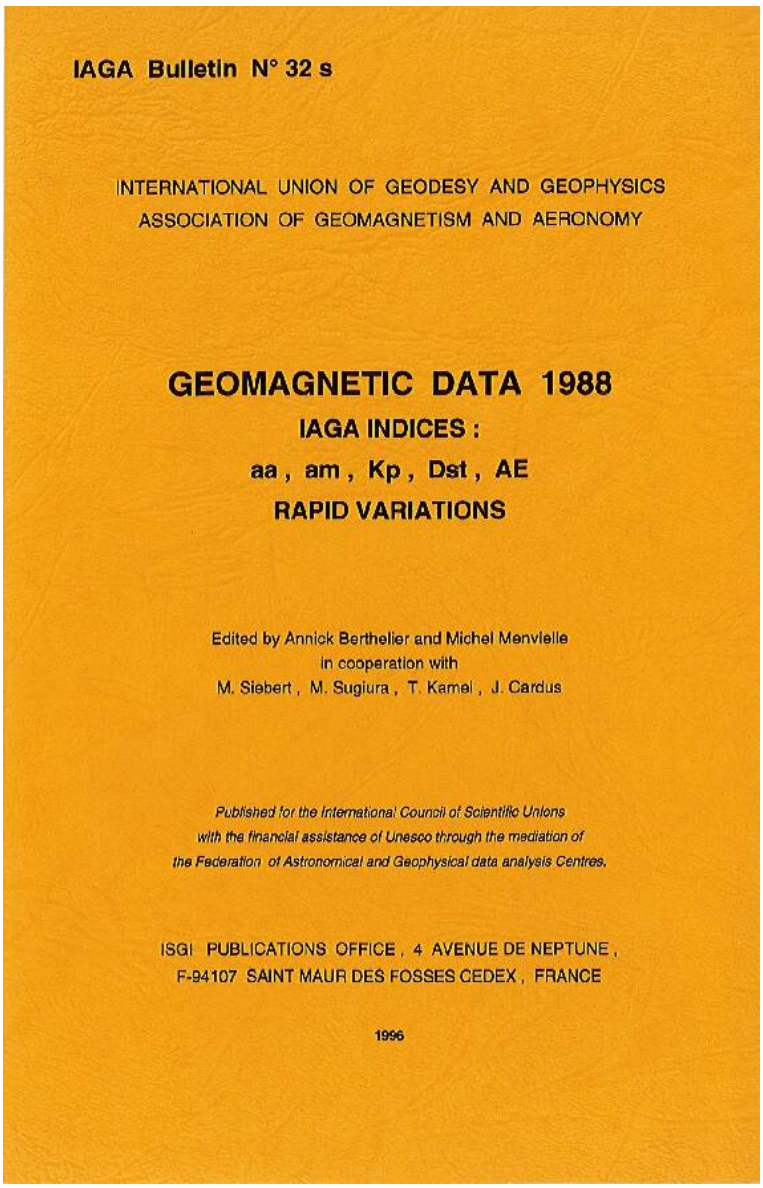


How to cite:

Berthelier, A., Menvielle, M., Siebert, M., Sugiura, M., Kamei, T., Cardus, J. O., & IAGA (1996). *IAGA Bulletin No. 32s, Geomagnetic Data 1988, IAGA INDICES: aa, am, Kp, Dst, AE, Rapid Variations.* ISGI Publications Office. https://doi.org/10.25577/qvz8-pv69

IAGA Bulletin N° 32 s

INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
ASSOCIATION OF GEOMAGNETISM AND AERONOMY

GEOMAGNETIC DATA 1988

IAGA INDICES :

aa , am , Kp , Dst , AE

RAPID VARIATIONS

Edited by Annick Berthelier and Michel Menvielle
in cooperation with
M. Siebert , M. Sugiura , T. Kamei , J. Cardus

Published for the International Council of Scientific Unions
with the financial assistance of Unesco through the mediation of
the Federation of Astronomical and Geophysical data analysis Centres.

ISGI PUBLICATIONS OFFICE , 4 AVENUE DE NEPTUNE ,
F-94107 SAINT MAUR DES FOSSES CEDEX , FRANCE

1996

IAGA Bulletin N° 32 s

INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
ASSOCIATION OF GEOMAGNETISM AND AERONOMY

GEOMAGNETIC DATA 1988

IAGA INDICES :

aa , am , Kp , Dst , AE

RAPID VARIATIONS

Edited by Annick Berthelier and Michel Menvielle
in cooperation with
M. Siebert , M. Sugiura , T. Kamei , J. Cardus

Published for the International Council of Scientific Unions
with the financial assistance of Unesco through the mediation of
the Federation of Astronomical and Geophysical data analysis Centres.

ISGI PUBLICATIONS OFFICE , 4 AVENUE DE NEPTUNE ,
F-94107 SAINT MAUR DES FOSSES CEDEX , FRANCE

1996

FOREWORD

While keeping the Bulletin series as homogeneous as possible, the general information is updated in each issue, and we try to improve contents and presentation as well.

The Bulletin 32 series aims at providing a reference publication with all definitive values of indices and rapid variation data for the year. It however may happen that difficulties in the derivation of some indices could cause siginificant delays so that it is desirable to issue the Bulletin 32 for the year before their definitive values become available. It has already been the case in the past, and it is unfortunately the case for the AE indices this year. After discussion with M.SUGIURA and T.KAMEI, we decided against our best intentions, to accept this desperate solution and publish only the first 6 months of AE indices in this issue.

A floppy having the same contents as the Bulletin (except for the rapid variations) is included, with a software for visualizing the tables. The floppies corresponding to the year 1981-1987 have also been prepared, and are now available on request at the ISGI Publication Office (c/o CETP, 4 Avenue de Neptune, F- 94107 Saint-Maur des Fossés Cedex, FRANCE).

Annick Berthelier, Michel Menvielle

ACKNOWLEDGEMENTS

We wish to acknowledge J.O.CARDUS, M.SIEBERT, T.KAMEI and M.SUGIURA for their cooperation in preparing the data published in this Bulletin. Thanks are also due to all the organisations, which support efficiently the preparation and distribution of these geomagnetic data (as listed in Table 1, page 10).

Let us add that M.SUGIURA, who is now at the Tokai University (Tokyo, Japan), wishes specially to acknowledge the valuable assistance of T.KAMEI and T. ARAKI (Data Analysis Center for Geomagnetism and Space Magnetism, Kyoto University) in the derivation of the indices, and in the preparation of the published tables and figures, for the Dst and AE indices.

As for us, we dully acknowledge the very long delay in the publication of the present Bulletin, due to problems in manpower, and we are pleased to express our thanks to all those who helped us in its elaboration.

Annick Berthelier, Michel Menvielle

Saint Maur, Orsay, April 1996

CONTENTS

Section 1 :	Presentation of the Bulletin	5
Section 2 :	List of Observatories	27
Section 3 :	IAGA Indices	41
	3.1. **aa** indices	43
	3.2. **am** indices	53
	3.3. **Kp** indices	75
	3.4. **Dst** indices	87
	3.5. **AE** indices	107
Section 4 :	Classification of Days	123
Section 5 :	Rapid Variations	129

SECTION 1

PRESENTATION OF THE BULLETIN

1.1.	Introduction	7
1.2.	List of Observatories	11
1.3.	IAGA Indices	13
1.4.	Classification of Days	22
1.5.	Rapid Variations	23

1.1. PRESENTATION

1.1.1. The IAGA Bulletin 32 series

The IAGA Bulletin N°32 series is a yearly compilation of geomagnetic indices and other geomagnetic data, based on the report of a great number of magnetic observatories. The series is the continuation of the former IAGA Bulletin N°12 and is prepared for publication by the Publications Office of the International Service of Geomagnetic Indices (ISGI). The ISGI, formerly called Permanent Service or "C and K center", operates under the supervision of IAGA Division V : Observatories, Instruments, Indices and Data. Since 1956, it belongs to the Federation of Astronomical and Geophysical Data Analysis Services. Its present address is :

ISGI, CETP - CNRS/IPSL/UVSQ, 4 Avenue de Neptune,
F - 94107 Saint-Maur des Fossés CEDEX, FRANCE.

As for 1988, the elaborated data were provided by the following Institutes, under the responsability of the adjoining collaborators :

- Institut für Geophysik, Göttingen (M. SIEBERT) :
  Kp, ap, Ap, Cp, Q-days and D-days.

- Université Paris Sud, Orsay, Paris (M. MENVIELLE) :
  aa, C-days and K-days, an, Kn, An, as, Ks, As, and am, Km, Am.

- Data Analysis Center for Geomagnetism and Spacemagnetism, Kyoto (M. SUGIURA) :
  Dst, AL, AU, AE.

- Observatorio del Ebro, Roquetas (J.O. CARDUS) :
  Rapid Variations.

The collection and the publication of the daily character figure C and of the international character figure Ci, together with the lists of selected quiet and disturbed days began in 1906.

The three-hourly K indices (scale 0-9) were introduced by Bartels in 1938, and, a few years later, planetary indices Kp were designed. They are computed from the K indices of 12 observatories which were routinely providing data at the time. The K indices of the selected stations for these early years were published in IAGA Bulletins N°12g and 12l. In addition to Kp, the corresponding range values ap and related daily indices Ap and Cp have been regularly published in the IAGA Bulletin N°12.

In accordance with the recommendations of the IAGA Assemblies in Madrid (1969) and in Moscow (1971), the publication of C and K indices of individual observatories in the IAGA Bulletins ended with the 1969 data, while other indices (Dst, an, Kn, as, Ks, am, Km) and a survey of magnetic storms were included since 1970.

This change marked the end of the IAGA Bulletin N°12 series and the beginning of the new IAGA Bulletin N°32 series. The publication of the Ci, Kp, ap, Ap indices, and of the international quiet and disturbed days, Q and D days, continued in the new series. Since 1976, the new index aa is published instead of Ci and the C figures are no longer compiled, according to a recommendation of the IAGA Assembly in Grenoble (1975).

A short recall of the definition of the published indices is given in the section 1.3 below. For more details, including the definition of the K indices, one can refer to the following reports:

- M. Siebert, in "Handbuch der Physik", vol.49/3, 206-275, Springer Verlag, 1971;
- P. N. Mayaud, *Derivation, Meaning and Use of Geomagnetic Indices*, Geophysical Monograph 22, Am. Geophys. Union, Washington D.C., 1980, gives a complete review of the present IAGA indices;
- G.K. Rangarajan, *Indices of geomagnetic activity*, in "Geomagnetism", edited by J.A. Jacobs, Academic, San Diego, 1989;
- M. Menvielle and A. Berthelier, *The K-derived planetary indices: description and availability*, Rev. Geophys., 29, 3, 415-432, 1991;
- A. Berthelier, Solar Terrestrial Prediction Workshop, *in STPW Proceedings*, ed. by J. HRUSKA et al, in vol 3, p. 3-20, US Gov. Publications Office, 1994.

