des sections d'autres Organismes du CIUS.

3. Les pays qui adhèrent à l'UGGI sont membres de l'AIGA et peuvent participer à ses activités.

4. Chaque Pays Membre est représenté par un Organisme unique (appelé Organisme National de l'AIGA), établi par l'Organisme de ce pays qui a adhéré à l'UGGI.

II. Administration

5. Le fonctionnement de l'Association est dirigé par la Conférence des Délégués.

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* Adoptés par l'Assemblée Générale Extraordinaire de l'Association à Seattle en 1977, et modifiés par la Conférence des Délégués à Hambourg en août 1983.

La Conférence des Délégués se compose des Délégués des Pays Membres, dont l'accréditation a été communiquée au Secrétaire Général avant le début de l'Assemblée par les Organismes Nationaux respectifs de l'AIGA. L'un des Délégués de chaque Pays Membre est désigné par son Organisme National comme Chef de Délégation pour voter au nom de son pays sur les questions administratives at financières ainsi qu'il est stipulé aux articles 14 et 15 des présents Statuts.

Un Délégué ne peut représenter qu'un seul Pays Membre. Un membre du Comité Exécutif (voir article 7 des Statuts) ne peut être Chef de Délégation, sauf s'il est le seul représentant du pays en question.

La Conférence des Délégués est convoquée durant chaque Assemblée de l'AIGA. Une Assemblée Générale ordinaire de l'AIGA se tient normalement en même temps que chaque Assemblée Générale ordinaire de l'UGGI.

L'intervalle entre la fin d'une Assemblée Générale ordinaire et la fin de la suivante est désigné, dans ces Statuts, par le terme "période".

6. La responsabilité de la direction des affaires de l'AIGA entre les réunions de la Conférence des Délégués est confiée au Comité Exécutif de l'Association, élu par la Conférence des Délégués. Les décisions du Comité Exécutif doivent être présentées à la Conférence des Délégués. Toute décision ou recommandation ne recevant pas l'agrément de celli-ci peut être renvoyée au Comité Exécutif pour nouvelle étude.

7. Le Comité Exécutif comprend le Président, deux Vice-Présidents, le Secrétaire Général, cinq autres Membres, et le Président sortant, en tant que membre de droit.

A l'exception du Président sortant, tous les membres du Comité Exécutif sont élus par la Conférence des Délégués selon la procédure prévue pour les questions d'ordre administratif à l'article 14 des Statuts.

Le Président est élu pour une période, et ne peut être réélu a la même fonction. Les Vice-Présidents sont élus pour une période, et peuvent être réélus une fois. Un Vice-Président sortant peut être élu Président. Le Secrétaire Général est élu pour deux périodes; il peut être réélu plusieurs fois pour une période. Les cinq autres Membres sont élus pour une période et peuvent être réélus plusieurs fois pour une période; ils ne peuvent rester en fonction pendant plus de trois périodes consécutives. Le Président sortant est membre de droit pour une seule période.

En cas de vacance en son sein, le Comité Exécutif a pouvoir de désigner quelqu'un pour remplir la vacance jusqu'à la fin de la période. L'éligibilité ultérieure d'une personne ainsi désignée n'en sera pas affectée. Si la vacance est celle du Président, le Comité Exécutif désignera l'un des Vice-Présidents pour exercer les fonctions de Président jusqu'à la fin de la période. A l'exception du Secrétaire Général, nul ne peut être élu à une fonction au sein du Comité Exécutif de l'AIGA pour quatre périodes.

8. Les Comité Exécutif doit administrer l'Association conformément aux présents Statuts et au Règlement Intérieur ainsi qu'aux décisions de la Conférence des Delégués.

Le Comité Exécutif se réunit au début et à la fin d'une Assemblée et au moins une fois entre les Assemblées Générales ordinaires.

9. Le rôle des Organismes intérieurs à l'AIGA (cf. Article 2 des Statuts) est de servir les buts scientifiques de l'Association en prenant en charge la coordination des recherches scientifiques, en organisant des réunions scientifiques, en promouvant l'échange d'informations et de données entre chercheurs, et en conseillant le Comité Exécutif en ce qui concerne la définition d'une politique générale en vue d'orienter les travaux scientifiques de l'Association.

10. Le rôle des Organismes qui sont institués en liaison avec d'autres Associations de l'UGGI ou des membres d'autres Organismes du CIUS (cf. Article 2 des Statuts) est d'assurer la coordination des programmes ou des réunions scientifiques qui concernent des sujets d'intérêt mutuel.

III. Finances

11. Le Secrétaire Général prépare, pour chaque période, un projet de budget des recettes et des dépenses pendant cette période. Au cours de la session de l'Assemblée Générale qui précède immédiatement cette période, le Secrétaire Général présente ce projet au Comité Exécutif et, après approbation de la Conférence des Délégués, peut engager les dépenses prévues au budget.

12. Au moins six mois avant l'ouverture d'une Assemblée Ordinaire, le Comité Exécutif désigne un Comité des Finances pour examiner les comptes et présenter à la Conférence des Délégués un rapport sur les résultats de cette vérification. Un membre du Comité Exécutif ne peut être en même temps membre du Comité des Finances.

IV. Droit de Vote

13. Lorsqu'un vote porte sur une question d'ordre exclusivement scientifique, chaque Délégué dûment accrédité et présent à une réunion de la Conférence des Délégués dispose d'une voix.

14. Pour les questions d'ordre administratif, le vote a lieu par Pays Membre, chaque Pays Membre disposant d'une voix en la personne du Chef de Délégation (ou de son représentant, conformément au Règlement Intérieur).

15. Pour les questions d'ordre financier, le vote a lieu par Pays Membre, chacun d'eux disposant d'un nombre de voix égal au numéro de la catégorie d'appartenance à l'UGGI. Les voix sont exprimées par les Chefs de Délégation de chaque Pays Membre (ou par leurs représentants, conformément au Règlement Intérieur).

16. Les questions qui sont en partie d'ordre scientifique et en partie d'ordre administratif et qui ne mettent pas en jeu de questions financières, sont considérées comme administratives.

17. Avant un vote, le Président décide si la question à débattre est d'ordre financier, administratif ou scientifique. La décision du Président ne peut être contestée que par le Chef de Délégation d'un Pays Membre. Dans cette éventualité, la décision du Président peut être modifiée par les Chefs de Délégation, à la majorité des deux tiers des présents.

18. Les votes sur des questions d'ordre administratif ou financier peuvent se faire par correspondance (conformément au Règlement Intérieur).

19. Pour la validité des délibérations de la Conférence des Délégués, la moitié au moins des Chefs de Délégation accrédités doivent être présents (ou représentés conformément au Règlement Intérieur).

Les décisions de la Conférence des Délégués sont prises à la majorité simple, sauf dans les cas spécifiés par les présents Statuts. S'il y a égalité de voix, la décision appartient au Président. La majorité simple ou la majorité des deux tiers sont calculées par le rapport des votes affirmatifs à la somme des votes affirmatifs et négatifs.

V. Généralités

20. Ces Statuts, de même que toute modification ultérieure, prennent effet à compter de la clôture de l'Assemblée Générale à laquelle ils ont été adoptés, sauf décision contraire de la Conférence des Délégués.

21. Ces Statuts ne peuvent être modifiés qu'avec l'approbation d'une majorité des deux tiers des Pays Membres qui ont accrédité des Délégués à l'Assemblée, conformément aux article 5 et 14 des Statuts.

22. Seuls les Pays Membres peuvent proposer une modification de ces Statuts. Toute proposition doit parvenir au Secrétaire Général au moins six mois avant la date annoncée pour l'Assemblée Générale à laquelle elle sera examinée. Le Secrétaire Général devra notifier les changements proposés à tous les Pays Membres au moins quatre mois avant la date annoncée pour l'Assemblée Générale.

23. La Conférence des Délégués est habilitée à adopter un Règlement Intérieur, dans le cadre des Statuts de l'Association. Ce Règlement Intérieur est adopté et peut être modifié par un vote à la majorité simple des Pays Membres qui ont accrédité des Délégués à l'Assemblée, conformément aux articles 5 et 14 des Statuts. Le Règlement Intérieur, ou toute autre modification ultérieure de celui-ci, prend effet à compter de la clôture de l'Assemblée Générale au cours de laquelle il a été adopté, sauf décision contraire de la Conférence des Délégués.

24. Les présents Statuts ont été rédigés dans les langues officielles de l'UGGI. Le texte anglais fait foi en cas de problème d'interprétation.

RÈGLEMENT INTÉRIEUR*

1. Structure

1. L'AIGA est composée de Divisions et d'Organismes Inter-Divisions (Commissions ou Groupes de Travail). Ce sont:

Division I : Champs Magnétiques Internes
Division II : Phénomènes Aéronomiques
Division III : Phénomènes Magnétosphériques
Division IV : Vent Solaire et Camp Magnétique Interplanétaire
Division V : Observatoires, Instruments, Indices et Données
Commission Inter-Divisions : Recherche Antarctique
Commission Inter-Divisions : Histoire
Commission Inter-Divisions : Moyenne Atmosphère
Commission Inter-Divisions : Pays en Voie de Développement

2. Chaque Division ou Organisme Inter-Divisions soumet son rôle, sa propre structure et son mode de fonctionnement à l'approbation du Comité Exécutif. Le rôle et l'efficacité de chaque Division et Organisme Inter-Divisions sont réexaminés par le Comité Exécutif à chaque Assemblée Générale ordinaire.

