

## Report of the IAGA Division V Business Meeting

Thursday, June 25, 2015, Conference Centre Room Terrace II, Prague, 18:00-20:00

Chair: Alan Thomson

Co-Chair (Minutes): Pieter Kotzé

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### Agenda:

1. Acceptance of the Agenda
  2. Report from Chair and Co-Chair: Alan Thomson
  3. Report from WG V-OBS: Pavel Hejda
  4. Report from WG V-DAT: Renata Lukianova
  5. Report from WG V-MOD: Chris Finlay
  6. IUGG 2015 session proposals from Division V
  7. IAGA resolution proposals from Division V
  8. Election of new chair and co-chair
  9. Any other business
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### 1. Acceptance of the Agenda

The agenda was accepted without any additional items.

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### 2. Report from Division V Chair and Co-Chair

Presenter: Alan Thomson

#### Various Division-related Meetings and Workshops

- The **XVIth IAGA Workshop On Geomagnetic Observatory Instruments, Data Acquisition and Processing** was held at the National Geophysical Research Institute (CSIR-NGRI), Hyderabad, India, on 7-16 October 2014, organized by the CSIR-NGRI, led by Dr K Arora and the Indian Institute of Geomagnetism (IIG), led by Dr B Veenadhari. The Scientific Session was formally inaugurated by Prof. Harsh Gupta, President of IUGG. This very well organized and well-attended (120 participants) workshop consisted of measurement sessions at the Choutuppal observatory and scientific sessions at NGRI
- The **XVIIth IAGA Workshop On Geomagnetic Observatory Instruments, Data Acquisition and Processing** will be held in Dourbes, Belgium in 2016.

- IAGA sponsored or supported meetings are described in the yearly IAGA newsletter: [http://www.iugg.org/IAGA/iaga\\_pages/pubs\\_prods/public\\_relation.html](http://www.iugg.org/IAGA/iaga_pages/pubs_prods/public_relation.html)

## Publications

- The **Proceedings of the XV IAGA Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing** (San Fernando, Cadiz, Spain, 4-14 June 2012) were published in BOLETÍN ROA No. 03/13, available at [http://iaga\\_workshop\\_2012.roa.es/IAGA%20Extended%20Abstract%20Volume.pdf](http://iaga_workshop_2012.roa.es/IAGA%20Extended%20Abstract%20Volume.pdf)

## Various Topics Related to Activities within the Three WGs of Division V

### MAGNETIC OBSERVATORIES

- **Changes**
  - KRO Krasnoe Lake (St. Petersburg) was changed to SPG St. Petersburg (Krasnoe Lake) following a request from the Geophysical Centre, RAS, Moscow. The aim was to maintain continuity with former observatories
- **Applications for new IAGA codes**
  - Choutuppal, India, CPL (status preliminary November 2013, operated by NGRI Hyderabad)
  - St Helena, SHE (status open, February 2013, operated by GFZ-Potsdam)
  - Santa Maria, Azores, SMA, (preliminary, February 2014, operated by GFZ-Potsdam)
  - Pantanal, Brazil, PNL (preliminary, February 2014)
  - Amazon (Tefe), AMZ (preliminary, February 2014)
  - Port Blair, India, PBR, (preliminary, April 2014, operated by Indian Institute of Geomagnetism)
  - Rajkot, India, RKT, (preliminary, April 2014, operated by Indian Institute of Geomagnetism)
  - Fort McMurray, Canada, FMC (preliminary, August 2014, BGS)
  - Lampedusa Island, Italy, LMP (preliminary, May 2015, Istituto Nazionale di Geofisica e Vulcanologia)
- **Closed geomagnetic observatories**
  - None?
- **The updated IAGA database of geomagnetic observatories and codes**
  - A catalogue (as a spreadsheet and Google Fusion table: <http://isgi.unistra.fr/iaga/> section “Obtaining an IAGA code”) was produced by the task force of V-OBS. Updates to the catalogue are requested via the *worldobs* and *imocontact* mailing lists. A new statement of the rules for obtaining IAGA codes also appeared on the V-OBS website.

### INTERMAGNET

- 11 new INTERMAGNET magnetic observatories (IMO) have been accepted into INTERMAGNET since 2013 (with 3 in 2014).