1.1.2. Data Availability

The whole series of geomagnetic indices are available at the World Data Centers (list and addresses in Table 1-a), and the IAGA Bulletins where they are published are available at the ISGI Publications Office (Table 1-c). More detailed information on the length of each series, and on the publication and availability of each index, and of the rapid variations are given below.

- The *K indices* of individual observatories are available for the years 1969-1974, at the World Data Center A (WDC-A, Table 1-a). Besides, the tables of local K indices can be found in the bulletins or yearbooks of many observatories. An extensive study on the K index by P. N. Mayaud and the practical rules for its determination are given in the "Atlas des indices K", IAGA Bulletin N°21, 1967.

- The *aa indices* constitute a series of indices beginning in the year 1868. Its description can be found in the IAGA Bulletin N°33, which contains tables and graphs of aa for the years 1868-1967. The values for the years 1968-1975 are published in the IAGA Bulletin N°39. These indices are regularly published in the IAGA Bulletins N°32 since 1976. They also regularly appear in the monthly tables edited by H. Coffey in the Journal of Geophysical Research and in the Solar Geophysical Data Publications (Table 1-c). They are sent on request by mail before the end of the next month, or by telex within 1 week, and they are available through an e-mail automatic service (ISGI Publications Office, Table 1-c).

- The meaning of *C, Ci, K* and *Kp* is explained in textbooks (e.g. Landolt-Börnstein, Zahlenwerte und Funktionen, Band 3, 731-744, Springer Verlag, 1952), in Terrestrial

Magnetism and Atmospheric Electricity (*44*, 411, 1939; *45*, 309, 1941) and in the IAGA Bulletin N°12i. Tables and diagrams of these indices for the whole period 1932-1961 are printed in the IAGA Bulletin N°18. Kp, Ap, Cp are published in the IAGA Bulletin N°32, and also in the monthly tables edited by H. Coffey in the Journal of Geophysical Research and in the Solar Geophysical Data Publications (Table 1-c). They can be sent on request before the end of the next month by the Institut für Geophysik, Göttingen (Table 1-b).

- The *three-hourly indices an, Kn,* and *as, Ks,* for the Northern and Southern hemispheres and the *planetary indices am, Km,* are described by P. N. Mayaud in "Indices Kn, Ks and Km, 1964-1967" (Editions du CNRS, Paris 1968). The indices for the years 1959-1963 are published in the IAGA Bulletin N°39, and for 1964-1967 in the above quoted publication. They are published in the IAGA Bulletins N°32 from 1968 onwards, and also appear in the monthly tables edited by H. Coffey in the Journal of Geophysical Research and in the Solar Geophysical Data Publications (Table 1-c). They are sent on request by mail within 6 weeks after the end of the month, and are available through and e-mail automatic service (ISGI Publications Office, Table 1-c).

- The *equatorial Dst index* is published in the IAGA Bulletin N°32 since 1970. The hourly values of Dst for the years 1957-1970, based on the data of three stations, have been published by M. Sugiura and D. J. Poros in the report X-645-71-278 of the Goddard Space Flight Center. The hourly Dst values for the IGY, based on the data of eight stations, are given in the Annals of the IGY, vol. 35. The same volume contains the three-hourly values of Dst for the IGY as determined by Kertz in a somewhat different way. Recently, M. Sugiura and T. Kamei recomputed an homogeneous series of Dst values, using the data of four stations. These Dst indices values for 1957-1986 are now published in the IAGA Bulletin N° 40 where is inserted a floppy disk containing the hourly Dst values for these 30 years. This report supersedes earlier Dst publications by Sugiura and co-workers.

- The *auroral electrojet index AE* was originally introduced by Davis and Sugiura in 1966 (J. Geophys. Res., *71*, 785). It was first derived at the Geophysical Institute of the University of Alaska, and the hourly values were published for the years 1957-1964 in the University of Alaska Reports prepared by T. N. Davis, Y. S. Wang and C. Echols, and published in 1967 and 1968. The data for 1965 were prepared by NASA ; from 1966 to 1976, they were prepared by WDC-A. Values from 1978 onwards are computed by the Data Analysis Center for Geomagnetism and Spacemagnetism of Kyoto University and published in the data books of this Institute. The hourly mean values are published in the IAGA Bulletins N°32 since 1981.

- Data on *rapid variations* are collected and prepared for publication at the Observatorio del Ebro (Table 1-b), according to the decisions made at the IAGA Assemblies in Madrid (1969) and in Grenoble (1975). They are thus given less extensively than in the former IAGA Bulletins. Provisional lists are available on request at ISGI within 6 weeks after the end of the month (Table 1-c).

Tables 1-a, 1-b and 1-c (next page) give present addresses of the ISGI, of the World Data Centers, and of the National Institutes and Data Centers related to this bulletin.

TABLE 1

a - ISGI and World Data Centers

ISGI	International Service of Geomagnetic Indices Service International des Indices Géomagnétiques CETP -CNRS/UVSQ, 4, Avenue de Neptune F-94107 SAINT MAUR DES FOSSES CEDEX, France Telephone 33 1 45 11 42 30 Telex 264 498 OBSMAUR Telefax 33 1 48 89 44 33
WDC-A	World Data Center-A for Solar-Terrestrial Physics NOAA code E/GC2, 325 Broadway BOULDER, Colorado 80303-3328 U.S.A. Telephone 1 303 497 6324 Telex 592 811 NOAA MASC BDR Telefax 1 303 497 6513
WDC-B	World Data Center-B Soviet Geophysical Committee, Academy of Sciences of the U.S.S.R. Molodezhnaya 3 MOSCOW 117296, U.S.S.R. Telephone 7 095 130 05 46 7 095 228 67 88 Telex 411 478 SGC SU
WDC-C	World Data Center-C2 for Geomagnetism Data Analysis Center for Geomagnetism and Space Magnetism Faculty of Science, Kyoto University KYOTO 606-01, Japan Telephone 81 75 753 3929 Telex 5422302 SCIKYU J Telefax 81 75 722 7884

b - ISGI Collaborating Institutes

M. MENVIELLE	Laboratoire de Physique de la Terre et des Planètes Batiment 504 - Université PARIS-XI F-91405 ORSAY CEDEX, France
M. SIEBERT	Geophysical Institute, Göttingen University Institut für Geophysik der Universitat Göttingen Postfach 2341, Herzberger Landstrasse 180 D-3400 GOTTINGEN, Federal Republic of Germany
J. O. CARDUS	Observatorio del Ebro Roquetas, TARRAGONA, Espagne
M. SUGIURA	Working Group on World Data Centers National Committee on Solar-Terrestrial Physics Science Council of Japan Institute of Research and Development Tokai University, 2 -28 Tomigaya, Shibuya-ku TOKYO 151, Japan

c - Bulletins and publications

• Solar Geophysical Data monthly publications :
NOAA National Geophysical Data Center
325, Broadway E/GC4, Dept. 961
BOULDER, Colorado 80303-3328 U.S.A.

• IAGA Bulletins and ISGI Monthly Bulletins :
ISGI Publications Office
CETP - 4, avenue de Neptune
94107 SAINT MAUR DES FOSSES CEDEX, France
E-mail automatic service : ISGLDATA@cetp.ipsl.fr

1.2. LIST OF OBSERVATORIES

A list of the magnetic observatories where continuous recordings have been made during at least five consecutive years is given pages 29-37. In this table, the observatories are listed according to the alphabetic order and one has indicated for each station, from left to right :

- its name and three-letter IAGA international code ;
- the geographic and geomagnetic coordinates, and altitude ;
- the K=9 lower limit, given only for the stations which belong to the networks used in Kp, am or aa calculation. (see section 1.3 for the description of these networks in 1988);
- the opening and closing years.

Note that temporary stations do not appear in this table, as for instance those operating during the International Polar and Geophysical years, but they can be found in the more extensive list published in the former IAGA-Bulletin n° 20 (1965).

The values of the parameters given in the table has been obtained from the following publications :

- C.R. Bock and R.W. Schumann : Katalog der Jahres mittel der Magnetischen Elemente der Observatorien und der Stationen an deinen eine Zeitlang erdmagnetische Beobachtungen Stattfanden, Geophysikalisches Institut Postdam Abhandlungen n° 8, Postdam, 1948;

- Annual mean values of Geomagnetic elements, Geomagnetic Bulletin n°10, Institut of Geological Sciences, Edinburgh, 1981 ;

- Yearbooks of individual observatories.

A list of the stations having provided continuous recordings over at least fifty years is given on pages 38-40. When one observatory has moved, the names of the different consecutive sites are indicated. The stations are listed following the alphabetic order of the oldest observatory. One has only indicated in this table the opening and closing years, as the other parameters can be found in the preceeding list.



Figure 1 : Distribution of am observatories



Figure 2 : Distribution of Kp observatories

1.3. IAGA INDICES

1.3.1. aa indices

The aa indices are derived using data from two nearly antipodal observatories, where magnetograms were available since 1868. For each three hour interval, K indices are measured at the two stations and converted back into amplitude; an individual aa index is the average of the northern and southern values, weighted to account for the small difference in latitude of the two stations, or for the slight changes in the very place of the observatory. The observatories used to derive aa are given in Table 2-a (next page), with weighting coefficients given in brackets.

The aa index is in nanotesla (nT) and it represents the activity level at an invariant magnetic latitude of about 50°. The half-daily and daily mean values of aa are very close to the corresponding values of the am indices. The values for 1988 are given pages 46-48 as follows :

N	=	daily values for the Northern observatory (Greenwich day)
S	=	same for the Southern observatory
am, pm	=	half-daily values of aa indices for the half Greenwich day before noon and after noon.
Aa	=	daily value of aa

For each month, the average values of daily N, S and aa, are given at the bottom of the tables.

The letters C and K indicate the quiet 24-hour and 48-hour intervals as obtained from aa : C = really quiet, K = quiet but with one or a few slightly disturbed three-hourly intervals (see section 4). The letter on the left column refers to the 24-hour Greenwich day, that on the right one refers to a period of 48 hours centered on the Greenwich noon. The asterisks mark the five international quietest days of the month (as deduced from Kp, see section 4).

A musical diagram of aa indices (logarithmic scale) is drawn page 45 for the whole year. The monthly and yearly mean values of aa for the years from 1868 onwards are listed pages 49-51. A graph of 12-month running mean values of aa is drawn page 52, covering the full period over which aa has been calculated so far, i.e. 1868-1988. In this graph, the point plotted at the abscissa of a given year corresponds to the average of aa from January to December of that year (unit : nT).

1.3.2. am indices

am, an and as indices are derived from K indices scaled at observatories located in the subauroral zones of the Northern and Southern hemispheres (Figure 1). The stations are arranged in groups (G1 to G9), each group representing a longitude sector in one of the hemisphere (see Table 2-b, next page). The corrected geomagnetic latitude indicated in this Table has been calculated by Mayaud for taking into account the actual topography of the main field.