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* Adopté par l'Assemblée Générale Extraordinaire de l'Association à Seattle en 1977, et modifié par la Conférence des Délégués à Seattle en 1977, à Canberra en décembre 1979 et à Hambourg en août 1983.

3. Les responsables des Divisions et des Organismes Inter-Divisions sont nommés par le Comité Exécutif pour une période, sous réserve de ratification par la Conférence des Délégués. Les vacances survenant au cours d'une période sont pourvues par le Comité Exécutif.

Pour que leur nomination devienne effective, les responsables de Divisions et d'Organismes Inter-Divisions doivent adresser au Président une lettre d'acceptation exprimant leur volonté de servir dans fonctions auxquelles ils sont appelés.

4. Les responsables des Divisions et des Organismes Inter-Divisions sont habilités à désigner, pour chaque période, des rapporteurs, des responsables de groupes de travail et les responsables d'autres sous-divisions possibles.

5. Etant bien entendu que les principaux critères pour les désignations visées aux articles 3 et 4 de ce Règlement Intérieur sont la compétence scientifique et administrative des candidats, le Comité Exécutif et les responsables de Divisions et d'Organismes Inter-Divisions veillent à ce que, dans toute la mesure du possible, ces désignations tiennent compte d'une représentation géographique adéquate.

6. Le Comité Exécutif peut créer des Organismes Communs avec d'autres Associations de l'UGGI ou avec des sections d'autres Organismes du CIUS en vue de traiter de sujets d'intérêt commun; il exerce la responsabilité de l'AIGA dans la désignation, en fonction des besoins, de leurs responsables, de leurs membres ou des représentants de l'AIGA.

Dans ses relations avec des Organismes n'appartenant pas à l'UGGI, le Comité Exécutif ne peut engager l'UGGI, ou agir au nom de l'Union, sans l'accord préalable du Comité Exécutif de l'UGGI.

II. Administration

7. Le Président peut à tout moment, avec l'approbation du Comité Exécutif, convoquer une Assemblée Générale extraordinaire.

Le Président est tenu de convoquer une telle Assemblée si elle est demandée par la moitié au mois des Pays Membres.

Une Assemblée Générale extraordinaire a les mêmes pouvoirs et est soumise aux mêmes règles qu'une Assemblée Générale ordinaire.

Entre les Assemblées Générales ordinaires de l'AIGA, des Assemblées scientifiques peuvent être tenues, conformément au Règlement Intérieur de l'UGGI.

8. Le Secrétaire Général notifie aux Pays Membres la date et le lieu de réunion de toute Assemblée au moins neuf mois à l'avance.

9. L'ordre du jour provisoire des réunions de la Conférence des Délégués est préparé par le Secrétaire Général et communiqué aux Organismes Nationaux au moins trois mois avant l'ouverture de l'Assemblée. Y figurent toutes les questions qui ont été soumises par les Organismes Nationaux pour être discutées par la Conférence des Délégués, ainsi que celles qui ont été proposées par le Comité Exécutif. Toute question qui n'aurait pas été ainsi notifiée ne peut être examinée qu'avec l'assentiment de la Conférence des Délégués.

10. Les réunions de la Conférence des Délégués sont publiques. Tout non-délégué peut participer à une discussion, pourvu que le Président l'y ait autorisé.

Le Président peut, de sa propre initiative ou à la demande d'une Organisme National de l'AIGA, inviter des représentants d'organismes scientifiques ou des personnalités à assister à une réunion de la Conférence des Délégués avec voix consultative.

11. Un Pays Membre qui n'est pas représenté à une réunion de la Conférence des Délégués peut voter par correspondance sur toute question du type indiqué aux articles 14 et 15 des Statuts, à l'exception de l'election du Comité Exécutif, pourvu que la question ait été clairement définie dans l'ordre du jour définitif distribué à l'avance aux Pays Membres, que la substance de la question n'ait pas été changée et que le vote du Pays soit parvenu au Secrétaire Général avant la réunion.

Avant un vote, le Président décide si la procédure de vote par correspondance s'applique. La décision du Président peut être remise en cause ainsi qu'il est décrit dans l'article 17 des Statuts.

12. Le Chef de Délégation d'un Pays Membre peut désigner un autre délégué de ce pays pour le représenter à tout ou partie d'une réunion de la Conférence des Délégués. Si le Chef de Délégation est dans l'impossibilité de faire cette désignation, les Délégués dûment accrédités de ce pays peuvent désigner un des leurs comme représentant du Chef de Délégation. Dans les deux cas, le Secrétaire Général en sera informé avant la réunion de la Conférence des Délégués à laquelle le représentant du Chef de Délégation aura à excercer son mandat.

13. Au moins six mois avant l'ouverture d'une Assemblée Générale ordinaire, le Président, après consultation du Comité Exécutif, désigne un Comité des Nominations, composé d'un Président et de quatre Membres. Le membres du Comité Exécutif ne peuvent pas faire partie de ce Comité.

Le Comité des Nominations est chargé de présenter à la Conférence des Délégués au moins un candidat pour chaque poste à pouvoir au Comité Exécutif et cela au moins quatre jours avant l'élection. En dehors de ces propositions du Comité des Nominations, un Chef de Délégation peut présenter d'autres candidatures en écrivant au Président du Comité des Nominations au moins deux jours avant l'élection. L'ensemble de toutes ces candidatures doit être rendu public au moins un jour avant l'élection.

En général, la composition du Comité Exécutif devrait refléter un équilibre convenable entre régions et entre disciplines.

L'élection des membres du Comité Exécutif est faite à bulletins secrets. Le Président choisit deux scrutateurs parmi les Délégués présents qui ne sont ni membres du Comité Exécutif, ni membres du Comité des Nominations, ni candidats aux élections.

14. Le Comité Exécutif est convoqué par le Président.

Lors d'une réunion du Comité Exécutif, aucun de ses membres ne peut se faire représenter par une autre personne. Pour la validité des délibérations du Comité Exécutif, la moitié au moins des membres doivent être présents. Toutes les décisions du Comité sont prises à la majorité simple du nombre total des membres présents. S'il y a égalité des voix, la décision appartient au Président.

Lorsque l'importance et l'urgence d'une décision le justifient, un vote par correspondance peut être organisé par le Secrétaire Général à la demande du Président. Les mêmes règles de validité et de majorité s'appliquent.

Le Président peut, de sa propre initiative ou à la requête d'un autre Membre du Comité Exécutif ou d'un Organisme National de l'AIGA, inviter des représentants d'organismes scientifiques ou des personnalités à assister à une réunion du Comité Exécutif avec voix consultative.

15. Les propositions relatives à l'ordre du jour des réunions du Comité Exécutif peuvent être présentées par les membres de ce Comité, par les responsables de Division ou d'Organisme Inter-Divisions, ou par les Organismes Nationaux de l'AIGA; elles doivent parvenir au Secrétaire Général trois mois au moins avant la réunion. L'ordre du jour définitif, après approbation du Président, doit être envoyé aux Membres du Comité Exécutif un mois au moins avant la réunion. Une question non inscrite à l'ordre du jour ne peut être discutée à une réunion du Comité Exécutif, sauf si une requête en ce sens a reçu l'approbation du Comité Exécutif.

16. Outre les fonctions définies aux articles 6 et 8 des Statuts de l'AIGA et aux Articles 2, 3 et 6 du présent Règlement Intérieur et dans la limite des directives générales et particulières de la Conférence des Délégués, le Comité Exécutif est habilité:

a) à agir en tant que comité d'organisation pour toutes les Assemblées, Colloques et Réunions de l'AIGA, ou à déléguer cette responsabilité à d'autres personnes en faisant les désignations nécessaires.

b) à confier à des commissions spéciales ou à certaines personnalités la préparation de rapports sur des sujets de la compétence de l'Association.

c) à inviter ou désigner, comme correspondants locaux de l'Association, des personnalités ou des institutions de pays qui ne sont pas membres de l'Association.

17. Les attributions du Président de l'AIGA sont:

a) de représenter l'AIGA au Comité Exécutif de l'UGGI,

b) de représenter l'AIGA dans ses relations avec les Organismes Nationaux correspondants, les autres Associations de l'UGGI et les autres organismes du CIUS,

c) de représenter ou de désigner une personne pour représenter l'AIGA aux réunions, conférences ou cérémonies où une représentation officielle est requise ou souhaitable,

d) de convoquer et de présider les réunions de la Conférence des Délégués et du Comité Exécutif,

e) et de soumettre à la Conférence ordinaire des Délégués à chaque Assemblée Générale, un rapport sur les travaux scientifiques de l'Association.