- 8 IMOs are causing concern, in terms of data delivery delays or observatory problems
- INTERMAGNET is now a member of the World Data System, like the WDC for Geomagnetism
- **New data products: Quasi-definitive & 1 second observatory data**
  - As of May 2015, 62 INTERMAGNET observatories (IMOs) were producing quasi-definitive data, and between 60 and 70 IMOs routinely produced quasi-definitive data during 2013-2015. This new type of data was used in the calibration/validation activities of the Swarm satellite mission, in the IGRF-12 development and validation and in the World Magnetic Model 2015
  - As of May 2015, 70 INTERMAGNET observatories were producing 1-second data, supporting research into rapid magnetic variations originating in the ionosphere and magnetosphere

## MAGNETIC SATELLITES

- **SWARM**
  - SWARM was launched in November 2013 and has been returning high quality data for scientific research, for example used by many groups submitting candidate models for the IGRF revision
  - However there are issues, now being resolved, on the Absolute Scalar Magnetometer (ASM) - Vector Fluxgate Magnetometer (VFM) scalar residuals, the temperature calibration of the Accelerometer (ACC) data and Thermal Ion Imager (TII) non-permanent degradation effects. The ASM on Swarm satellite C is now non-functioning, though calibration of the vector instrument on Swarm C has proved possible using Swarm A
  - The 3<sup>rd</sup> SWARM International Science Meeting took place in Copenhagen in June 2014
  - The 4<sup>th</sup> SWARM Data Quality Workshop took place in Potsdam in December 2014
  - Level 2 data products are being produced by the Swarm Constellation Research and Applications Facility, on behalf of ESA. Products (e.g. a Dst-like but vector magnetospheric activity index) have been available since early 2015 and more (e.g. core field models) are being added later this year. <https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/swarm>
- **Ørsted**
  - Continues to return (intermittently) scalar magnetic data, well after the expected end of life. Unclear if data are still being processed for scientific use

## GEOMAGNETIC INDICES

- The Polar Cap (PC) index was adopted by the IAGA executive committee as an official IAGA index at the Merida IAGA assembly, 2013. Many thanks are due to the efforts of DTU and AARI and to the V-DAT task force who spent a great deal of time checking and verifying the PC index's quality, accuracy and production, on behalf of the Division and IAGA
- The New ISGI Web site was officially launched the 28<sup>th</sup> June 2015 during the 26<sup>th</sup> IUGG General Assembly in Prague, Czech Republic (<http://isgi.unistra.fr>).

## **IGRF**

- The 12<sup>th</sup> generation IGRF model for the year 2015 with predictive secular variation up to 2020 was delivered in December 2014 by a task force set up by WG V-MOD. A special issue of Earth, Planets and Space was dedicated to candidate models prepared for the IGRF12. Many thanks are due to the task force and to field model developers around the world.

## **ISO STANDARDS in geomagnetic data and models**

- The ISO standard for geomagnetic models was published on 15<sup>th</sup> February 2014. This standard can be amended in future if required
- The proposed ISO standard for forecasting of geomagnetic indices only concerns rules for compliance through the normal route of proper scientific documentation, publication and availability of data and results. This standard therefore does not limit scientific research and IAGA's role is described

## **MAGNIO (Magnetics in the North Indian Ocean region)**

- NGRI, Hyderabad, India (K Arora) won financial support from IUGG to improve links between countries and institutes operating magnetic observatories in the North Indian Ocean region (e.g. Sri Lanka, Indonesia, Maldives, and India). MAGNIO aims to share best practice in observatory operations and to publish data through the WDC for Geomagnetism. A news item was prepared for the AGU EOS magazine announcing this new development

## **DOI update**

- Monika Korte

## **WDMAM update**

- Jerome Dyment

## **EPOS**

- The European Plate Observing System (EPOS) has a work package dedicated to delivering European geomagnetic observatory and other data for research. WP13-"Geomagnetic Observations" is coordinated by Pavel Hejda (IG ASCR, Czech Republic).
- EPOS has been called for negotiation over its budget. This means that it is highly likely to be funded and to commence work later in 2015.
- EPOS will provide needed support for important development activities such as observatory metadata and web services to deliver geomagnetic data for research. This will benefit the geomagnetic community as a whole.