TABLE 2

a - List of aa observatories

Northern Hemisphere			*Southern Hemisphere*		
Observatory		*Corr. Geom. Lat.*	*Observatory*		*Corr. Geom. Lat.*
1868-1925	Greenwich *(1.007)*		1868-1919	Melbourne *(0.967)*	
1926-1956	Abinger *(0.934)*		1920-1979	Toolangui *(1.033)*	
1957- ...	Hartland *(1.059)*	50.0°	1980- ...	Canberra *(1.084)*	45.2°

b - List of am observatories

Northern Hemisphere				*Southern Hemisphere*			
	Observatory		*Corr. Geom. Lat.*		*Observatory*		*Corr. Geom. Lat.*
G1	Magadan	MGD	53.8°	G6	Eyrewell	EYR	50.2°
	Petropavlosk	PET	46.4°		Canberra	CAN	45.2°
	Memambetsu	MMB	37.4°				
G2	Podkammenkaya	POD	57.2°	G7	Gnangara	GNA	44.1°
	Sverdlovsk (1)	SVD	52.2°		Amsterdam	AMS	48.3°
G3	Witteveen (2)	WIT	50.2°	G8	Kerguelen	PAF	58.8°
	Hartland	HAD	50.0°		Crozet	CZT	52.4°
	Niemegk	NGK	48.8°		Hermanus	HER	41.1°
G4	Ottawa	OTT	58.9°	G9	Argentine Islands	AIA	49.7°
	Frederiksburg	FRD	51.8°		Trelew	TRW	27.8°
G5	Victoria	VIC	53.9°				
	Tucson	TUC	39.7°				

(1) Present name : Ekaterinburg
(2) Closed at the beginning of March 1988

c - List of Kp observatories

Northern Hemisphere			*Southern Hemisphere*		
Observatory		*Corr. Geom. Lat.*	*Observatory*		*Corr. Geom. Lat.*
Meanook	MEA	62.5°	Eyrewell	EYR	50.2°
Sitka	SIT	60.0°	Canberra	CAN	45.2°
Lerwick	LER	58.9°			
Ottawa	OTT	58.9°			
Lovö	LOV	56.5°			
Eskdalemuir	ESK	54.3°			
Brorfelde	BJE	52.7°			
Fredericksburg	FRD	51.8°			
Wingst	WNG	50.9°			
Witteveen	WIT	50.2°			
Hartland	HAD	50.0°			

For a given time interval, the K values measured at the observatories of one group are averaged and converted back to amplitude. These amplitudes are weighted for balancing the differences in longitude width of the sectors, and the hemispheric averages of these weighted amplitudes give rise to the three-hour an and as indices respectively; am is equal to (an + as) / 2. Am, An and As are the daily mean values of am, an and as. They are all expressed in nanoteslas.

For the sake of tradition and convenience, Km, Kn, Ks equivalent values are also made available by means of a conversion table (see below); they are as usually expressed by values from 0o to 9o, corresponding to the given interval of am (or an, or as).

am	0.0	1.4	3.4	5.4	7.4	10.4	13.4	16.4	20.4	26.4
Km	0o	0+	1-	1o	1+	2-	2o	2+	3-	
am	26.4	33.4	40.4	50.4	60.4	70.4	86.4	103.4	120.4	146.4
Km	3o	3+	4-	4o	4+	5-	5o	5+	6-	
am	146.4	173.4	200.4	243.4	286.4	330.4	386.4	443.4	500.4	611.4
Km	6o	6+	7-	7o	7+	8-	8o	8+	9-	9o

Monthly tables of an, and as are given pages 56-67, each line corresponding to a Greenwich UT day. Following values are displayed from left to right :

- Kn (Ks) values for the 8 three-hour intervals ;
- σn (σs) values for the 8 three-hour intervals represent, by a code using one digit from 0 to 9, the variance of the sector values of K in the Northern (Southern) hemisphere calculated for each given three-hour interval;
- an (as) values for the 8 three-hour intervals ;
- An (As) daily mean value.

At the end of each table, one can find the monthly mean value.

Monthly tables of am (pages 68-73) are displayed in a similar way :

- Km values for the 8 three-hour intervals ;
- daily sum ΣKm ;
- am values for the 8 three-hour intervals ;
- Am, daily mean value ;
- Am2, mean value of am over a 48-hour period centered at the middle of the Greenwich day.

Km values are displayed as "musical diagram" according to Bartels solar rotations (page 55). A compilation of the musical diagrams from 1959 onwards is available on request at ISGI Publication Office (Table 1-a). The monthly and yearly mean values of Am from 1959 onwards are given page 74.

1.3.3. Kp indices

The planetary three-hour-range index Kp is the mean standardized K-index from 13 observatories between 44° and 60° northern or southern geomagnetic latitude (Figure 2, and Table 2-c). The scale is 0o to 9o, expressed in thirds of a unit, e.g. 5- is 4 2/3, 5o is 5, 5+ is 5 1/3. This planetary index has been designed to measure solar particle radiation by its magnetic effects.

The other indices derived from Kp are the three-hour index ap (the equivalent range), the daily indices Ap, the Cp and C9 characters that are related to the daily sum of ap.

The three-hour equivalent amplitude ap is deduced from Kp as follows :

Kp	= 0o	0+	1-	1o	1+	2-	2o	2+	3-	3o	3+	4-	4o	4+
ap	= 0	2	3	4	5	6	7	9	12	15	18	22	27	32

Kp	= 5-	5o	5+	6-	6o	6+	7-	7o	7+	8-	8o	8+	9-	9o
ap	= 39	48	56	67	80	94	111	132	154	179	207	236	300	400

In order to use ap as an equivalent amplitude, it is considered in relation to the conditions at a standard station, which is a station having the lower limit of 500 nT for K = 9. At such a station the average range in nT of the most disturbed of the two horizontal components in a three-hour interval can be taken as 2 ap (for instance, for Kp = 3+, ap=18, ie 36 nT). In other words ap is an equivalent amplitude in the unit 2 nT. The column headed Ap gives the daily average for the eight values ap per day. Therefore, Ap may be called the "equivalent daily amplitude Ap", expressed in the unit 2 nT for a standard station. It is recommended to use Ap in preference to the sum of the indices Kp.

The last column gives the daily planetary character figure Cp, as defined in Bulletin 12e, page 111. It should be noted that Cp, introduced for a standardization of the international character figures Ci, has not been approved by the Association. Instead, Ap was preferred. For a rough conversion of Ci figures (prior to 1932) into Ap, the following table (derived from Bulletin 12e, page 111, their Table 2) may be used :

10.Ci	= 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ap	= 2	4	5	6	8	9	11	12	14	16	19	22	26	31	37	44	52	63	80	110	160

Monthly tables of Kp and derived indices are given pages 78-83. Kp values are displayed as "musical diagrams" according to Bartels solar rotation page 77. These diagrams are also available on request at Geophysical Institute, Göttingen (Table 1-b). The frequencies of Kp indices is given by month page 84. Monthly and yearly mean values of Ap from 1932 onwards are given page 85.

Note - Observatories wishing to compute local equivalent amplitudes ak from their local K indices, may use the conversion table given below, which consists in the amplitudes (in nT) of the middle of each K class, as firstly proposed by Bartels (IATME Bull. 12e, 1951), and following a IAGA WG 5.5 recommandation (Buenos Aires, 1993).

K	=	0	1	2	3	4	5	6	7	8	9
ak	=	2.5	7.5	15	30	55	95	160	275	415	666

These values are given here for a K = 9 lower limit L9 = 500 nT; at stations having a different value of L9, they should be multiplied by L9/500, in order to have ak in nT (see IAGA News 32, page 23).

1.3.4. Dst index

The Dst index for 1988 are derived using the data from the four magnetic observatories given in Table 3.

These observatories were chosen on the basis of the quality of observation and for the reason that their locations are sufficiently distant from the auroral and equatorial electrojets and that they are distributed in longitude as evenly as possible. A map of the network is given in Figure 3.

The baseline

The baseline for H is defined for each observatory in a manner that takes into account the secular variation. For each observatory, the annual mean values of H, calculated from the "five quietest day" for each month, form the data base for the baseline.

It should be remembered that the final Dst values are determined after each calendar year and that therefore in this determination the annual mean values are available only up to and including the year (referred to below as the current year) for which the Dst is to be deduced.

The baseline is expressed by a power series in time and the coefficients for terms up to the quadratic are determined by the method of least squares, using the annual means for the current year and the four preceding years. Thus, the baseline, H_{base} is expressed as

$$H_{base}(\tau) = A + B\tau + C\tau^2 \qquad (1)$$

where τ is time years measured from a reference epoch.

It is noted here that if the polynomial expansion of the annual means is made in a straighforward manner as described above, an artificial discontinuity, although seldom large enough to be recognized by a casual inspection, can be introduced between the baseline value for the last hour of one year and that for the first hour of the following year, because these two baseline values are calculated from two different polynomials. To minimize such a discontinuity the polynomial determination is actually made in two steps.

From the polynomial expansion determined in the first step, the baseline value at the end of current year is calculated. In the second step, this value is included as an additional data point in the polynomial fitting. This procedure has been found to be satisfactory.

The baseline value $H_{base}(T)$ calculated from (1) for each UT hour of the current year is subtracted from the observed H value, $H_{obs}(T)$:

$$\Delta H(T) = H_{obs}(T) - H_{base}(T) \qquad (2)$$

The deviations, $\Delta H(T)$, form the data base in the following derivation for each of the observatories.