18. Les attributions des Vice-Présidents, l'un ou l'autre selon les dispositions prises par le Comité Exécutif, sont, en cas d'empêchement du Président, de présider les réunions des Conférences des Délégués ou du Comité Exécutif et de représenter le Président aux réunions du Comité Exécutif de l'UGGI, conformément à l'article 11, paragraphe 2, du Règlement Intérieur de l'UGGI.

Le Président peut désigner l'un des Vice-Présidents pour agir en son nom en toute autre fonction ou lors de réunions ou conférences pour lesquelles une représentation officielle de l'AIGA est requise ou souhaitable.

19. Les attributions du Secrétaire Général sont:

a) d'assurer le secrétariat de l'AIGA, d'organiser les Assemblées conformément aux directives du Comité Exécutif, d'organiser les réunions du Comité Exécutif, de préparer et de distribuer rapidement l'ordre du jour et les compte-rendus des réunions de la Conférence des Délégués et du Comité Exécutif,

b) de gérer les affaires administratives et scientifiques de l'Association, de s'occuper de la correspondance, de tenir à jour les archives et d'en assurer la conservation,

c) de tenir informés les membres du Comité Exécutif, entre les réunions de ce dernier, de toute affaire importante concernant l'Association,

d) d'assister le Président au cours des réunions du Comité Exécutif de l'UGGI,

e) de recevoir st de gérer les fonds qui peuvent être alloués à l'Association par l'UGGI ou qui peuvent provenir de toute autre origine, de dépenser ces fonds conformément aux décisions de la Conférence des Délégués ou aux instructions du Comité Exécutif, de tenir le compte de toutes les recettes et dépenses et de soumettre ce compte, certifié par un comptable qualifié, à la vérification du Comité des Finances désigné selon l'article 12 des Statuts de l'AIGA,

f) de préparer et publier le programme et les compte-rendus de l'Assemblée Générale,

g) de publier un bulletin interne à l'Association (tel que le IAGA News) contenant les informations d'intérêt général pour l'Association,

h) de préparer, pour chaque Assemblée, la liste des Délégués et Chefs de Délégation,

i) et d'accomplir toute autre tâche qui peut lui être confiée par le Président ou par le Comité Exécutif.

III. Finances

20. Lors de la prévision des dépenses par le Secrétaire Général et au moment de son approbation par le Comité Exécutif, comme mentionné à l'Article 11 des Statuts de l'AIGA, les fonds attendus sont affectés, par ordre a), b), c) de priorité décroissante, aux besoins suivants:

a) Fonctionnement du Serétariat de l'Association, y compris la préparation administrative des Assemblées et des réunions du Comité Exécutif, la publication des IAGA News et des compte-rendus, et les dépenses de voyage liées à la représentation de l'AIGA aux réunions du Comité Exécutif de l'UGGI.

Réunions du Comité Exécutif durant les Assemblées Générales, y compris les frais de voyage des Membres du Comité Exécutif qui ne peuvent obtenir un autre soutien financier.

Dépenses administratives mineures demandées par les Responsables des Organismes Communs, des Divisions et des Organismes Inter-Divisions qui ont indiqué, par écrit, qu'ils n'ont pu obtenir le soutien nécessaire de l'Organisme National de l'AIGA, s'il existe dans leur pays, ou de l'Institution à laquelle ils appartiennent.

b) Réunions du Comité Exécutif qui ont lieu entre les Assemblées, y compris les frais de voyage des membres du Comité Exécutif.

Contribution partielle aux frais de voyage, pour des réunions officielles soit administratives soit scientifiques et patronnées par l'AIGA, qu'il s'agisse de responsables de Division, d'Organisme Inter-Division et d'Organisme Commun ou qu'il s'agisse de conférenciers, d'organisateurs ou de membres d'un comité des programmes, dont le Comité Exécutif juge la participation essentielle au succès de la réunion et qui ont indiqué par écrit qu'ils n'ont pu obtenir le soutien nécessaire de l'Organisme National de l'AIGA, s'il existe dans leur pays, ou de l'Institution à laquelle ils appartiennent.

Frais de voyage du Président pour remplir ses fonctions de représentation de l'AIGA.

Aide, si nécessaire, aux publications régulières du Service International des Indices Géomagnétiques, dans lesquelles l'AIGA a une responsabilité fondamentale.

c) Publications particulières, dépenses administratives particulières ou tout autre besoin non mentionné en a) ou b) et conformes aux buts de l'Association.

IAGA INTERNAL STRUCTURE AND LEADERS (1983-1987)

EXECUTIVE COMMITTEE

President:	D. Ian GOUGH,	Institute of Earth and Planetary Physics, University of Alberta Edmonton, Alberta T6G 2J1, Canada
Vice-Presidents:	Roger E. GENDRIN,	Group de Recherches Ionosphérique CNET-CNRS-IPG 3 Avenue de la Republique 92131 Issy-les-Moulineaux, France
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Members:	Naoshi FUKUSHIMA,	Geophysics Research Laboratory University of Tokyo Tokyo 113, Japan
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(ex officio)	Keith D. COLE,	Division of Theoretical and Space Physics, La Trobe University Bundoora, Victoria 3083, Australia

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Honorary Members of IAGA:

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J.O. CARDUS (Observatorio del Ebro, Roquetas, Tarragona, Spain)
L.R. ALLDREDGE (USGS MS964, Box 20546, Denver, CO 80225, U.S.A.)

DIVISION I. INTERNAL MAGNETIC FIELDS

Chairman: M.W. McELHINNY, Bureau of Mineral Resources, Geology and Geophysics, Box 378, Canberra City, A.C.T. 2601, Australia.

Vice-Chairmen: M. KONO, Department of Applied Physics, Tokyo Institute of Technology, Tokyo 152, Japan.

R.A. LANGEL, Code 922, NASA Goddard Space Flight Center, Greenbelt, MD 20771, U.S.A.
(until August 1984, in Bullard Lab., University of Cambridge, Cambridge CB3 0EZ, U.K.)

M.S. ZHDANOV, IZMIRAN, Troitsk, Moscow Region 142092, U.S.S.R.

Working Group I-1, Analysis of the Main Field and Secular Variations

Chairman: D.R. BARRACLOUGH, Geomagnetism Unit, Institute of Geological Sciences, Murchison House, West Mains Road, Edinburgh EH9 3LA, U.K.

Vice-Chairman: W. MUNDT, Zentralinstitut für Solar-Terrestrische Physik, Rudower Chaussee 5, DDR-1199 Berlin-Adlershof, German Dem. Rep.

Working Group I-2. Theory of Planetary Magnetic Fields and Geomagnetic Secular Variation

Chairman: I.A. ELTAYEB, School of Mathematical Sciences, University of Khartoum, Khartoum, Sudan.

Vice-Chairman: D.E. LOPER, Geophysical Fluid Dynamics Institute, Florida State University, Tallahassee, FL 32306, U.S.A.

Working Group I-3. Electromagnetic Induction and Electrical Conductivity (earth and moon)

Chairman: B.A. HOBBS, Department of Geophysics, University of Edinburgh, JCMB King's Bldgs., Mayfield Road, Edinburgh EH9 3JZ, U.K.

Vice-Chairman: S.E. HJELT, Department of Geophysics, Oulu University, SF-90570 Oulu 57, Finland.

Working Group I-4. Magnetic Anomalies (land and sea)

Chairman: P.J. HOOD, Rm 559, Geological Survey of Canada, 601 Booth Street, Ottawa K1A 0E8, Canada.

Vice-Chairman: W.J. HINZE, Geophysical Laboratory, Department of Geosciences, Purdue University, West Lafayette, Indiana 47907, U.S.A.

Working Group I-5. Paleomagnetism

Chairman: D.A. VALENCIO, Departamento de Geológia, Ciudad Universitaria, Pabellon 2, 1428 Buenos Aires, Argentina.

Vice-Chairman: C.E. BARTON, Graduate School of Oceanography, Narragansett Bay Campus, University of Rhode Island, Kingston, RI 02881, U.S.A.

Working Group I-6. Rock Magnetism

Chairman: S.K. BANERJEE, Department of Geology and Geophysics, University of Minnesota, 310 Pillsbury Drive S.E., Minneapolis, MN 55455, U.S.A.

Vice-Chairman: H.C. SOFFEL, Institut für Allgemeine und Angewandte Geophysik, Universität München, Theresienstrasse 41/IV, D-8000 München 2, Fed. Rep. Germany.

DIVISION II. AERONOMIC PHENOMENA

Chairman: M.H. REES, Geophysical Institute, University of Alaska, Fairbanks, AK 99701, U.S.A.

Vice-Chairmen: A. BREKKE, Auroral Observatory, University of Tromsø, P.O. Box 953, N-9001 Tromsø, Norway.

S. KATO, Radio Atmospheric Science Center, Kyoto University, Uji, Kyoto 611, Japan.

V.I. MOROZ, Space Research Institute, Profsoyuznaya 88, Moscow 117810, U.S.S.R.