## **Metrology Standards, National Standards Institutes and Geomagnetic Observatories**

- A project (of the Mendeleev Institute of Metrology, Moscow) set up to compare national standard magnetometer instruments with a reference quantum magnetometer which is based on the proton magnetic resonance method combined with the Overhauser effect.
- The aim is to help reduce uncertainty between national standards to 0.1 nT.
- Comparisons were made (in 2013-2014) with national standards in Russia, Belgium, Germany, Czech Republic, South Korea, China, Austria, Australia and UK.
- A report was issued in August 2014 with a call for further national institutes to take part in future studies. The report simply summarized the observed differences between national standards and the reference instrument.

## **Awards – People Associated with Division V**

- John Riddick (UK) and Hans-Joachim Linthe (Germany) have been awarded the IAGA long service award (both 2015)
- Mioara Manda received the International Award at the AGU Fall Meeting Honors Ceremony, held on 17 December 2014 in San Francisco, California. This award recognizes “outstanding contribution to furthering the Earth and space sciences and using science for the benefit of society in developing nations” (2014)
- Jean-Louis Le Mouel was awarded the first IAGA Shen Kuo medal for outstanding contributions to geomagnetism over his long and distinguished career (2013)
- Dr. Evgeny Kharin was awarded an IAGA long service medal for his significant contributions to accumulation, retention and dissemination of data on the Earth’s magnetic field required for fundamental scientific research (2013)
- Prof. Michel Menvielle of the French magnetic observatory was awarded an International Association of Geomagnetism and Aeronomy long service medal for his extensive and sustained contributions to IAGA and geomagnetism (2013)
- David Kerridge (UK), Charles Barton (Australia) were awarded honorary member of the IAGA executive status (all 2013)

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### **3. Report from WG V-OBS**

Presenter: Pavel Hejda

#### **Agenda**

- 3.1. Welcome and Agenda approval
- 3.2. Report on activity for the period from BM in Merida, August 2013
- 3.3. Report on the XVI Observatory Workshop held in Hyderabad, India in October 2014 (Kusumita Arora)
- 3.4. Information about the XVII Observatory Workshop that will be held in Dourbes, Belgium in 2016 (Jean Rasson)
- 3.5. List of observatories and IAGA codes

3.6. Proposal for sessions and conveners for IAGA SA 2017, Cape Town

3.7. Proposals for resolutions

3.8. Election of WG Chair and Co-Chair

3.9. Any other business

### **3.1 Welcome and Agenda approval**

Chair of the WG Pavel Hejda welcomed the participants and presented the agenda. The agenda was unanimously approved.

### **3.2 Report on activity for the period from BM in Merida, August 2013**

- Proceedings of the XVth IAGA Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing → Extended Abstract Volume. Real Instituto y Observatorio de la Armada, Boletín No. 3/13 (September 2013), editors: Pavel Hejda, Arnaud Chulliat, Manuel Catalan

### **3.3 Report on the XVI Observatory Workshop held in Hyderabad, India in Oct. 2014**

- XVIth IAGA Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing was held in Hyderabad, October 7 / 16, 2014.
- Report can be found in IAGA News 51, pp. 12-13.

*Report by Kusumita Arora*

### **3.4. Site selection for IAGA Observatory Workshop 2016**

- Call for bids announced in November 2013
- Selection Committee established: P. Hejda and A. Chulliat (WG V-OBS), A. Thomson and P. Kotze ( Division V), M. Korte (EC member), M. Mandaia (IAGA Secretary General)
- Bids submitted: Dourbes and Chambon-la-Forêt (withdrawn)
- Dourbes was confirmed

*Report by Jean Rasson*

### **3.5 List of observatories and IAGA codes**

#### **3.5.1 Catalog of Observatories**

- Task Force for revision of the list of observatories was established: Pavel Hejda (chair), Arnaud Chulliat, Justin Mabie, Masahito Nose, Susan Macmillan & Alan Thomson.
- Synoptic table (spreadsheet) compiled from all available catalogues
- Fusion Table created by Ewan Dawson (BGS)