TABLE 3

List of Dst observatories

Observatory	*Symbol*	*Dipole Lat.*	*Dipole Long.*
Honolulu	HON	21.0°N	266.4°
San Juan	SJG	29.9°N	3.2°
Hermanus	HER	33.3°S	80.3°
Kakioka	KAK	26.0°N	206.0°

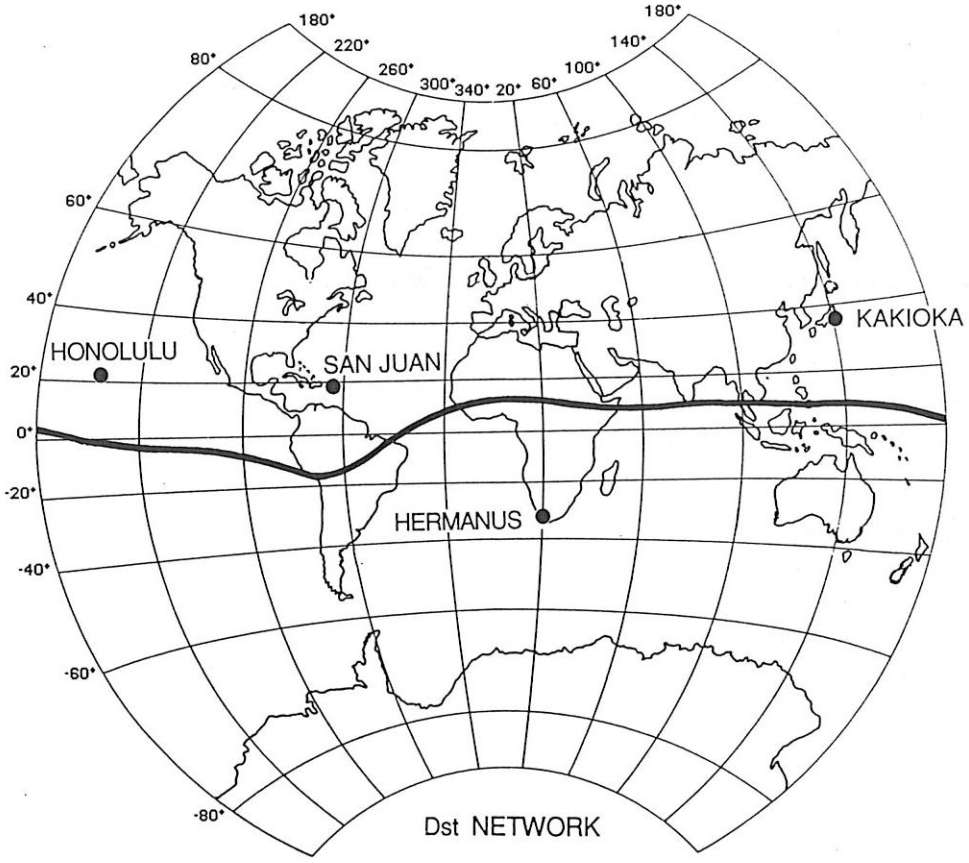


Figure 3 : Distribution of Dst observatories;
the solid line marks the magnetic dip equator.

The Sq elimination

The solar quiet daily variation, Sq, is derived for each observatory as follows. The average Sq variation for each month is determined from the values of H(T) for the internationally selected five quietest days of the month.

These quietest days are determined in UT. In order to define an average Sq variation for the local day of each observatory, we form the averages for the local hours using five quietest days. Also, using hourly values immediately before and immediately after the local days selected, we evaluate the linear change and subtract it from the Sq variation. In this manner we remove from Sq the noncyclic change, which is part of Dst variation, and also evaluate Sq from the midnight level.

The 12 sets of the monthly average Sq so determined for the year are expanded in a double Fourier series with local time, t, and month number, s, as two variables:

$$S_q(t,s) = \sum_m \sum_n A_{mn} \cos(mt + \alpha_m) \cos(ns + \beta_n) \qquad (3)$$

This representation allows us to calculate Sq(T) at any UT hour, T, of the year. This procedure is applied to each observatory.

The Hourly Equatorial Dst Index.

For each observatory the disturbance variation, D(T), is defined by :

$$D(T) = \Delta H(T) - S_q(T) \qquad (4)$$

Then D(T) is averaged over the four observatories and normalized to the dipole equator by :

$$Dst(T) = D(T) \; / \; \cos \varphi$$

where the denominator is the average of the cosines of the dipole latitudes, ϕ_i (i=1,4), of the observatories contributing to the average. This normalization procedure has been found to minimize undesired effects from missing hourly values.

Monthly tables of hourly Dst-values are given pages 92-103, followed by a table of mean values (page 104). The graph of hourly values for the whole year is given pages 89-91; the table of monthly and yearly mean values from 1959 onwards is given page 105.

TABLE 4

List of AE observatories

Observatory	*Symbol*	*Geographic*		*Geomagnetic*	
		Lat. (°N)	*Long. (°E)*	*Lat.(°N)*	*Long. (°E)*
Abisko	ABK	68.36	18.82	66.04	115.08
Dixon Island	DIK	73.55	80.57	63.02	161.57
Cape Chelyuskin	CCS	77.72	104.28	66.26	176.46
Tixie Bay	TIK	71.58	129.00	60.44	191.41
Cape Wellen	CWE	66.17	190.17	61.79	237.10
Barrow	BRW	71.30	203.25	68.54	241.15
College	CMO	64.87	212.17	64.63	256.52
Yellowknife	YKC	62.40	245.60	69.00	292.80
Fort Churchill	FCC	58.80	265.90	68.70	322.77
Poste de la Baleine	PBQ	55.27	282.22	66.58	347.36
Narssarssuaq	NAQ	61.20	314.16	71.21	36.79
Leirvogur	LRV	64.18	338.30	70.22	71.04

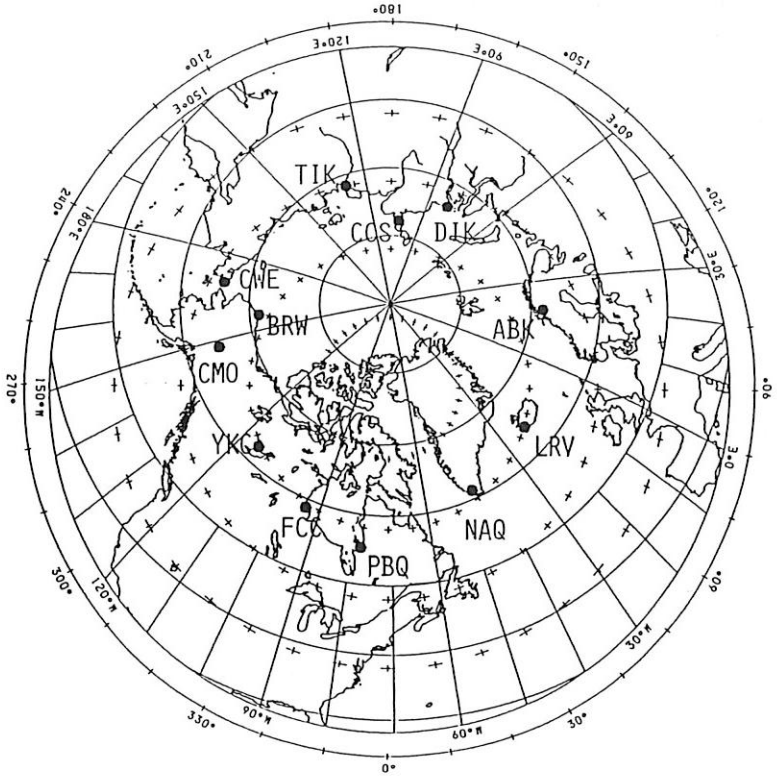


Figure 4 : Distribution of AE(12) stations

1.3.5. AE index

The AE indices are derived from geomagnetic variations in the horizontal component observed at selected observatories along the auroral zone in the northern hemisphere (Figure 4, Table 4). These variations are measured from a base line determined for each of the observatories. For each given time (UT), at one minute intervals the AU and AL indices are respectively defined as the maximum and minimum values among the one minute values of the variations from all the AE observatories at this UT. The AE index is defined by AU-AL, A0 is (AU+AL)/2.

For the sake of simplicity the term "AE (Auroral Electrojet) indices" is generally used to mean all the AE associated indices, i.e. AU, AL, AE and A0. In a superposed plot of one minute values of H from all the AE observatories with a common time axis the AU and AL indices represent the upper and lower envelopes of the plotted points, respectively, and the AE value gives the separation of these envelopes.

The AU and AL indices are intended to represent a measure of the maximum current density of the eastward and westward auroral electrojets, respectively. The AE index represents a measure of global auroral electrojet activity.

One minute values of the AE indices (AU, AL, AE and A0) are calculated at the Data Analysis Center for Geomagnetism and Spacemagnetism, (same address as WDC-C, Table 1-a) and detailed plots and tables are given in the Data Book series of the World Data Center C2 for Geomagnetism. One minute values of these indices are available on magnetic tape at the World Data Center-A for Solar Terrestrial Physics in Boulder, Colorado and at the World Data Center-C2 for Geomagnetism in Kyoto (See Table 1-a).

As for 1988, only the AE indices for the first half year are available at the time of publication of the present Bulletin 32 because of difficulties in the data digitization for some AE observatories. Data for the second half of the year will be published when they become available.

Tables of hourly averages of AU, AL and AE are given pages 110-121 for January to June 1988. The six month graph is given page 109. The hourly averages of AU, AL and AE are computed from the one minute values of the respective indices, therefore they may not necessarily satisfy the relationship AU - AL = AE exactly. Similarly the daily mean indices are averages of the one minute values for the whole day and are not the daily means of the hourly averages. Monthly and yearly mean values from 1957 onwards are given page 122.

1.4. CLASSIFICATION OF DAYS

The list of the international five quietest days and the selection of the 24-hour and 48-hour intervals which are really quiet (C) or very quiet (K) are given month by month pages 126-127. They are presented on an annual diagram for 1988 page 125. The list of the international quietest and of the more disturbed days, and a list of magnetic storms are also given page 128. These classifications are made according to the following.

1.4.1. Classification deduced from Kp indices

The selection of the quietest and most disturbed days of each month is made on the basis of three criteria :

(a) = the sum of the eight values of Kp ;
(b) = the sum of the squares of these values ;
(c) = the greatest of the eight values of Kp.

According to each of these criteria, a relative "order number" is assigned to each day of a month, the three order numbers are averaged and the days with the lowest and the highest mean order numbers are selected as the five quietest, the ten quietest and the five most disturbed days (Table page 128, with a list of magnetic storms).

It should be noted that these selection criteria give only a relative indication of the character of the selected days with respect to the other days of the same month. As the general disturbance level may be quite different for different years and also for different months of the same year, the selected quietest days of a month may sometimes be rather disturbed or vice versa.

In order to indicate such a situation, selected days which do not satisfy certain absolute criteria are marked as follows.

- A selected "quiet day" is considered "not really quiet" and is marked by the letter A if for that day : $Ap > 6$, or marked by the letter K if $Ap \leq 6$, with one Kp value greater than 3 or two Kp values greater than 2+.
- A selected "disturbed day" is considered "not really disturbed" and marked by an asterisk if $Ap < 20$ (see P.N. Mayaud, Ann. Géophys., *26*, 901, 1969).

1.4.2. Classification deduced from aa indices

The selection of the quiet 24-hour intervals is made firstly on the basis of the mean value of aa which must be lower than the fixed value : 13 nT. Then, each individual aa value of the day is represented by a weight p, namely :

p	0	1	2	4	6
aa	≤ 17	$17 < aa \leq 21$	$21 < aa \leq 28$	$28 < aa \leq 32$	> 32

A day with a mean value of $aa \leq 13$nT and for which Σp is higher than, or equal to 4 is a quiet K-day ; if Σp is lower than 4, the day is a really quiet C-day.

The same rules are applied to select the 48-hour quiet or really quiet intervals, with the same limit for the aa mean value (13 nT) and a limit for Σp equal to 6. One must note that in these intervals every local day (0 h to 24 h in local time) is really quiet, at any longitude. For further details, see P. N. Mayaud, *Derivation, Meaning and Use of Geomagnetic Indices*, Geophys. Monograph 22, Am. Geophys. Union, Washington 1980.