C.A. REDDY, Space Physics Division, Vikram Sarabhai Space Centre, Trivandrum 695 022, India

Topic II-1. Structure and Dynamics of the Thermosphere

Topic II-2. Neutral and Ion Chemistry and Solar Fluxes

Topic II-3. Atmospheric Quantal Emissions

Topic II-4. Ionospheric Small Scale Structures

Topic II-5. Ionosphere-Magnetosphere Interactions

Topic II-6. Stratosphere-Mesosphere-Ionosphere Interactions

Topic II-7. Aeronomy of Other Planetary Atmospheres

Topic II-8. Laboratory Experiments of Aeronomic Interest

Topic II-9. Planetary Exospheres

Remark: Topic Reporters will be nominated later.

Working Group II-A. Electrodynamics of the Middle Atmosphere

Chairman: R.A. GOLDBERG, NASA Goddard Space Flight Center, Code 691, Greenbelt, MD 20771, U.S.A.

Vice-Chairmen: A. BREKKE, Auroral Observatory, University of Tromsø, P.O. Box 953, N-9001 Tromsø, Norway.

H. VOLLAND, Radioastronomical Observatory, University of Bonn, Auf dem Hügel 71, D-5300 Bonn, Fed. Rep. Germany.

Working Group II-B. Optical Interferometry

(Membership will be decided later)

DIVISION III. MAGNETOSPHERIC PHENOMENA

Chairman: A. NISHIDA, Institute of Space and Astronautical Science, Komaba 4-6-1, Meguro-ku, Tokyo 153, Japan.

Vice-Chairmen: B.J. FRASER, Department of Physics, University of Newcastle, Newcastle, NSW 2308, Australia.

D.J. SOUTHWOOD, Blackett Laboratory, Imperial College, London SW7 2BZ, U.K.

C.U. WAGNER, Zentralinstitut für Solar-Terr. Physik, Telegrafenberg, DDR-15 Potsdam, German Dem. Rep.

Topic III-1. Magnetosphere-Ionosphere Interactions

Reporter: Y. KAMIDE, Department of Computer Sciences, Kyoto Sangyo University, Kamigamo-Motoyama, Kita-ku, Kyoto 603, Japan.

Topic III-2. Magnetosheath, Magnetospheric Boundary and Plasma Penetration

Reporter: S.W.H. COWLEY, Blackett Laboratory, Imperial College, London SW7 2BZ, U.K.

Topic III-3. Distribution and Properties of Magnetospheric Plasmas

Reporter: D.T. YOUNG, Los Alamos National Laboratory, Los Alamos, NM 87545, U.S.A.

Topic III-4. Energetic Particle Populations Including Cosmic Ray Entry

Reporter: L.R. LYONS, NASA/ Marshall Space Flight Center, Huntsville, Alabama 35812, U.S.A.

Topic III-5. ULF Waves

Reporter: A.D.M. WALKER, Department of Physics, University of Natal, Durban, Natal 4001, South Africa.

Topic III-6. Plasma Waves and Wave-Particle Interactions

Reporter: M. ASHOUR-ABDALLA, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90024, U.S.A.

Topic III-7. Magnetic Storms and Substorms, Including Aurora-Magnetosphere Relations

Reporter: W. BAUMJOHANN, Max-Planck-Institut für Extra-Terrestrische Physik, D-8046 Garching, Fed. Rep. Germany.

Topic III-8. Magnetospheres of Other Planets

Reporter: G.L. SISCOE, Institute of Atmospheric Sciences, University of California, Los Angeles, CA 90024, U.S.A.

Topic III-9. Active Space Experiments, Laboratory Experiments and Computer Simulation

Reporter: S.D. SHAWHAN, NASA Headquarters, Washington, D.C. 20546, U.S.A.

Working Group III-1. ULF Pulsations

Chairman: W.J. HUGHES, Department of Astronomy, Boston University, 725 Commonwealth Avenue, Boston, MA 02215, U.S.A.

Working Group III-2. Composition of Hot Magnetospheric Plasma

Co-Chairmen: R.G. JOHNSON, Lockheed Palo Alto Research Laboratory, Dept. 52-10, Bldg. 205, 3251 Hanover Street, Palo Alto, CA 94304, U.S.A.
H. BALSIGER, Physikalisches Institut, Universität Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland.

Working Group III-3. Quantitative Magnetospheric Models

Chairman: W.P. OLSON, Space Sciences Department, McDonnell Douglas Astronautics Co., 5301 Bolsa Avenue, Huntington Beach, CA 92647, U.S.A.

DIVISION IV. SOLAR WIND AND INTERPLANETARY MAGNETIC FIELD

Chairman: F.M. NEUBAUER, Institut für Geophysik und Meteorologie, Universität zu Köln, Albertus-Magnus-Platz, D-5000 Köln 41, Fed. Rep. Germany

Co-Chairmen: T.K. BREUS, Space Research Institute, Profsoyuznaya 88, Moscow 117810, U.S.S.R.
T. GOMBOSI, Department of Cosmic Rays, Research Institute of Physics, P.O. Box 49, H-1525 Budapest 114, Hungary.
M. NEUGEBAUER, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91103, U.S.A.
S. PINTER, Geophysical Institute of the Slovak Academy, 94701 Hurbanovo, Czechoslovakia.

Topic IV-1. Large-Scale Characteristics of the Interplanetary Medium

Reporters: A.J. LAZARUS, Center for Space Research, Massachusetts Institute of Technology, Cambridge, MA 02139, U.S.A.
J.L. STEINBERG, Observatoire de Paris-Meudon, DESPA, 92195 Meudon Principal Cedex, France.

Topic IV-2. Waves, Discontinuities and Turbulence in the Solar Wind

Reporters: M.L. GOLDSTEIN, Laboratory for Extraterrestrial Physics, Goddard Space Flight Center, Code 692, Greenbelt, MD 20771, U.S.A.
D.A. GURNETT, Department of Physics and Astronomy, University of Iowa, Iowa City, Iowa 52242, U.S.A.

Topic IV-3. Solar Wind Interaction with Unmagnetized or Weakly Magnetized Bodies

Reporters: M.K. WALLIS, Dept. of Applied Mathematics and Astronomy, University College of Cardiff, Cardiff, Wales, U.K.
T. GOMBOSI, Department of Cosmic Rays, Research Institute of Physics, P.O. Box 49, H-1525 Budapest 114, Hungary.
T.E. CRAVENS, Space Physics Research Laboratory, University of Michigan, Ann Arbor, MI 48109, U.S.A.

Topic IV-4. Plasma Composition and Neutral Gases

Reporters: H.J. FAHR, Institut für Astrophysik, Universität Bonn, D-5300 Bonn 1, Fed. Rep. Germany.
K.W. OGILVIE, Laboratory for Extraterrestrial Physics, NASA Goddard Space Flight Center, Greenbelt, MD 20771, U.S.A.
GRUNTMAN, U.S.S.R.

DIVISION V. OBSERVATORIES, INSTRUMENTS, INDICES AND DATA

Chairman: W.F. STUART, Geomagnetism Research Group, British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, Scotland, U.K.

Co-Chairmen: K.L. SVENDSEN, SEDSD (D62), EDS, NOAA, 325 Broadway, Boulder, CO 80303, U.S.A.
W.G. ELFORD, Physics Department, University of Adelaide, Adelaide, S.A. 5001, Australia.
A.N. ZAITZEV, IZMIRAN, Troitsk, Moscow Region 142092, U.S.S.R.

Working Group V-1. Geomagnetic Observatories, Instruments and Standards

Chairman: E.R. NIBLETT, Division of Seismology and Geomagnetism, Earth Physics Branch, EMR, Ottawa, K1A 0Y3, Canada.

Co-Chairman: A.J. FORBES, Geomagnetism Research Group, British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, Scotland U.K.

Working Group V-2. Meteor and Partial Reflection

Chairman: B.L. KASCHEYEV, Institute of Radioelectronics, Kharkov, U.S.S.R.

Co-Chairman: W.G. ELFORD, Physics Department, University of Adelaide, Adelaide, S.A. 5001, Australia.

Working Group V-3. Optical Calibration Standards

Chairman: H. LAUCHE, Max-Planck-Institut für Aeronomie, Postfach 20, D-3411 Katlenburg-Lindau, Fed. Rep. Germany.
G.J. KÜHN, Hermanus Magnetic Observatory, P.O. Box 32, Hermanus 7200, South Africa.

Working Group V-4. Magnetic Surveys and Charts

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APPENDICES

SUMMARIES OF THE IUGG INTERDISCIPLINARY SYMPOSIA SPONSORED BY IAGA

The XVIII General Assembly of IUGG was held in Hamburg, Federal Republic of Germany, during 15-27 August 1983. The assembly organized the following 21 interdisciplinary symposia.