- New web page of WG V-OBS hosted by BGS

### **3.5.2 Status of Observatories – new IAGA Codes**

- Code KRO Krasnoe Lake (St. Petersburg) was changed to SPG St. Petersburg (Krasnoe Lake) - request from GC RAS
- Choutuppal, India, CPL (status preliminary November 2013, operated by NGRI Hyderabad)
- St Helena, SHE (status open, February 2013, operated by GFZ-Potsdam)
- Santa Maria, Azores, SMA, (preliminary, February 2014, by GFZ-Potsdam)
- Pantanal, Brazil, PNL (preliminary, February 2014)
- Amazon (Tefe), AMZ (preliminary, February 2014)
- Port Blair, India, PBR, (preliminary, April 2014, Indian Institute of Geomagnetism )
- Rajkot, India, RKT, (preliminary, April 2014, Indian Institute of Geomagnetism)
- Fort McMurray, Canada, FMC (preliminary, August 2014, BGS)
- Lampedusa Island, Italy, LMP (preliminary, May 2015, Istituto Nazionale di Geofisica e Vulcanologia)

### **3.6 Proposals for sessions and conveners for IAGA South Africa 2017, Cape Town**

- “Ground magnetic observations: instrumentation improvements, data processing and operation” → *Proposed Conveners/co-conveners*: Kusumita Arora, Andriy Marusenkov
- Applications of ground magnetic data and indices for space weather, space climate and commercial sector (together with V-DAT, Div. IV) → *Proposed Conveners/co-conveners*: Aude Chambodut, Elen Clarke
- Secular variation studies from ground and satellite data (together with V-MOD) → *Proposed Conveners/co-conveners*: Vincent Lesur,

### **3.7. Proposals for resolutions**

No proposals were submitted

### **3.8.Election of chair and co-chair**

Chair: Arnaud Chulliat

Co-chair: Jürgen Matzka

### 3.9. Other Business

Business Meeting of EPOS (European Plate Observing System) Implementation Phase Project – WP Geomagnetic Observations: Friday at 12:00 at Teracce I

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#### 4. Report from WG V-DAT

Presenter: Renata Lukianova

Thursday, 25 June 2015, 12:00 – 13:30, Room Terrace II, PCC - Floor 2, Prague, Czech Republic, 26th IUGG General Assembly

~30 attendees

#### Agenda

- 4.1. Introduction: Acceptance of the agenda
- 4.2. The WG deliverables and update
- 4.3. Status of the IAGA indices
- 4.4. Progress in referencing geomagnetic data products by Digital Object Identifier (DOI) for getting better recognition for data production
- 4.5. Elections: WG Chair and co-Chairs for 2015-2019
- 4.6. Sessions for IAGA-2017
- 4.7. Miscellaneous

#### 4.1. Introduction: Acceptance of the agenda

Agenda is accepted

#### 4.2. Update since 2013

##### 4.2.1 IAGA-2013 Resolution No.3 “Polar Cap (PC) index”:

- IAGA recommends use of the PC index and urges that all possible efforts be made to maintain continuous operation of all geomagnetic observatories contributing to the index.
- Endorsement has been made according to the document “*Criteria for endorsement of new geomagnetic indices by IAGA*” elaborated by the WG-DAT
- The document has been included to “**IAGA Products and Services**”. Now the adoption of new indices endorsed by IAGA is done according to the Criteria

##### 4.2.2 Modifications of IAGA 2002 format



- INTERMAGNET proposed **Quasi Definitive (Q) data type** and **valid geomagnetic element G**. The IAGA2002 Data Exchange Format was modified accordingly.
- Recent INTERMAGNET meeting: adding a header line containing the publication date.
- The inclusion of additional line (#13) is optional but desirable for the modern data. The old data files can be not modified.
- Document “**Modifications of IAGA 2002 format**” has been announced, formally approved by the WG BM and posted at the WG web.