1.5. RAPID VARIATIONS

1.5.1. Storm sudden commencements (ssc)

The old definition, that said that "an ssc is a sudden commencement of a magnetic storm", is now changed into "sudden commencements followed by a magnetic storm *or* by an increase in activity lasting at least one hour".

The change was introduced by P. N. Mayaud (IAGA Bulletin 33 : "*A Hundred Years Series of Geomagnetic Data, 1868-1967. Indices aa and storm sudden commencements*"; see also IAGA Bulletin 39 : "*Supplementary Geomagnetic Data 1957-1975*", including a new list of ssc's 1968-1975). In this new definition more importance is given to the change of rhythm in the magnetic activity, than to the amplitude of the magnetic storm, and therefore some ssc's included in the list are not followed by a real magnetic storm.

The routine procedure of the Service in establishing the final list consists essentially of several steps, following as much as possible the instructions given by Mayaud in order to get a continuous series of homogeneous data.

Step 1. From the monthly reports of Rapid Variations prepared by 43 magnetic observatories (see list page 133), a combined list of all events is compiled.

Step 2. This list is checked against the magnetograms of two low latitude observatories (HON and EBR), and cases reported by only a very few observatories and that are clearly not an ssc in the magnetograms of HON and EBR, are eliminated.

Step 3. All other cases are then included in a new list, and copies of the magnetograms for all of them are requested from the five collaborating low latitude observatories, that are regularly spaced in longitude (Table 5a), or from their supplementary observatories (Table 5b).

Step 4. From the copies of the magnetograms sent by the five observatories as a reply to Step 3, every ssc is evaluated independently for each observatory and a number (0 to 3) is assigned to each event, in the following scale :

0. the event could have escaped the attention of the observers or does not deserve to be called an ssc,
1. the event is possibly an ssc, but is not clear enough in itself to be identified as a true ssc without inspection of other records at different longitudes,
2. the event can be unmistakably identified as an ssc from the single record on consideration,
3. is assigned, instead of 2, when the event presents a very sharp change of rhythm in the agitation, has a large amplitude and its general morphology is remarkable.

If an event gets three codes 0 out of the five observatories, it is rejected from the list.

Step 5. Finally the duration in minutes, and the amplitude in nT are measured on the copies from the five observatories and their mean values are calculated.

TABLE 5

a - Collaborating Observatories for Rapid Variations

Observatory	*Symbol*	*Geographic*		*Geomagnetic*	
		Lat. (°N)	*Long. (°E)*	*Lat. (°N)*	*Long. (°E)*
MBOUR	MBO	14.40	343.02	20.68	56.80
FUQUENE	FUQ	5.47	286.27	16.47	357.07
HONOLULU	HON	21.32	202.00	21.46	268.57
PORT MORESBY	PMG	-9.40	147.15	-17.99	219.75
ALIBAG	ABG	18.63	72.87	9.64	145.39

b - Supplementary Observatories

Observatory	*Symbol*	*Geographic*		*Geomagnetic*	
		Lat. (°N)	*Long. (°E)*	*Lat. (°N)*	*Long. (°E)*
TENERIFE	SZT	28.48	343.72	34.60	60.30
SAN JUAN	SJG	18.38	293.88	29.36	5.21
APIA	API	-13.80	188.22	-15.61	261.99
KANOYA	KNY	31.42	130.88	21.12	199.85
HYDERABAD	HYB	17.42	78.55	7.86	150.69

In the list of storm sudden commencements (section 5.1., pages 133-135) the following indications are given for each event :

a) Day, hour and minute (mean value taken from the monthly reports); first and last minutes thus reported are given in brackets at the end of the line.

b) The five number codes (one for each collaborating observatory) ; if some figures are underlined, it means that the replacement observatory was used.

c) The mean average duration, in minutes, of the event and its average amplitude, in nT.

d) The following figures indicate the number of observatories that in the monthly reports have characterized the ssc by each of the three letters A, B, or C, their meaning being :

A = very remarkable
B = fair, ordinary but unmistakable
C = very poor, doubtful.

Please note that the 0 to 3 qualification is given by the Service on Rapid Variations, independently from these A, B, C, qualifications which are given by the observatories, although some sort of correlation must exist among them.

The last group indicates the number of observatories that have classified the event other than an ssc, namely :

si = sudden impulse, but not an ssc,
sfe = solar flare effect
b = bay-like disturbance.

1.5.2 Solar flare effects (sfe).

The aim of the Service is to provide a reliable list of times when a magnetic solar flare effect did occur. Unfortunately, the reports on solar flare effects are not provided by all the observatories sending regularly the monthly reports on Rapid Magnetic Variations to the Service. As the sfe is a phenomenon dependent of longitude, it is not an easy task to provide a complete round the world coverage.

Step 1. The list of all times given in the monthly reports from observatories as possible occurrences of sfe's are checked with data taken mainly from Solar Geophysical Data, on the occurrence of alpha-flares, radio bursts or SID's, as, by definition, the crochet-like disturbance in the magnetograms must be an effect from solar activity and more precisely of a light emission from the Sun.

Times that are not correlated with any of these solar or ionospheric phenomena are eliminated from the list except in the cases when they were reported by more than one observatory or when a single observatory gave the time with the indication that it was confirmed. These exceptions try to take into account the fact that the correlation between solar events and magnetic crochets is not hundred percent.

Step 2. The list prepared in such a way is sent to all magnetic observatories, as a *checking list*, and they are asked to inspect their magnetograms and provide their judgement in two steps :

First : Do the magnetic records show a movement at the time given?

The answer is given by the following letters :

A = very clear movement
B = fair, ordinary movement
C = very poor movement
D = movement not observed, although records are satisfactory
E = movement cannot be observed due to heavy disturbance
X = record missing

Please note that this letter index refers only to the existence of a movement in the curves and not to the opinion of this movement being or not being a sfe.

Second : The opinion of this movement being or not a sfe is given after letters A, B, and possibly C, by a number index :

3 certainly a sfe
2 probably a sfe
1 probably not a sfe
0 certainly not a sfe

The answers from observatories are plotted into world maps for each event ; in these maps are also drawn times showing the sunlit hemisphere and the twilight zones.

Step 3. From these maps a judgement is made about the event being or not a sfe. A simultaneous judgment is done about the existence or not of a solar, ionospheric and radio-sun event that could be the cause of the magnetic disturbance. And finally each event is classified as a sfe, a doubtful sfe or a rejected sfe.

Tables for solar flare effects and for doubtful solar flare effects are given in Section 5.2. of the present Bulletin for the year 1988 (pages 139-161). The format is the following :

a) A summary list gives for each month, the day and time of the beginning of sfe; if the sfe is confirmed the letter C follows the time of the event. Then are indicated the number of observatories having reported a movement (letters A, B, C, see explanation in *Step 2* above), and the number of observatories having not reported any movement (letters D, E, X, see *Step 2* above).

b) It is followed by detailed tables giving for each event the list of observatories reporting it with the number-index, arranged according to the classifying letter and to longitude.

Stations in the twilight zone, reporting a movement (A, B, C and also E and X) are indicated by normal brackets; those in the night-side of the earth by square brackets. Station in these two zones reporting D have been omitted from the lists

The separation into such two tables of sfe and "doubtful" sfe may be rather subjective, due to the fact that we do not really know the mechanism linking the radiation emission from a flare and its effect on the magnetic records.

For instance, if we accept that the link is an ionising radiation from a solar flare producing an electric current in some region of the sunlit ionosphere, can this current extend its effect into the night hemisphere of the earth? And can all flares, observed in the alpha-light, produce such ionisation ? We are aware, from observations of solar flux, that not all frequencies produce similar magnetic effects. Satellite observations of X-ray flares may help in solving these and similar questions, but until now we have a fairly good coverage of alpha-flares and a rather limited of X-flares. Moreover it must be taken into account that not all flares have the same emission of energy and that their effects on the earth therefore may be limited to a smaller, or to a larger region of the earth.

Following the same kind of reasoning, we may find different effects due to the geometric relative position of the angle of emission in the Sun and the angle of reception at the earth.

For all these reasons, the tables of solar-flare-effects do not appear to be directly usable for detailed statistical studies, but they may be a good indication for researchers, where to look in the magnetic records when they study some particular event.

SECTION 2

LIST OF OBSERVATORIES

LIST OF OBSERVATORIES

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
ABN	ABINGER	51.18	359.61	53.58	84.55	244	520	1925-1957
ABK	ABISKO	68.36	18.82	65.88	115.50	380		1945
AAE	ADDIS ABABA	9.03	38.77	5.19	110.97	2442		1958
ADE	ADELAIDE	-34.60	138.40	-43.99	214.06			1973
AGN	AGINCOURT	43.78	280.73	54.65	349.54	175	700	1881-1969
AHM	AHMEDABAD	23.02	72.60	14.03	145.65			1973
ALE	ALERT	82.50	297.50	86.24	163.08	2260		1961
ABG	ALIBAG	18.63	72.87	9.64	145.39	10		1904
AAA	ALMA ATA	43.25	76.92	33.69	152.21	1300		1963
ALM	ALMERIA	36.85	357.53	40.16	76.83	65		1955
ALU	ALOUSHTA	44.68	34.42	40.86	114.94			1957
AML	AMBERLEY	-43.15	172.72	-47.16	254.00	40	530	1929-1977
AWS	ANDREWS AFB	38.20	282.63	49.13	352.23			1972
ANN	ANNAMALAINAGAR	11.40	79.68	1.77	151.20	0		1957
TAN	ANTANANARIVO	-18.92	47.55	-23.85	114.58	1375		1902
ANO	ANTIPOLO	14.60	121.17	3.50	191.60	220		1910-1938
APA	APATITY	67.55	33.33	62.78	125.99			1973
API	APIA	-13.80	188.22	-15.61	261.99	2		1905
ART	ARCTOWSKI	-62.16	301.52	-51.33	9.25	16		1978
ARE	AREQUIPA	-16.47	288.52	-5.45	359.45			1958
AIA	ARGENTINE ISLAND	-65.20	295.70	-54.23	4.73	10	490	1957
SV3	ARTI	56.43	58.43	48.50	139.90			1973
ASH	ASHKHABAD	37.95	58.10	30.58	134.62		300	1958
ASO	ASO	32.88	131.02	22.58	199.85	570		1940
PEG	ATHENS	37.97	23.72	32.60	121.60	110		1900-1908
AUT	AU-TAU	22.45	114.05	11.20	184.60	60		1928-1939
AVE	AVERROES	37.99	14.02	38.13	93.59	230		1970
BKC	BACK	57.69	265.77	67.43	326.54			1978
BAG	BAGUIO	16.42	120.60	5.61	191.08	440		1967
BAL	BALDWIN	38.78	264.83	48.90	330.60	340		1901-1909
BLC	BAKER LAKE	64.33	263.97	73.67	319.15	30		1951
BNG	BANGUI	4.43	18.57	4.45	90.33	390		1952
BAP	BARRACKPORE	22.78	88.36	12.20	160.30	10		1904-1914
BRW	BARROW	71.30	203.25	69.10	243.67	7		1949
BTH	BARTH	54.37	12.75	55.00	99.90	20		1898-1903
BTV	BATAVIA	-6.18	106.83	-17.19	177.64	10		1884-1944
BJI	BEI-JING	40.06	116.18	29.12	186.20	43		1957
KGD	BEREZNIAKI	49.82	73.08	40.30	150.00			1965
BEL	BELSK	51.83	20.80	50.19	105.24	180		1960
BIN	BINZA	-4.38	15.26	-3.57	85.40	300		1953
BJN	BJORNOYA	74.50	19.20	71.06	124.67	80		1951
BOC	BOCHUM	51.49	7.23	52.42	92.24	120		1893-1912