No. 1 Structures and processes in subduction zones (22-24 August 1983).
No. 2 Lithospheric deformations (19 and 22, August 1983).
No. 3 Crustal accretion in and around Iceland (16-18 August 1983).
No. 4 Geodetic features of the ocean surface and their implications (25-26 August 1983).
No. 5 Geophysics of the polar regions (22 August 1983).
No. 6 Data management (16-17 August 1983).
No. 7 Hot spots and mantle plumes (19 August 1983).
No. 8 Assessment of natural hazards (16-19 August 1983).
No. 9 Time-dependent processes and properties in planetary materials (22-23 August 1983).
No. 10 Heat flow and geothermal processes (23-24 August 1983).
No. 11 Structure and composition of the oceanic crust (25-26 August 1983).
No. 12 Plateau uplift, rifts and volcanism (17 August 1983).
No. 13 Scientific discoveries from MAGSAT investigations (22-23 August 1983).
No. 14 Interim results from the MIddle Atmosphere Program (18-19 August 1983).
No. 15 Remote sensing for climate studies (16-17 August 1983).
No. 16 Sea ice margins (18=19 August 1983).
No. 17 Low latitude coupled ocean/atmosphere circulation (22-24 August 1983).
No. 18 Ridge crest hydrothermal activity and the chemistry of sea water (24 August 1983).
No. 19 The ocean and the CO_2 climate response (18 -19 August 1983).
No. 20 Oceanic and atmospheric boundary layers (26 August 1983).
No. 21 Coastal and near shore zone processes (16-18 August 1983).

IAGA was the leading Association for organizing Symposia Nos. 6, 13, and 14 (with IAMAP); IAGA cosponsored the symposia Nos. 2 and 5. The reviews of these IAGA-sponsored IUGG Interdisciplinary symposia are summarized below. The Abstracts of all 21 symposia have been published in book form (in two volumes, tatal 1912 pages) and are available from the IUGG Publications Office (39 ter, rue Gay-Lussac, 75005 Paris, France), at the price of ç20, postage extra.

In addition to the above IUGG interdisciplinary symposia, IAGA co-sponsored the Symposium on the MVddel Atmosphere Sciences, organized by IAMAP. The programme and abstracts of this IAMAP-IAGA joint symposium were included in the IAMAP booklet, and the reprint from the IAMAP booklet was provided to all IAGA registrants. The reprint (202 pages) is on sale at the IUGG Publications Office at the price of ç4.50, postage extra. A condensed report on this IAMAP-IAGA Joint Symposium on the MIddle Atmosphere Sciences is also included in this section of the Transactions of the IAGA Hamburg Assembly.

No. 2. SYMPOSIUM ON THE LITHOSPHERIC DEFORMATIONS

This Symposium was not a particularly useful one but a number of lessons can be learnt from it. The initial response to the request for abstract was rather dismal. Many submitted papers dealt with totally unrelated topics. No one paper addressed itself to the main theme: namely the interdependence of the geodetic, magnetic and seismic evidence for lithospheric deformations. If I had accepted the nominal closing time for abstracts the programme would have been poor indeed. Only by some active late minute canvasing was a reasonable programme possible. The programme was still characterised by the omissions. And it was still very much a subdivision of mini symposia.

The programme was planned in several sections:

1. space geodetic methods and results.
2. Mathematical modelling of lithospheric deformation.
3. Local crustal deformations and stress.
4. Regional tectonic problems.

The geodesy papers were characterised by a total disregard for the multi-disciplinary nature of the audience and by a jargon that even I found hard to understand. When will this community learn to sell its product?

The three mathematical modelling papers were of high standard and informative. The papers were also relevant to those asking the questions of what geodetic measurements should be made. But by this time most geodetic participants had left the audience.

The papers dealing with regional tectonic problems were generally useful. I tried to maintain a good balance between regions of the world, and between disciplines, and between nationalities. The result was a bit patchy but I, at lease, got some new insight into several outstanding problems.

In planning the Symposium I tried to maintain a fairly leisurely pace, giving speakers about 20 minutes each with 10 minutes for discussion. I considered this an important aspect. Too many other Symposia were crowded and rushed. The few favourable comments I received on the Symposium related to this.

A comment on general organisation may explain the generally poor participation in the Symposium. Parallel with the Symposium on 19 August was a similar one organised by IUGG: Symposium 7. [Hot Spots and Mantle Plumes]. Thermal processes are a central part of lithospheric deformations. IASPEI held a Symposium on Quantitative Geodynamics on the same day and ICL held its Symposium ICL 1. Even IAG held not unrelated Symposia at the same time. Gravity fields and reference systems are relevant to understanding the kinematics and dynamics of the lithosphere.

I decided against publishing the papers. Symposia proceedings are frequently not a very useful contribution to the literature. Good papers will be published in any case.

(K. Lambeck, Convener)

No. 5 INTERDISCIPLINARY SYMPOSIUM ON GEOPHYSICS OF THE POLAR REGIONS

This IUGG Symposium was held in commemoration of the 100th anniversary of the First International Polar Year, the 50th anniversary of the Second International Polar Year, and the 25th anniversary of the International Geophysical Year. In an introductory paper, G.D. Garland (Canada) drew the

historical perspective and showed that magnetic observations obtained during the First Polar Year are still useful and analysis of them supports modern thoughts on crustal structure.

Seven invited papers, sponsored by the seven Associations of IUGG, dealt with the impact of these first international geoscience programmes on the development of geophysics. H. Alfvén (USA) looking ahead discussed how knowledge was and can be extended from the laboratory scale to a near-Earth environment, to the solar system, to the Universe: the cosmic triple-jump. He showed how the known properties of laboratory and solar plasmas can be extended to predict the structure of cosmic plasma. N.A. Streten (Australia) pointed out the unique nature of polar meteorology, and that a closely knit group of workers in this field have added new insight into the nature of global climate. Oceanography was already a mature science at the time of the first IPY, but was not able to meet fully the challenge of the IGY because of too few ships and scientists, according to G.E.R. Deacon (UK). G. de Q. Robin (UK) reported that glaciology emerged as a separate discipline of science during the IGY, and for the first time Arctic sea ice and the Antarctic ice sheet were studied extensively. He also noted the fact that satellites are now routinely used for science because they were first employed in the name of science (IGY) rather than the military; that situation contrasts with the use of nuclear submarines that could have provided critically needed data on sea ice thickness. Demonstrating many applications of geodesy to polar sciences, K. Bretterbauer (Austria) also pointed out that the Earth's shape and rotation are very dependent on the changing mass and location of ice. E.S. Husebye & Y. Kristoffersen (Norway) discussed the lithosphere in the north and south polar regions. The two main structural basins of the Arctic are very different and their origins not fully understood; the continental margins of West and East Antarctica range from active to passive. The volcanism of Antarctica and its plate tectonics implications were discussed by J. Nougier (France).

A short discussion session dealt with future scientific plans, including the ICSU proposal for a possible programme on global change and the need for an organization, possibly under IUGG, to support solid Earth Geophysics in the Arctic.

(M.F. Meier, Convener)

No. 6 SYMPOSIUM ON GEOPHYSICSL DATA MANAGEMENT

The Interdisciplinary "Symposium on Geophysical Data Management" was devoted to consideration of problems arising in the acquisition, processing analysis, archiving and dissemination of geophysical data. The symposium was divided into eight sessions. The first of these was devoted to the topic of World Data Centres and International Workshops. Two others considered specialized data bases in the disciplines of hydrology, meteorology, and geodesy. The remainder examined specialized aspects of data base formats, data base creation, and interactive analysis of data bases.

Presentations made in the session on World Data Centres suggests there are serious problems in data management at the international level. The disciplines of geophysics necessarily require data from all parts of the world. Unfortunately, many nations do not have sufficient resources to acquire needed data, or to convert it to usuable formats when they have it. Often, data may be available, but a lack of national commitment has resulted in insufficient resources being devoted to managment of the data. Too often the agency or individuals responsible for producing the data pass on responsibility for archiving it to other

agencies which do not have the resources to deal with it.

Some progress is being made in the problem of international data archiving and exchange. The World Data Centres are expanding their capabilities for dealing with digital data. Work continues on the definition of more general formats for the exchange of digital data. International workshops, which have been particularly useful in this regard, focus interest on a specific problem and mobilize resources that would not otherwise be available.

In the sessions on data bases in various disciplines, it became clear that there are great disparities between disciplines. Disciplines where there are immediate applications of the data to problems of national security, such as geodsy or seismology, have progressed more rapidly. In all disciplines, however, it appears that data base management is still an art rather than a science. Almost universally, geophysical data bases have been developed by the scientists using the data, rather than by commercial organizations. These data bases are quite specialized and devoted to specific types of data. Typically they are implemented in a machine-dependent manner and are not easily transportable.

In the sessions concerned with special aspects of data bases, several trends emerge. Data base creation can be accomplished in a distributed fashion by appropriately programmed microcomputers. When combined with a data validation programme making use of physical constraints on the data, it is possible for relatively unskilled workers at many locations to enter data onto floppy disks. These can be mailed to a central location and automatically entered into a large data base.

From the sessions concerned with data formats, it appears that the relational data base is gaining considerable popularity with those concerned with time series data. These data bases make use of flat files, i.e. table consisting of rows and columns. By requiring that the number of columns in a file be fixed, it is possible to write data for a given time into simple,fixed-length records. These records may be easily sorted and accessed in a random manner. By adding a high-level query language, many operations on the file may be carried out without programming.