#### 4.3. Status of IAGA indices

Kp - Report by J. Matska (GFZ)

aa, am, CK days - Report by A. Chambodut (EOST)

- The ISGI-Collaborating-Institute, in charge of the calculation of *aa* and *am*, is now EOST, Strasbourg, France (previously LATMOS, Guyancourt, France).
- Rejuvenation of the Website completed: <http://isgi.unistra.fr>
- Monthly Bulletin: development of a new edition procedure, please send an email to : [isgi@unistra.fr](mailto:isgi@unistra.fr) (if not previously in the ISGI mailing list)

Dst, AE - Report by M. Nose (Kyoto)

PC - Report by O. Troshichev (AARI)

- New website: <http://pc-index.org>

Summary: All indices are in a good health. Comment by P. Stauning on the errors in the PC index procedure (see his presentation at A37)

#### 4.4. Progress in referencing geomagnetic data products by Digital Object Identifier (DOI) for getting better recognition for data production

- In 2013, the Task Force “DOI-Data” was established. Prompt response from the community and lively post-IAGA2013 discussion via e-mails showed that the problem is important for the community. Geomagnetic data need of measurable output indicators like number of publications and in particular citations.
- Possible solution: **referencing geomagnetic data products by DOI** (Digital Object Identifiers)

Activity in Japan: Report by Dr. M. Nose (Kyoto)

Activity in Russia: Report by M. Nisilevich (GC RAS) – first obs. (KLI) obtained the DOI for its 1-min and 1-h data

New TF Chairperson: *Masahito Nose (Kyoto)*; 14 TF members

- Noted that the problem becomes more and more important. Also other scientific bodies (CODATA, ISCU, etc.) are interested in this issue. Decided to continue working and to propose a joint session for the 2017 IAGA meeting.

#### **4.5 WG\_DAT officers for 2015-2019**

Chair: Masahito Nose

Co-Chairs: Aude Chambodut and Ellen Clarke

#### **4.6 Sessions for IAGA-2017**

Option #1: Session only for Div. V; proposed together with WG-OBS

##### **Div. V**

1) Geomagnetic products for commercial users, space weather, and space climate

Conveners: A. Chambodut (France), E. Clarke (UK), A. Soloviev (Rus), A. Chuliat (US)

Option #2: Two sessions, one is more “scientific” and for Div. V only; another one is more practically oriented, interdivisional and includes the ionospheric applications, e.g. GNSS.\_

##### **Div. V**

1a) Geomagnetic data and indices for space weather and space climate

Conveners: T. Asikainen (Finland)

##### **Inter-division V + II**

2) Implementation of the geomagnetic and *ionospheric* research for industry and society

*Conveners: the same as for (1)*

##### **Inter-association**

3) Referencing of data products for getting better recognition for data production

Conveners: M. Nose (Japan)

This session is new and a bit untypical. But perhaps it is worth to try to figure out either the topic is actual for a wider community.

Criticizm from Gautier Hulot, supporting comment from Mioara.

#### **4.7 Other business**

Moving of the WG website from NOAA to Kyoto or France/UK for easier posting and modification.

No proposals for IAGA resolution this time. The DOI issue may be future candidate for IAGA (or even IUGG) resolution. But more work and achievements are needed before.

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## **5. Report from WG V-MOD**

Presenter: Chris Finlay

IUGG 2015, Prague

This report describes the activities of WG V-MOD since the previous IAGA meeting in Merida, 2013. It reflects reports presented at the V-MOD business meeting in Prague, 2015.

The major activities of the working group have been:

### **5.1 IGRF-12**

The IGRF-12 task force led by Erwan Thebault supervised the construction of the 12<sup>th</sup> generation International Geomagnetic Reference Field which was released on time in late December 2014. It consisted of a new DGRF for epoch 2010, a new IGRF for epoch 2015 and a new predictive SV for 2015-2020. Data from the Swarm mission and ground observatories were crucial for the epoch 2015 model. More candidate models were received than for any previous IGRF generation.

The IGRF-12 task force voted (but not unanimously) to implement an iterative-reweighting scheme in space to determine the weights to be allocated to the candidate models in the construction of the final products. The model is available online at:

<http://www.ngdc.noaa.gov/IAGA/vmod/igrf.html>

A special issue of Earth Planets and Space devoted to IGRF-12 will be published before the end of the year. Many of the papers are already available online. This includes the main paper documenting IGRF-12, a paper describing the evaluation of candidate models and papers on the candidate models themselves.