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
BGA	BORGA	-72.97	356.20	-66.46	42.49			1975
BOX	BOROK	58.03	38.97	52.97	324.23			1977
BOU	BOULDER	40.13	254.77	48.88	319.04	1675		1964
BZR	BOUZAREAH	36.80	3.02	39.20	82.40	340		1912-1920
BJE	BRORFELDE	55.63	11.67	55.80	97.60	80		1978
BVZ	BUDAKESZI	47.52	18.90	46.40	101.80	410		1949-1955
BDV	BUDKOV	49.07	14.02	48.82	97.64	496		1967
BY1	BYRD STATION 1	-79.98	240.00	-70.60	336.60	1515		1957-1961
BY2	BYRD STATION 2	-80.01	240.51	-70.60	336.90	1515		1962-1965
CBB	CAMBRIDGE BAY	69.10	255.00	76.77	299.13	17		1972
CAN	CANBERRA	-35.30	149.00	-43.38	226.09	850	420	1980
CCS	CAPE CHELYUSKIN	77.72	104.28	66.72	177.41	10		1935
CGH	CAPE OF GOOD HOPE	-33.93	18.48	-33.10	81.80			1842-1846
CTO	CAPE TOWN	-33.95	18.47	-33.12	82.06	20		1932-1940
CWE	CAPE WELLEN	66.17	190.17	62.36	239.37	10		1933
CY.	CAPO DI MONTE	40.86	14.26	40.90	94.80	160		1883-1911
CPI	CAPRI	40.55	14.22	40.58	94.60			1957
CAO	CASTELLACCIO	44.43	8.93	45.34	90.82	1175	350	1933
CRC	CASTLE ROCK	37.23	237.87	43.56	301.06		460	1970
HVN	CENTRO GEOFISICO	22.97	277.86	34.00	347.40			1965
CPA	CHA-PA	22.35	103.83	11.38	175.03	1550		1957
CLF	CHAMBON LA FORET	48.02	2.27	50.06	85.71			1936
CLH	CHELTENHAM	38.70	283.20	49.65	352.89	72	530	1901-1956
CBI	CHICHIJIMA	27.15	142.30	17.80	210.78	154		197
CHR	CHRISTCHURCH	43.54	172.62	47.60	254.3	10		1902-1928
COI	COIMBRA	40.22	351.58	44.53	71.78	140		1866
BOM	COLABA	18.90	72.82	9.70	145.30	10		1846-1905
CMO	COLLEGE 2	64.87	212.17	65.10	259.23	200		1948
CLL	COLLMBERG	51.32	13.00	51.16	97.70			1935
CSS	COLORADO SPRINGS	38.50	255.51	47.36	320.27			1973
COP	COPENHAGEN	55.69	12.58	55.39	99.64			1892-1900
CZT	CROZET	-46.43	51.87	-51.49	111.46	500		1974
DAL	DALLAS	32.98	263.25	42.73	330.14	210		1964-1974
DRS	DAR ES SALAAM	-6.51	39.18	-10.17	108.56			1896-1900
DAV	DAVAO	7.08	125.58	-3.49	196.39			1968
DVS	DAVIS	-68.60	78.00	-76.81	124.34			1973
DBN	DE BILT	52.10	5.18	53.40	90.56			1899-1938
DDI	DEHRA DUN	30.32	78.06	20.50	151.60	680		1903-1943
DIK	DIXON	73.55	80.57	63.36	162.45	20		1933
DOB	DOMBAS	62.07	9.12	61.97	100.94	660		1916
DOU	DOURBES	50.10	4.60	51.60	88.99	208		1955
DL	DUBLIN	53.35	353.73	56.90	80.00			1841-1850

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
DRV	DUMONT DURVILLE	-66.66	140.01	-75.06	232.15	40		1957
TFS	DUSHETI	42.08	44.70	36.50	23.50	982		1938
KIV	DYMER	50.72	30.30	47.30	113.60	100		1964
EAA	EAST ANGLIA	52.63	1.30	54.64	87.01			1973
EIC	EASTER ISLAND	-27.17	250.58	-18.37	324.28			1959-1963
EP.	EASTPORT	44.90	293.02	56.20	4.80			1860-1867
EBR	EBRO	40.82	0.50	43.45	81.13	50		1910
ENB	EIELSON AFB	64.67	212.92	65.06	260.11			1966
ELI	ELIZABETHVILLE	-11.63	27.42	-13.00	95.93	1230		1932-1957
ESK	ESKDALEMUIR	55.32	356.80	58.04	84.07	245	660	1908
EKP	ESKIMO POINT	61.10	265.93	70.78	324.73			1973
EYR	EYREWELL	-43.41	172.35	-47.48	253.71	390	540	1979
FAL	FALMOUTH	50.15	354.92	53.60	79.40	50		1892-1912
FCC	FORT CHURCHILL 1	58.80	265.90	68.53	325.60	15		1964
FCC	FORT CHURCHILL 2	58.77	265.73	68.70	325.20	15		1964
FMM	FORT MCMURRAY	56.70	248.60	64.18	305.05			1973
FSV	FORT SEVERN	55.98	272.35	66.34	336.32			1977
FSM	FORT SMITH	58.00	246.00	65.01	301.02			1973
FYU	FORT YUKON	66.57	214.70	67.08	259.59			1957
FRD	FREDERICKSBURG	38.20	282.63	49.13	352.23	69	520	1956
FTN	FREETOWN	8.46	346.79	14.21	59.59			1961-1967
FUQ	FUQUENE	5.47	286.27	16.47	357.07	2543		1954
FUR	FURSTENFELDBRUCK	48.17	11.28	48.48	94.62	572		1939
GEN	GENOVA MC	44.55	8.96	45.50	91.00	700		1958-1962
GEN	GENOVA C	44.43	8.93	45.50	91.00	350		1933-1969
GIT	GILGIT	35.93	74.30	26.67	148.86	1494		1967
GIM	GILLAM	56.40	265.30	66.11	326.54			1975
GIR	GIRARDVILLE	49.00	287.40	60.01	357.77			1973
GNA	GNANGARA	-31.78	115.95	-42.71	187.94	60	440	1959
GDH	GODHAVN	69.23	306.48	79.25	34.62	8		1926
GOT	GOTTINGEN	51.55	9.97	51.97	95.00	270		1957
GVD	GONZALES VIDELA	-64.82	297.15	-53.88	5.80	60		1961
VLA	GORNOTAYEZHNAYA	43.68	132.17	30.10	199.60	200		1958
GRM	GRAHAMSTOWN	-33.28	26.48	-34.01	90.04	650		1974
GWC	GREAT WHALE RIVER	55.30	282.25	66.21	350.32	25		1965
GRW	GREENWICH	51.48	0.00	53.79	85.10	50		1846-1925
GCK	GROCKA	44.63	20.77	43.28	102.27	231		1958
GUA	GUAM	13.58	144.87	4.57	214.76	150		1957
HLL	HALLET	-72.32	170.22	-74.42	278.16			1957-1963
HBA	HALLEY BAY	-75.50	333.40	-66.36	25.85	30		1957
HBK	HARTEBEESTHOEK	-25.88	27.71	-27.01	93.14			1980
HAD	HARTLAND	50.98	355.52	54.17	80.29	95	530	1957

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
HTY	HATIZYO	33.07	139.83	23.45	207.83			1978
HVN	HAVANA	22.97	277.85	33.75	347.53			1964
HII	HEARD ISLAND	-53.03	73.37	-61.50	132.30	10		1950-1954
HIS	HEISS ISLAND	80.62	58.05	71.60	156.33	20		1959
HLP	HEL	54.60	18.82	53.19	104.80	4		1957
HLW	HELWAN	29.87	31.33	26.98	108.01	120		1903-1959
HCR	HERCHMER	57.40	265.90	67.16	326.86			1973
HER	HERMANUS	-34.42	19.23	-33.73	82.67	26	300	1941
HNA	HOLLANDIA	-2.57	140.52	-11.94	212.17	98		1957-1962
HKC	HONG KONG 1	22.30	114.18	11.00	184,70	30		1884-1928
HKC	HONG KONG 2	22.20	114.20	11.22	184.82	555		1972
HON	HONOLULU 1-2-3	21.32	202.00	21.46	268.57	4		1902
HUA	HUANCAYO	-12.05	284.67	-1.06	355.67	3313		1922
HRB	HURBANOVO	47.87	18.18	46.89	101.07	120		1938
HYB	HYDERABAD	17.42	78.55	7.86	150.69	500		1965
IBD	IBADAN	7.43	3.90	10.17	76.46	300		1956
IRT	IRKUTSK	52.17	104.45	41.18	176.22	470		1887-1914
ISL	ISLAND LAKE	53.90	265.30	63.65	327.61			1976
ISK	ISTANBUL KANDILLY	41.07	29.07	38.31	108.87	130		1947
JSS	JASSY	47.18	27.53	44.40	109.60			1935-1957
KAK	KAKIOKA	36.23	140.18	26.62	207.77	28		1913
KNG	KALININGRAD	54.60	20.20	52.94	106.06			1964
KNY	KANOYA	31.42	130.88	21.12	199.85	105		1957
KNZ	KANOZAN	35.25	139.97	25.63	207.70	342		1961
KGD	KARAGANDA	49.82	73.08	40.56	150.04			1966
TFS	KARSANI	41.83	42.70	36.20	123.50	1100		1905-1934
KZN	KAZAN	55.83	48.85	49.36	131.52	80		1909
KEL	KELES	41.42	69.20	32.40	145.20	450		1936-1963
KEM	KEM	65.00	34.40	60.26	124.74			1973
KEW	KEW	51.47	359.68	54.10	85.10	10		1857-1924
KHB	KHABAROVSK	48.48	135.07	38.39	201.74			1972
KIV	KIEV	50.72	30.30	47.42	113.40	100		1963
KIR	KIRUNA	67.83	20.42	65.14	116.19	390		1950
KLY	KLYUCHI	55.03	82.90	44.70	159.00			1967
KOD	KODAIKANAL	10.23	77.47	0.81	148.93	2323		1902
KTS	KORETS	50.60	61.07	42.64	140.10			1968
KOR	KOROR	7.33	134.50	-2.64	205.21	10		1957-1966
MOS	KRASNAYA	55.47	37.32	50.70	121.70	190		1930
KSA	KSARA	33.82	35.88	30.03	113.26	920		1937-1968
KUY	KUYPER	-6.03	106.73	-17.04	177.54	1		1950-1962
KWJ	KWAJALEIN	9.05	167.20	3.13	237.11			1973
AQU	L'AQUILA	42.38	13.32	42.52	94.35	682		1960