In another session devoted to interactive analysis, it became apparent that most scientists vastly prefer interactive to batch computing. The ability to quickly browse through a digital file, either tabulating or graphing data to the screen of a CRT, is extremely useful. When combined with a variety of specialized analysis programmes, it is possible to quickly transform the data and view the results. Such systems will only work, however, if they make use of general data formats with special access subroutines, i.e. there is an underlying data base management system. Without this, the output of one programme is not compatible with the input to another, and constant programming is required to do useful work.

In the long term, it seems likely that good geophysical data management systems will be the result of commercial developments. In this community, there are sufficient resources to develop bug-free, user-friendly, transportable software systems. Also, specialized hardware will be required by these systems to speed up access to data in response to user queries. The primary impetus for this work will be the need for management information. It can also be expected that the requirements of commercial data exchange between different organizations and different nations will force the development of standards and protocols which the scientific community can use. Continued reduction in the cost of microcomputers and minicomputers, combined with increasing power in these devices, will make them more accessible to more people and make possible the acquisition of digital rather than hard-to-manage analog data.

If the foregoing developments are to be of much use to the scientific community, there must be changes in geovernmental attitudes. First, the notions

that computers are "toys" which must be restricted, or that once acquired they have infinite lifetimes, must disappear. Second, there must be governmental recognition that retention of scientific data is a valuable enterprise and that it requires government subsidy to do it. Third, it must be acknowledged that management of data is at least as hard as the acquisition of data and it must be planned from the outset and funded appropriately. Fourth, arrangements must be made so that the users of the data can influence the data management system. Storage of data for its own sake without concern for user needs is a too likely consequence of isolated government activities. Finally, it seems likely that the widespread distribution of computers, linked by communication networks, utilizing compatible data management systems will result in the emergence of distributed data bases in various disciplines, with each unit managed by a small group of scientists. In such a system, the function of national and World Data Centres would become that of cataloging and facilitating access to the data in various units.

(R.L. McPherron, Convener)

No. 13 SYMPOSIUM ON SCIENTIFIC DISCOVERIES FROM MAGSAT INVESTIGATIONS

A. External Field Studies

This session was chiefly concerned with effects on the MAGSAT data due to activity external to the solid Earth. These disturbances to the main and crustal fields of the Earth are due primarily to currents near the Earth and throughout the magnetosphere initiated by solar activity combined with the Earth's motion and magnetic field.

Induction effects of the Earth were investigated by J.F. Hermance in contrast to similar effect on ground magnetic measurements. These effects are particularly noticeable near conductivity gradients, e.g. ocean-landmass borders. The south coast of Australia is ideal for such a study but less than 10% of the field was attributable to induction implying that the MAGSAT data are freer of such effects than ground based data. T. Kamei reported for T. Araki concerning the shielding effect of the ionosphere on sudden commencements. Both ground measurements and MAGSAT data were utilized and a ratio of approximately 1.3 in the equatorial satellite H disturbance versus the ground H disturbance was found. N. Fukushima reported for A. Suzuki on the integration of the tangential disturbance component around an entire MAGSAT orbit. This integration yields the total current within the loop by Ampere's law. Anti-sunward current was found near the Earth which is highly correlated with the AE index, suggesting a connection via Birkeland currents to a partial ring current completed around to the dusk sector. T. Kamei reported for M. Maeda concerning a meridional current at dusk associated with the equatorial electrojet. This current is interpreted as an F layer phenomena generated by pressure gradients and is correlated with sunspot number and with the AE index. B.S. Lanchester reported coincidences of 1-10 dm disturbances in the D component (implying Birkeland currents) with auroral arc forms observed at Spitsbergen. The sign of the current was consistent with downward electron fluxes responsible for the arcs. Such coordination is always difficult, this being compounded by auroral movement at times comparable in velocity with the MAGSAT velocity. Y. Kamide compared 300ev-20kev electron fluxes from the TIROS and NOAA satellites and Birkeland current signatures from MAGSAT. The electron fluxes almost always

could not account for the current flux implied by the D (about 1 $\mu A/m^2$) disturbance. The existence of secondary and ionospheric electrons in an up and down current loop below the auroral acceleration region was proposed. N. Fukushima reported for T. Iijima new Birkeland current patterns for strongly northward IMF, such being the Region 1 - Region 2 with another region extending poleward. Commensurate ionospheric currents were shown implying reverse convection (sunward) in the polar cap for strong northward IMF. P.F. Bythrow presented statistical patterns of Birkeland currents for zero, shouthward and northward IMF. The locations of the Birkeland currents at the equatorward edge were well organized according to IMF implying steadiness due to magnetospheric inertia. The poleward borders showed more structure, implying better response to the solar wind. L.T. Zanetti reported locations and intensities of ionospheric currents as well as Birkeland currents. The findings imply Hall to Pedersen conductivity ratios are constant in the auroral zone for individual orbits. Hall current electrojets are colocated with Birkeland current sheets and of similar intensity. T. Kamei reported on ionospheric current systems observed by MAGSAT and sorted according to the IMF.

J.R. Burrows presented an invited review paper summarizing most of the above, accenting the value of the internal field model MGST (4/81) without which most of the above would be impossible. Burrows and his colleagues model the high latitude current systems by first reproducing the dominant near east-west component due to field aligned currents. The north-south and parallel fields are then reproduced well by assuming a constant Hall to Pedersen conductivity ratio. Using this technique they computed a residual parallel component which was reproduced well for several different passes and is interpreted as due to crustal anomalies. Burrows also noted that it is now possible to consider questions that were not even attempted with prior data.

B. Crustal Anomaly Studies

A number of topics were addressed by investigators using the MAGSAT measurements to study crustal anomalies. A series of papers analyzed the crustal anomaly maps from a regional geology perspective. Geographic areas covered included India and adjacent oceanic regions, Europe, Africa, western North America, the North Atlantic Ocean basin and the central Pacific. A major feature of the research is that regional geologic provinces have distinctive magnetic signatures. There is less agreement on the causes and geologic processes responsible for the anomalies. In particular it was noted that the first-order magnetic patterns and amplitudes are very similar for oceanic and continental regions. This raises a number of questions on the controlling factors for the anomalies in view of the major geologic differences between oceanic and continental regions. One suggestion is that the "crustal anomaly field" includes significant components arising from a complex, high-order, main field signal. Or alternatively the oceanic regions contain more strongly magnetized geologic sections that the usual models suggest.

The paper by Langel et al. described the contamination of anomaly maps by ionospheric effects, in particular the strong enhancement of fields due to the equatorial electrojet in the dusk data. New maps based on improved data selection were displayed and in particular separate dawn and dusk maps for the northern polar regions showed good consistency. A power spectral plot of data from mid- to low latitudes was presented, it suggests exaggerated power in E-W trending anomalies.

The papers by Yanagisawa et al. and Kono et al. also discussed the equatorial electrojet effect. They attempted several methods of filtering non-crustal fields from the data. The most effective way to deal with the problem was found to be by simply stacking residual fields at the same dip latitude. Mean Ionospheric Field Corrections (MIFC) are obtained in this way for both dawn and dusk

meridians.

The papers by Nakagawa et al. and Fukushima et al. discussed modeling of the anomaly field in the vicinity of Japan. Rectangular harmonic analysis was used. A strong anomaly is associated with the Kurile Trench. A pair of dipole-like anomalies was found south of Korea, the source of which is unknown. If they are local, discrete sources, a strong remanent magnetization is implied.

The papers by Morner and by Mayer et al. described the power spectrum of a global crustal anamaly field based on a dipole model synthesized in accordance with known geology. It was shown that the sepctrum is "white" down to very low order. Thus field models based on spherical harmonic expansion to, say, (13, 13) probably include and important part of the crustal field. This may explain why published global anomaly maps show so little contrast between oceans and continents - the relevant part of the spherical harmonic expansion has been removed in the field model.

The analysis by Wasilewski of crustal rock materials from all major types of geological provinces and zenoliths from mantle sources does not show any unusual minerals with high Curie temperatures (greater than 600°C). Emplacement and crustal alteration processes tend to develop geologic sections with average Curie temperatures around 550°C. This coupled with the good correlation of magnetic anomalies and regional heat flow patterns by Mayhew for the western United States suggest the depth of the Curie temperature isotherm is a controlling source parameter. These results and the regional geologic models developed by other researchers are not clearly compatible. This suggests additional work is needed to develop integrated solutions for magnetic sources, regional magnetization models, and thermal effects for both continental and oceanic regions.

Harrison examined known rock magnetizations for the oceans and concluded that induced magnetization is unable to account for the anomalies measured by MAGSAT but that NRM is. He also performed a study indicating that the expected oceanic/crustal differences are not present and that the average magnetization shows no latitudinal effect. A very interesting study of the north Atlantic Ocean basin by La Breque showed a first order correlation of the crustal anomaly field to the major reversal sequences recorded by the sea floor spreading process. The MAGSAT anomalies do not record individual magnetic polarity intervals but separate the high frequency Tertiary reversed sequences from the long constant polarity intervals in the Mesozoic and late-Paleozoic. Preliminary work in the Pacific suggests the results may be extended to that region as well.