### **5.2 WDMAM, version 2**

The task for force for the world digital magnetic anomaly map (WDMAM) led by Jerome Dyment and Manuel Catalan have supervised the construction of a new version of the WDMAM, released in Prague at IUGG 2015. This involved many new data sources, a new model of the magnetic field in the oceans, and new data processing and map construction techniques. The WDMAM task force, finally received only 1 candidate model, from a merged team of GFZ-Potsdam and IPGP-CNRS, Paris. The proposed map was reviewed by a team of 9 independent assessors, and was corrected in response to their comments. WDMAM 2.0 was released in June 2015 and it is now available online from

<http://www.wdmam.org>

## 5.3 Other important information relevant to geomagnetic field modelling:

### 5.3.1 Status of Magnetic Survey Satellites

ESA's Swarm mission is now providing high quality data suitable for field modelling (for example it was crucial in the construction of IGRF-12), although efforts to improve calibration are ongoing. Swarm data is freely available through the ESA web portal:

<https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/swarm>

There has been no regular contact with the Oersted satellite since mid-2013. It is tumbling, hence communications are intermittent and difficult to establish

The DMSP satellites have also provided magnetic data for field modelling. The magnetic data is freely available, but not presently the satellite positions.

### 5.3.2. Ground observatories

Ground geomagnetic observatories continue to play a crucial role in field modelling. There are 172 currently operating observatories, 66 providing definitive or close to definitive data in 2015. Quasi-definitive data is crucial in producing up-to-date geomagnetic field models.

### 5.3.3. Other field models

The Swarm Initial Field model for 2014 was published early this year in GRL. ESA's Level 2 products (including various field models) were reported during the Swarm session at IUGG and have been, or soon will be released.

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## 6. IUGG 2015 Session Proposals from Division V

6.1 Ground magnetic observations: instrumentation improvements, data processing and operation (V-OBS) → Proposed Conveners and co-Conveners: *Kusumita Arora (NGRI, India), Andriy Marusenkov (NAS, Lviv CISR, Ukraine)*

6.2 Ground and space magnetic data, indices and derived products for space weather and space climate research and for commercial users (together with V-OBS, V-DAT, Div. II, III, IV, VI) → Proposed Conveners and co-Conveners: *Aude Chambodut (EOST, France), Ellen Clarke (BGS, UK), Anatoly Soloviev (GC RAS, Russia), Arnaud Chulliat (NOAA, US), Timo Asikainen (University of Oulu, Finland)*

(There was an option to split this session into one solely looking at research progress and another session looking at more practical uses.)

6.3 Studies from ground and satellite data and models of core dynamics (V-MOD, V-OBS, DIV I) → Proposed Conveners and co-Conveners: *Vincent Lesur (GFZ, Germany), Nicolas Gillet (ISTerre, France)*

- 6.4 The referencing of geophysical data products: the role of DOIs (V-DAT, Inter-association) → Proposed Conveners and co-Conveners: *Masahito Nose (WDC Kyoto, Japan)*
- 6.5 Results from *Swarm* and other satellite missions (V-MOD, Inter-Commission. Joint with other divisions) → Proposed Conveners and co-Conveners: *Claudia Stolle (GFZ, Germany), Patrick Alken (NGDC, USA), Ciaran Beggan (BGS, UK)*
- 6.6 Lithospheric field, WDMAM, and geological/tectonic interpretations (V-MOD) → Proposed Conveners and co-Conveners: *Erwan Thebault (LPG Nantes, France), Foteini Vervelidou (GFZ, Germany), Stavros Kotsiaros (DTU, Denmark)*
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## **7. IAGA resolution proposals from Division V**

No resolutions were proposed at the meeting, however Gauthier Hulot mentioned that ESA would like to see a resolution emphasising the need to continue with new satellites, particularly missions concentrating on geomagnetic field observations. Such a resolution could be proposed at the next IAGA meeting in 2017. In the interim it was suggested to use the previous IAGA resolutions from 2011 to demonstrate any IAGA concerns for future and current mission support.

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## **8. Election of new chair and co-chair**

The new chair elected is Pieter Kotze, while the co-chair is Renate Lukianova. It was also mentioned that both persons were also candidates for possible election on the IAGA EC. Cathy Whaler, president of IAGA, mentioned that it is possible for IAGA EC to appoint suitable candidates to serve as chair and co-chair in such a case.

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## **9. Other Business**

None

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The chair thanked those present for their attendance and contributions and closed the meeting.

A total of 35 people attended the meeting.