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
LQA	LA QUIACA	-22.10	294.40	-11.13	5.01	3464		1920
LAS	LAS ACACIAS	-35.00	302.32	-24.24	11.86	20		1964
LDR	LAUDER	-43.03	169.41	-37.70	232.10	370		1977
LRV	LEIRVOGUR	64.18	338.30	69.71	71.98	30		1957
LNN	LENINGRAD	59.95	30.70	56.14	118.32	70		1869-1877
LER	LERWICK	60.13	358.82	62.15	89.55	105	920	1923
LIS	LISBON	38.72	350.85	43.30	70.60			1890-1900
LGR	LOGRONO	42.45	357.50	45.59	78.66	445		1957
MMK	LOPARSKAYA	68.25	33.08	63.30	126.70	200		1961
LOB	LORING AFB	46.95	292.12	57.95	3.89			1966
LA.	LOS ANGELES	34.05	241.74	41.20	305.70			1882-1889
LMM	LOURENCO MARQUES	-25.92	32.58	-27.98	97.96	40		1957
LOV	LOVO	59.35	17.83	57.84	106.75	25	720	1928
LOZ	LOVOZERO	67.97	35.02	62.90	127.64			1957
LUA	LUANDA	-8.92	13.17	-7.63	82.48	53		1956
LB	LUBECK	53.86	10.69	54.00	97.00			1885-1893
LUK	LUKIAPANG	31.32	121.03	20.20	190.80	100		1908-1933
LNP	LUNPING	25.00	121.17	14.21	191.28		100	1965
LVV	LVOV	49.90	23.75	47.80	107.10	400		1952
LWI	LWIRO	-2.25	28.80	-4.06	99.10	1680		1958-1970
MBO	MBOUR	14.40	343.02	20.68	56.80	10		1952
MCQ	MACQUARIE ISLAND	-54.50	158.95	-60.54	244.48	4		1951
MGD	MAGADAN	60.12	151.02	51.28	212.15		610	1966
MSC	MAISACH	48.20	11.26	48.50	94.90	480		1927-1932
MQ	MAKERSTOUN	55.58	357.48	52.20	85.30			1841-1849
MAB	MANHAY	50.30	5.68	51.60	90.15	440		1936-1971
MAN	MANILA	14.58	120.98	3.50	191.40			1891-1904
MRN	MARION ISLAND	-46.85	37.87	-49.30	96.75	45		1972
AMS	MARTIN DE VIVIES	-37.83	77.57	-46.94	142.78			1981
MSR	MATOCHKIN SHAR	73.26	56.40	64.80	147.40	250		1937-1944
MRI	MAURITIUS	-20.09	57.55	-26.80	124.40	50		1892-1965
MAW	MAWSON	-67.60	62.88	-73.32	106.62	6		1955
MEA	MEANOOK	54.62	246.67	61.88	304.02	686	1360	1916
MEL	MELBOURNE	-37.83	144.98	46.60	222.30	30		1865-1921
MEV	MELVILLE AFB	53.28	299.47	64.05	14.25			1966
MMB	MEMAMBETSU	43.90	144.20	34.61	210.23	39	340	1950
MNK	MINSK	54.10	26.52	51.32	111.51			1961
MIR	MIRNY	-66.55	93.02	-76.80	151.15		20	1956
MLT	MISALLAT	29.52	30.90	26.72	107.52	120		1960
MIU	MIYAZU	35.32	135.11	25.30	203.32			1973
MIZ	MIZUSAWA	39.01	141.08	29.47	208.21			1969
MFP	MOCA	3.35	8.67	5.27	80.39	1949		1958-1971

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
MOL	MOLODEZHNAYA	67.67	45.85	70.10	87.50	854		1965
MOS	MOSCOW	55.48	37.32	50.79	121.62	190		1880-1888
MBC	MOULD BAY	76.30	240.60	79.62	259.89	150		1962
MWC	MT WILSON	34.14	241.97	41.19	306.30			1926-1958
MNH	MUNCHEN	48.15	11.61	48.40	95.20	530		1842-1926
MUT	MUNTINLUPA	14.37	121.02	3.58	191.57	62		1951
MMK	MURMANSK	68.25	33.08	63.45	126.43	210		1958-1960
NCK	NAGYCENK	47.63	16.72	46.93	99.59	160		1961
NAI	NAIROBI	-1.28	36.83	-4.60	107.19	1673		1964
NTS	NANTES	47.25	358.44	50.10	81.70	35		1923-1958
NAQ	NARSSARSSUAQ	61.20	314.6O	70.60	38.66	4		1973
NL	NEW ALESUND	78.92	11.93	75.43	130.70	12		1966
NEW	NEWPORT	48.27	242.88	55.14	302.78	780	700	1966
NYI	NEW YEAR ISLAND	54.65	295.85	43.30	5.20			1902-1916
NCE	NICE	43.72	7.30	45.00	89.00			1889-1901
NGK	NIEMEGK	52.07	12.68	51.94	97.77	78	500	1932
NSM	NITSANIM	31.73	34.60	28.21	111.55	150		1963-1967
NOK	NORILSK	69.20	88.00	58.68	165.77			1969
NKK	NOVOKAZALINSK	45.77	62.12	37.76	139.83			1974
NVL	NOVOLAZAREVSKAYA	-70.77	11.82	-66.76	55.88	460		1961
NVS	NOVOSIBIRSK	55.03	82.90	44.92	159.07		480	1967
NUR	NURMIJARVI	60.52	24.65	57.71	113.51	105		1953
ODE	ODESSA	46.78	30.88	43.52	112.42	50		1896-1925
OGY	O'GYALIA	47.88	18.19	46.80	101.30	110		1906-1912
OKN	OKINAWA	24.75	125.33	14.14	195.18			1977
ORC	ORCADAS DEL SUR	-60.74	315.22	-50.30	20.00	4		1931-1962
OSL	OSLO	59.98	10.72	59.60	101.10			1843-1930
OTT	OTTAWA	45.40	284.45	56.37	354.11	75	790	1968
PAG	PANAGYURISHTE	42.52	24.18	40.61	104.75	556		1948
PPT	PAPEETE	-17.55	210.38	-15.09	284.44			1958
PAB	PARAMARIBO	5.82	304.78	16.41	16.28	2		1957
PET	PARATUNKA	53.10	158.63	44.80	220.00	110		1973
IRK	PATRONY	52.17	104.45	40.90	176.10	500		1959
PEB	PELLY BAY	68.50	270.20	78.39	323.86			1977
PEK	PEKING 1	39.95	116.47	28.70	186.30			1870-1883
PEK	PEKING 2	40.04	116.18	28.80	186.10			1957-1964
PEG	PENDELI	38.03	23.52	36.38	102.73	495		1958
PRF	PERPIGNAN	42.70	2.88	44.90	84.30	30		1890-1900
PIL	PILAR	-31.67	296.12	-20.73	6.39	336		1905
PLS	PLAISANCE	-20.43	57.67	-27.02	124.68	123		1966
PZ	PLESHCHENITZI	54.50	27.88	51.40	113.10	200		1961
POD	PODKAMENAYA TUNG	61.40	90.00	50.84	165.64		670	1968

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
POL	POLA	44.86	13.26	44.80	95.90	30		1883-1922
PAF	PORT AUX FRANCAIS	-49.35	70.22	-57.31	130.79	50	750	1957
PMG	PORT MORESBY	-9.40	147.15	-17.99	219.75	80		1957
PBQ	POSTE DE LA BALEINE	55.30	287.25	66.31	357.38			1984
POT	POSTDAM	52.38	13.06	52.16	98.28	80		1890-1907
PRU	PRUHONICE	49.98	14.55	49.59	98.55	329		1946
QUE	QUETTA	30.18	66.95	21.77	141.35	1737		1953
RIT	RANKIN INLET	62.80	267.90	72.64	326.36			1975
REG	REGENSBERG	47.48	8.44	48.40	91.70	605		1957-1969
RES	RESOLUTE BAY	74.70	265.10	83.14	295.98	25		1954
RDJ	RIO DE JANEIRO	-22.91	316.83	-12.80	26.00	60		1899-1906
ROB	ROBURENT	44.30	7.88	45.41	89.74	815		1964
RSV	RUDE SKOV	55.85	12.45	55.56	99.61	48	600	1907-1978
SAB	SABHAWALA	30.33	77.80	20.78	151.34	498		1964
SFS	SAN FERNANDO	36.47	353.80	40.47	72.90	28		1891
SJG	SAN JUAN 1-2-3	18.38	293.88	29.36	5.21	100		1903
SNA	SANAE	-70.30	357.65	-64.23	46.20	52		1962
STJ	SAINT JOHNS	47.59	307.32	58.20	23.30			1968
PSM	SAINT MAUR	48.81	2.49	50.80	86.60			1883-1900
SMG	SAN MIGUEL	37.77	334.35	45.04	52.61	175		1911
SBA	SCOTT BASE	-77.85	166.78	-78.84	293.24	15		1957
SED	SEDDEN	52.28	13.01	52.10	98.50	40		1908-1931
STF	SDR STROMFJORD	67.02	309.28	76.83	36.25			1972
SSH	SHE-SHAN	31.10	121.19	20.30	191.03	100		1934
SHB	SHEPERD BAY	68.75	266.25	78.14	316.78			1966
SHL	SHILLONG	25.55	91.88	14.99	163.95			1975
SSO	SIMOSATO	33.57	135.93	23.62	204.24	59		1954-1978
SIT	SITKA	57.07	224.67	60.31	278.12	22	1020	1902
SOD	SODANKYLA	67.37	26.63	63.68	120.64	178		1914
SLU	SLUTSK	59.68	30.48	55.80	118.30			1878-1941
SGG	SOUTH GEORGIA	-54.28	323.52	-44.82	27.73		350	1974-1982
SPA	SOUTH POLE	-90.00	0.00	-78.98	0.00	2820		1959
SRE	SREDNIKAN	62.43	152.32	53.67	212.35	61		1936-1966
MGD	STEKOLNI	60.12	151.02	51.00	211.80			1966
ODE	STEPANOVKA	46.78	30.88	43.40	112.50	140		1948
STO	STONYHURST	53.85	357.53	56.52	83.91	116		1865-1967
SUA	SURLARI	44.68	26.25	42.32	107.42	84		1949
SVD	SVERDLOVSK	56.73	61.07	48.64	141.89	290	530	1887-1931
SWI	SWIDER	52.12	21.25	50.38	105.79	100		1921
SYO	SYOWA BASE	-69.03	39.60	-70.10	79.70	15		1958-1970
TAM	TAMANRASSET	22.80	5.53	24.94	81.23	1395		1932
TNG	TANGERANG	-6.17	106.63	-17.18	177.43	14		1964