Regional studies were presented by Oliver for Europe and Africa, using a reduced-to-pole version of the satellite anomaly map, and by Negi, Rastogi and Arur for India and vicinity. The emphasis was on qualitative association of satellite anomalies with known geologic features.

The crustal fields session was closed by Mayhew's review emphasizing not only results of analysis but also some of the problems which might entrap the unwary data user. Such problems include external fields and, for the vector data, jumps in the attitude solution. His analysis results were mainly from the United States and Australia. He indicated that equivalent source solutions for these regions based on scalar data, and assuming induction, seem capable of reproducing the vector data also.

C. Main Field Studies

All four papers on the programme were presented and, with the ensuing discussion, constituted a lively and interesting session.

Cain described the US Geological Survey's modeling activity and compared them with the work being done at Goddard Space Flight Center. He demonstrated

that, without MAGSAT, errors in charts and models of the geomagnetic field would by now have reached over 400 nT in several parts of the world.

Langel and Estes described the latest, and probably final, models produced by the GSFC team from a careful selection of the MAGSAT data. Separate models were produced using data taken at dawn and at dusk. The latter data set needed to be corrected for equatorial electrojet effects before the two sets were recombined to give final model.

Benton and Voorhies have used a series of models, some using MAGSAT data, to find the radius of the core by Hide's method. All models gave values very close to that found from seismological data. In particular the GSFC(9/80) model, which does include MAGSAT data, gave r_c=3463 km. This model was also used to examine the flow of the fluid at the surface of the core. Upwellings and downwellings were detected in several places but not overall westward drift.

Risbo also used the GSFC(9/80) model (and others) to examine the geomagnetic field at the core-mantle boundary. He discussed jerks and westward drift in terms of a four-foci model and modification of Busse's dynamo.

(R.A. Langel, Convener)

No. 14 SYMPOSIUM ON INTERIM RESULTS FROM THE MIDDLE ATMOSPHERE PROGRAMME

This Symposium, jointly sponsored by IAGA and IAMAP, consisted solely of invited papers, and was intended to provide not only an overview of the progress already made in furthering our understanding of the middle atmosphere, the primary objective of SCOSTEP's Middle Atmosphere Programme, but also some sense of direction of future studies.

While, unfortunately, three papers were withdrawn, leaving unaddressed the topics of the climatology of the stratosphere, atmospheric tides, and D region ion chemistry, the twelve papers presented provided a good balance between techniques, theory and experiments for those topics covered. Those topics not covered were well represented in the IAGA-IAMAP Inter-Association "Middle Atmosphere Science Symposium" which followed.

In his introductory remarks, Roper pointed out that while the Middle Atmosphere Programme had made a rather hesitant start, perhaps being somewhat overawed by its mission "to be to the middle atmosphere what GARP is to the troposphere, and the IMS to the magnetosphere", considerable momentum seems to have been forthcoming, as evidenced by the amount of time devoted to this subject at the current Assembly.

In discussing satellite contributions to middle atmosphere studies, Gille made a point that was emphasized again and again throughout the Symposium - that the understanding of the middle atmosphere requires the understanding of global phenomena, for the observation of which satellites are ideally suited, and that all experimenters, whatever techniques they employ, need to interpret and understand their data as part of a global set.

While excited at the wealth of satellite data available on many important trace gases in the middle atmosphere, as well as of observed and derived dynamical quantities, Gille voiced a particular concern for the future. Because of the recent world economic problems, missions have been cancelled or postponed, placing the future of satellite observations of the middle atmosphere in jeopardy. (A resolution addressing this concern was later passed at the IUGG Final Plenary Session).

A recent development which has immediate application as a realtime wind profiler, and for continuous monitoring of tropopause dynamics, the stratosphere/troposphere (ST) radar, and its "big brother", the mesosphere/stratosphere /

troposphere (MST) radar, were reviewed by Balsley. While the ST radar shows great potential as a tool for real time observations of the troposphere and lower stratosphere, unless the higher powered MST radar is also to be used for thermospheric studies, the co-location of an ST radar with an HF partial reflection wind measuring system, such as that described next by Vincent, is definitely more cost effective.

In addition to these "coherent scatter" radars, incoherent scatter systems are also capable of producing time-height profiles of such parameters as electron concentrations, ion-neutral collision frequency, neutral atmosphere temperature, pressure and winds, and mean negative and positive ion masses and concentrations. Mathews presented a qualitative view of the collision dominated incoherent scatter process as an aid in understanding the capabilities and limitations of these measurements, with the prediction that they will contribute significantly to our understanding of the winter absorption anomaly and D Region "ledge" chemistry. Röttger's review of the EISCAT (European Incoherent Scatter Radar Facility) further demonstrated the potential of these radars to contribute to our knowledge of middle atmosphere dynamical and aeronomic processes.

The review of lidar observations presented by Chanin led to considerable discussion. In particular, observations of wavelike temperature structures, presumably associated with random interval atmospheric gravity waves, were most interesting.

The final paper of the first day sessions presented simultaneous observations of wavelike structures in mid-latitude infrared airglow and radar backscatter near 85 km. Adams intends to use the infrared photographs to assist in the interpretation of what is actually being "seen" by the HF radar.

The second day opened with an excellent exposition by Dickinson on infrared cooling and other global energy source/sinks in the mesosphere and lower thermosphere, and the question of their efficient parameterization in dynamic models. This was followed by Salby's presentation of the implications for theory and for observing systems of the presence of traveling waves (particularly large scale transients) in the stratosphere. The importance of vertically propagating disturbances for upward energy transport and momentum deposition were emphasized.

At the other end of the dynamic spectrum, Weinstock discussed the importance of gravity wave propagation, saturation and diffusion in detail. A review of the wave dissipation process, with accompanying eddy diffusivity and momentum and heat deposition was given using both quasi-linear and non-linear wave interaction theories.

Hunt presented his attempts at modeling the global circulation from the surface of the lower thermosphere, with emphasis on the latter because of the influence there of mechanisms which are poorly understood, such as the transport of free chemical energy, particularly by diffusion, which considerably modifies the implied heating rate due to absorption of solar energy. His modeling of tides in the lower thermosphere produced by diurnal "pumping" of water vapour and ozone absorption in a stadystate GCM were quite impressive.

Finally Goldberg presented an overview of middle atmosphere electrodynamics, a field which is only just beginning to arouse the interest and attention it deserves. Goldberg reviewed the instruments being flown by experimenters, and the somewhat controversial (volt/meter) fields being measured in the mesosphere and upper atmosphere. He raised the interesting implication that if these large magnitude fields persist in both space and time, they could perturb the global electric circuit with a component subject to modulation by phenomena related to solar activity.

(P.C. Simon for the Convener)

RESOLUTIONS OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

RESOLUTION 1

The International Union of Geodesy and Geophysics

Considering the scientific, technical and economic importance of the African Doppler Survey (ADOS),

noting the significance of this programme for improving the knowledge of the figure of the Earth and for coordinating the various geodetic networks in Africa,

noting that two training seminars on Doppler techniques are to be organized in collaboration with the IAG as well as the Third International Symposium on Geodesy in Africa in 1985,

requests the international and national cooperative organizations to support these activites.

RESOLUTION 2

The International Union of Geodesy and Geophysics

Considering the extraordinary international importance of the U.S. Navy Navigation Satellite System, both to the science of geodesy and to civil surveying in this field,

noting that (1) this system is due to be discontinued, and (2) other precise satellite-based radio positioning systems such as U.S. Global Positioning System (GPS) and the USSR Global Navigational Satellite System (GLONASS) are being developed or conceived,

strongly urges the appropriate authorities to make available to the international scientific and civil community the information necessary to obtain maximum position accuracy from the new system.

RESOLUTION 3

The International Union of Geodesy and Geophysics

Noting that a goal of Project MERIT (measurement of Earth's rotaion and intercomparison of techniques) is to complete a comparative evaluation of the Earth rotation results obtained by different techniques during a dedicated campaign,

considering that detailed standards are being prepared to accomplish this goal,

recommends that all MERIT results be referred to these standards, and

urges that all participants in the Project adhere to the constants, models and reference frames and to the protocols for their use as will be defined in the final MERIT Standard Document.

RESOLUTION 4

The International Union of Geodesy and Geophysics

Noting that the transfer of angular momentum between the oceans, atmosphere, and solid Earth is rapidly emerging as a problems of great scientific importance and in view of the significance of this coupling mechanism of fundamental studies in geodesy and solid Earth geophysics,

recognizing that understanding the Earth's polar motion and rotation depends on an understanding of the effect of the atmosphere and oceans on the solid Earth,

recommends that cooperative research efforts be encouraged in all countries in order to acquire relevant data and to bring together scientists from all disciplines in multidisciplinary studies of the angular momentum transfer between the solid Earth, the oceans, and the atmosphere.

RESOLUTION 5

The International Union of Geodesy and Geophysics

Noting the recent demonstration that angular momentum transfer between the atmosphere and solid Earth makes a major contribution to short term variations in the length of the day and polar motion,

considering that the Main Campaign of Project MERIT, during the period 1 September 1983 to 31 October 1984, will produce the highest resolution and most accurate measurements of Earth rotation ever achieved,

requests that WMO make every effort to collect the most complete possible set of global wind and pressure data and to reduce these data in a consistent manner in order to obtain the highest quality atmospheric angular momentum and polar motion excitation function throughout this period, and especially during April through June 1984, concurrent with the period of high intensity MERIT observations.

RESOLUTION 6

The International Union of Geodesy and Geophysics

Recognizing that the middle atmosphere is of crucial importance to the biosphere through the protection by ozone of the Earth's surface from harmful UV radiation, and because of its possible effects on tropospheric climate, and

recognizing that understanding of middle atmospheric chemistry, radiation transfer, and dynamics is required for reliable predietion of the effects of human activity on the middle atmosphere,

recommmends that the agencies involved in space research develop and launch satellites to obtain the observations of radiation and chemical and dynamical processes require for uninterrupted growth in our understanding of these processes.

RESOLUTION 7

The International Union of Geodesy and Geophysics

Recognizing (1) that the World Climate Research Programme (WCRP) requires atmospheric and oceanic observations over oceans, and that termination of Ocean station PAPA in the North Pacific in 1981 constitutes a serious loss to the climatic record, to atmospheric and oceanic research activities, and to operational weather forecasting, (2) that as a result of increasing cost of operation, special weather ships cannot be relied on to provide continuous fixed point observations, and that several North Pacific nations are cooperating under Canadian leadership, in new ship-of-opportunity programmes to provide oceanographic, surface meteorological, and upper air observations, and (3) the increasing capacity of satellites for oceanographic and meteorological observations over the World's oceans,

commends the efforts of Canada and other cooperating countries in undertaking to develop a satisfactory ship-of-opportunity observing system for the North Pacific, and

recommends that nations operating satellites over ocean areas be urged to take all steps to ensure the continuity and the quality of meteorological and oceanographic data.

RESOLUTION 8

The International Union of Geodesy and Geophysics

Noting that more than ninety-five percent of the fresh water on the surface of the Earth is in the great ice sheets of Antarctica and Greenland, which may be subject to significant changes in volume on time scales of decades or centuries,

aware that such changes could, through their effect on sea level, have an impact on mankind greater than all short-term climate-induced changes in lower latitudes,

recognizing that there are at present no accurate data on changes in the total ice volume, but that now for the first time it is technically feasible by satellite altimetry to determine surface elevation changes as small as 0.5 m., which would allow detection of changes in volume of the Antarctic ice sheet of as little as 1 part in 5000,

drawing attention to the fact that such changes would provide information about the effects of climate variations long before an unambiguous sea level signal was recognizable,

wishes to point out the urgent need for and great value of including precision altimetry on a truly polar-orbiting (87°-93° inclination) satellite, and

urges that all altimeter-equipped satellites in high-latitude orbits should record the surface elevation of the Antarctic and Greenland ice sheets, and that these data should be made available to the scientific community,

RESOLUTION 9

The International Union of Geodesy and Geophysics

Noting that the dynamics of the equatorial middle atmosphere are poorly understood, and, in particular, that there have been inadequate observations of such phenomena as equatorial waves, tides, gravity waves and turbulence, and of their contribution to the momentum and heat budgets of this region, and

taking into account the development of new ground based techniques such as MST/ST radars and lidars, and the refinement of partial reflection and meteor wind radars,

recommends that one or more observatories which combine as many of these systems as possible be established at the earliest opportunity near the equator and preferably in the Eastern or Western Pacific, where extensive chains of stations already exist at high and mid-latitudes.

Resolution 10

The International Union of Geodesy and Geophysics

Noting the resolution of ICSU(1) recognizing both the need for public understanding of the possible consequences of the nuclear arms race and the competence that could be mobilized by ICSU to make an assessment of the biological, medical, and physical effects of the use of nuclear weapons,

noting further the establishment by the Scientific Committee on Problems of the Environment (SCOPE) of a project on the effects of nuclear war on the atmosphere and the subsequent establishment by the General Committee of ICSU of a broadly based Steering Committee to guide the SCOPE project and to coordinate further proposals for action by members of the ICSU family,

recognizing the desirability of avoiding any undue dispersion of effort by scientists in relation to the objective assessment of the effects of nuclear war,

urges all Associations to forward any proposals for additional action to the Steering Committee.

Resolution 11

The International Union of Geodesy and Geophysics

Recognizing that the need for cartographic representation of the structure of the Earth's crust and upper mantle has become urgent,

invites all interested Associations to participate actively in the projects of the Working Group on the comprehensive mapping of the Earth's crust and upper mantle established jointly by the International Association of Seismology and Physics of the Earth's Interior and the Commission on the Geological Map of the World of the International Union of Geological Sciences.

Resolution 12

The International Union of Geodesy and Geophysics

Noting the resolution of the International Union of Geological Sciences concerning the Unesco Subprogramme X.1.4(Interdisciplinary Research on the Earth's Crust),

endorses the general objectives of the Inter-Union Comission on the Lithosphere, and in particular, the special goal of strenghening the Earth

(1) Resolution 23 of ICSU General Assembly at Cambridge.

sciences and their effective application in developing countries,

suports the Resolution of the International Union of Geological Sciences, and

urges the General Conference of Unesco to authorize the Director General to include an adequate budget allocation for scientific meetings and symposia of the Inter-Union Commission on the Lithosphere and thus help Unesco to meet the targets of its Major Programme X: The Human Environment and Terrestrial and Marine Resources.

Resolution 13

The International Union of Geodesy and Geophysics

Noting the number of recent incidents involving high-level aircraft entering volcanic-ash plumes, the difficulties of ground observers on or near volcanoes providing warning to pilots in the air, and the potentially disastrous hazard of engine failure caused by ash intakes,

recommends that much closer links be established between national volcano-monitoring agencies and regional air-traffic control and meteorological offices, and between international aviation organisations (such as the International Air Transport Association and the International Civil Aviation Organization) and the International Association of Volcanology and Chemistry of the Earth's Interior.

Resolution 14

The International Union of Geodesy and Geophysics

Recalling Resolution 14 of the XVIIth General Assembly (Canberra), recommending the establishment of a Volcanological Institute for the Western Pacific,

supports the Draft Project Document for improved training and research in volcanology in the Western Pacific that has been prepared by Unesco's Regional Office for Science and Technology for Southeast Asia (ROSTSEA), and

Urges the United Nations to provide appropriate funds for the immediate implementation of this ROSTSEA project.

Resolution 15

The International Union of Geodesy and Geophysics

Noting the immense value to the scientific community of past international programmes of coordinated data acquisition, analysis and interpretation such as the International Geophysical Year, the International Year of the Quiet Sun and the International Magnetospheric Survey,

recognizing the importance, complexity and dynamic nature of the solar-terrestrial interaction, and the need for international programmes designated to acquire and analyze global data for quantitative investigations of the physical and chemical processes that are involved,

urges member countries to support and to participate in ICSU programmes on Solar-terrestrial interaction, especially in the final analysis phase of

the IMS and the continuation of the MAP and in similar programmes now being planned for the coming decade.

RESOLUTION 16

The International Union of Geodesy and Geophysics

Recognizing the fundamental role which radiative energy exchange processes play in the physics of the climate system,

considering the requirements for accurate data sets, adequately distributed geographically, on the radiation budget components at the Earth's surface for climate research,

recommends that

1) WMO and ICSU urge all their members to submit data sets from as many stations as possible to the World Radiation Data Center in Leningrad, according to the recommended procedures which are specified in World Climate Programme Publication N°48,
2) WMO and ICSU members establish calibration and inspection routines for experimentally operated stations in addition to the national networks, and
3) special climatic data sets be prepared for sensitive and important areas of the Earth for which the data density is still sparse (for example semi-arid areas, the Arctic sea-ice and the Antarctic continent, and the world oceans).

RESOLUTION 17

The International Union of Geodesy and Geophysics

Recognizing the difficulties of scientists in obtaining adequate climate data for research on meteorology, climatology, and climate impacts studies,

noting that one of the primary objectives of the World Climate Data Programme is to make climate data more available on convenient formats,

urges WMO arrange for compilations of climate data to be made available from international or national data centres to individual scientists for their research in convenient and multipurpose format at concessional rates, especially to scientists in developing countries.

RESOLUTION 18

The International Union of Geodesy and Geophysics

Considering the importance of highly accurate absolute gravity measurements for geophysical and geodetic research and applications,

recognizing that future comparisons of different absolute gravity apparatus are necessary to study sources of systematic error,

requests the support of the Bureau International des Poids et Mesures (International Bereau of Weights and Measures) in hosting an international compaign to compare absolute apparatus, and

requests all countries having transportable apparatus to take part in the campaign and the subsequent data reducton and analysis.

RESOLUTION 19

The Council of the IUGG records with great pleasure its appreciation of the efficient yet relaxed organization of both the scientific and supporting programmes, and on behalf of all participants offers its heartfelt thanks to the National Committee of the Bundesrepublik Deutschland, the Local Organizing Committee and all others concerned for making the XVIIIth and largest ever, General Assembly such a pleasant and scientifically satisfying experience.

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