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
TKT	TASHKENT	41.33	69.62	32.51	145.52	500		1883
TTB	TATUOCA	-1.20	311.48	8.98	220.50	10		1957-1971
TEH	TEHERAN	35.73	51.38	29.36	128.05	1367		1960-1973
SZT	TENERIFE	28.48	343.72	34.60	60.30	310		1959
TEO	TEOLOYUCAN	19.75	260.82	29.35	329.24	2280		1923
TAA	TERRE ADELIE	-66.67	140.02	-75.07	232.18	40		1957
TMP	THOMPSON	55.72	262.12	65.09	322.65			1969
THU	THULE/CAMP TUTO	76.55	291.17	87.53	11.26	480		1932-1952
THL	THULE/QANAQ	77.48	290.83	88.46	14.10	57		1956
TFS	TIFLIS	42.08	44.70	36.62	123.49	982		1879-1905
THY	TIHANY	46.90	17.90	46.01	100.41	187		1949
TKH	TIKHAYA BAY	80.30	52.80	71.74	153.42	10		1932-1958
TIP	TIRUCHIRAPALLI	10.80	78.70	1.26	150.19			1975
TIK	TIXIE BAY	71.58	129.00	60.99	192.81	40		1944
KAK	TOKYO	35.75	139.72	26.10	207.41	20		1897-1912
TOL	TOLEDO	39.88	355.95	43.39	76.18	501		1947
TMK	TOMSK	56.47	84.93	46.21	160.93	200	510	1958-1969
TOO	TOOLANGI	-37.53	145.47	-46.05	222.66	457	510	1922-1980
AGN	TORONTO	43.67	280.50	54.80	349.10			1872-1898
TLE	TOULOUSE	43.61	1.46	46.00	83.20	190		1894-1905
TGO	TOUNGOO	18.93	96.45	7.90	167.80	300		1905-1923
TOH	TOYOHARANEW	46.95	142.75	37.20	208.30	70		1932-1941
TRW	TRELEW	-43.25	294.68	-32.28	4.81		290	1957-1970
TRD	TRIVANDRUM	8.48	76.95	-0.88	148.24	300		1957
TRO	TROMSO	69.67	18.95	67.00	117.16	105		1930
TSN	TSINGTAO	36.07	120.32	25.00	189.90	80		1924-1936
TSU	TSUMEB	-19.22	17.70	-18.59	84.83	1300		1964
TUC	TUCSON	32.25	249.17	40.37	314.57	770	380	1910
TUL	TULSA	35.92	264.22	45.75	330.78	257		1961
UCC	UCCLE	50.80	4.36	52.30	89.40	100		1896-1919
UBA	ULAN BATOR	47.85	106.75	36.84	178.03			1966
WIT	UTRECHT	52.00	5.12	53.40	90.80			1891-1896
VLJ	VAL JOYEUX	48.82	2.02	50.87	85.83			1901-1936
VAL	VALENTIA	51.93	349.75	56.15	74.79	14		1899
VSS	VASSOURAS	-22.40	316.35	-12.53	25.70	457		1915
VIC	VICTORIA	48.52	236.58	54.33	295.66	185	660	1956
VQS	VIEQUES	18.15	294.55	29.11	5.93			1903-1924
VLA	VLADIVOSTOK	43.12	131.90	32.84	199.68			1932
LNN	VOEIKOVO	59.95	30.70	56.00	118.50	70		1947
VOR	VOROSHILOV	43.78	132.03	33.20	199.60	30		1952-1957
VOS	VOSTOK	-78.45	106.87	-89.31	139.62	3500		1958
SVD	VYSOKAYA	56.73	61.07	48.40	141.90	290		1932

LIST OF OBSERVATORIES (continued)

IAGA Code	Name	Geographic		Geomagnetic		Alt. (m)	K=9 lower limit	Open -Closed
		Lat.	Long.	Lat.	Long.			
WAT	WATHEROO	-30.30	115.90	-41.23	187.82	240		1919-1958
WES	WESTON	42.38	288.68	53.40	359.49			1960
WHS	WHITE SHELL	49.80	264.80	59.56	328.39			1975
WIK	WIEN	48.25	16.36	47.60	69.70			1892-1898
WIA	WIEN-AUHOF	48.20	16.24	47.50	69.60	2050		1929-1950
WIK	WIEN-KOBENZL	48.27	16.32	47.62	69.48	400		1954
WLH	WILHELMSHAVEN	53.53	8.15	54.20	94.50	10		1884-1911
WIL	WILKES	-66.25	110.58	-77.26	182.71			1957-1966
WNG	WINGST	53.75	9.07	54.22	95.21	50	550	1939
WNP	WINNIPEG	49.63	262.87	59.19	326.02			1969-1975
WIT	WITTEVEEN	52.82	6.67	53.79	92.39	17	540	1938-1988
YAK	YAKUTSK	62.02	129.72	51.53	195.40	100		1931
TKT	YANGI BAZAR	41.33	69.62	32.30	145.60	500		1964
YAU	YAUCA	-15.53	285.33	-4.54	356.36			1957-1960
YKC	YELLOWKNIFE	62.47	245.53	69.14	296.56	198		1958
YSS	YUZHNO SAKHALINSK	46.95	142.72	37.49	208.45			1948
KNK2	ZAIMISHCHE	55.83	48.85	49.20	131.60	80		1914-1972
ZAR	ZARIA	11.15	7.65	13.12	80.89			1964
ZKW	ZI KA WEI	31.22	121.43	20.20	191.20	10		1875-1907
ZIN	ZINZEN	37.48	126.63	26.60	195.30	50		1921-1941
ZSC	ZO SE	31.10	121.19	20.00	190.80	100		1933-1974
ZUY	ZUY	52.47	104.03	41.20	17.80	430		1915-1958

Sites of observatories having provided records over 50 years or more

First Observatory Name	Open -Closed	Further Observatories, if any Name	Open -Closed
AGINCOURT	1881 - 1969	OTTAWA	1968 - ...
ALIBAG	1904 - ...		
AMBERLEY	1929 - 1977	LAUDER	1977 - ...
ANTANANARIVO	1890 - ... (1894 - 1901 and 1923 - 1928 missing)		
APIA	1905 - ...		
BATAVIA	1884 - 1944 (1899 - 1902 missing)	KUYPER TANGERANG	1950 - 1962 1964 - ...
CAPE CHELYUSKIN	1935 -... (1946-1950 and 1952-1953 missing))		
CAPE TOWN	1932 - 1940	HERMANUS	1941 - ...
CAPE WELLEN	1933 - ... (1944 - 1949 missing)		
CHELTENHAM	1901 - 1956	FREDERICKSBURG	1956 - ...
COIMBRA	1866 - ...		
COLABA	1846 - 1905	ALIBAG	1904 - ...
DIXON	1933 - ... (1945 and 1947 missing)		
DOMBAS	1916 - ...		
EBRO	1910 - ... (1938 - 1942 missing)		
ESKDALEMUIR	1908 - ...		
GODHAVN	1926 - ...		
GREENWICH	1846 - 1925	ABINGER HARTLAND	1925 - 1957 1957 - ...
HELWAN	1903 - 1959 (1952 - 1955 missing)	MISSALAT	1960 - ...
HURBANOVO	1938 -...		
HONG KONG	1884 - 1928	AU TAU HONG KONG	1928 - 1939 1972 - ...
HONOLULU	1902 - ...		
HUANCAYO	1922 - ...		
KAZAN	1909 - ...		
KELES	1936 - 1963	YANGI BAZAR	1964 - ...
KEW	1858 - 1924		
KODAIKANAL	1902 - ...		
KRASNAYA	1930 - ... (1934 - 1937 and 1939 - 1945 missing)		

LIST OF OBSERVATORIES (continued)

Sites of observatories having provided records over 50 years or more

First Observatory Name	Open -Closed	Further Observatories, if any Name	Open -Closed
LA QUIACA	1920 - ...		
LENINGRAD	1869 - 1877 (1871 missing)	SLUTSK VOEIKOVO	1878 - 1941 1947 - ...
LERWICK	1923 - ...		
LOVÖ	1928 - ...		
MANILA	1891 - 1904	ANTIPOLO MUNTINLUPA	1910 - 1938 1951 - ...
MAURITIUS	1892 - 1965		
MEANOOK	1916 - ...		
MELBOURNE	1865 - 1921	TOOLANGUI CANBERRA	1922 - 1980 1980 - ...
OSLO	1843 - 1930		
PILAR	1905 - ...		
POSTDAM	1890 - 1907	SEDDEN NIEMEGK	1908 - 1931 1932 - ...
RUDE SKOV	1907 - 1978	BJORFELDE	1978 - ...
SAINT MAUR	1883 - 1900	VAL JOYEUX CHAMBON LA FORET	1901 - 1936 1936 - ...
SAN FERNANDO	1891 - ...		
SAN JUAN (PUERTO RICO)	1903 - 1924 (1925 missing)		
SAN MIGUEL	1911 - ...		
SITKA	1902 - ...		
SODANKYLA	1914 - ... (1945 missing)		
STONYHURST	1865 - 1967 (1944 - 1960 missing)		
SVERDLOVSK	1887 - 1978	VYSOKAYA - DUBRAVA	1932 - ...
SWIDER	1921 - ...		
TEOLOYUCAN	1923 - ...		
TIFLIS	1879 - 1905	KARSANI DUSHETI	1905 - 1934 1938 - ...
TIKHAYA BAY	1932 - 1958 (1947 - 1950 missing)	HEISS ISLAND	1959 - ...
TOKYO	1897 - 1912	KAKIOKA	1913 - ...
TROMSÖ	1930 - ...		
TUCSON	1910 - ...		
UCCLE	1896 - 1919	MANHAY	1936 - 1971

Sites of observatories having provided records over 50 years or more

First Observatory Name	Open -Closed	Further Observatories, if any Name	Open -Closed
		(1943 - 1945 missing)	
		DOURBES	1955 - ...
UTRECHT	1891 - 1896	DE BILT	1899 - 1938
		WITTEVEEN	1938 - 1988
VALENTIA	1899 - ...		
VASSOURAS	1915 - ...		
WATHEROO	1919 - 1958	GNANGARA	1959 - ...
WILHELMSHAFEN	1884 - 1911	WINGST	1939 - ...
YAKUTSK	1931 - ...		
ZAIMISHCHE	1914 - 1972		
ZI - KA - WEI	1875 - 1907	LUKIAPANG	1908 - 1933
		ZO - SE	1933 - 1974

SECTION 3

I A G A INDICES

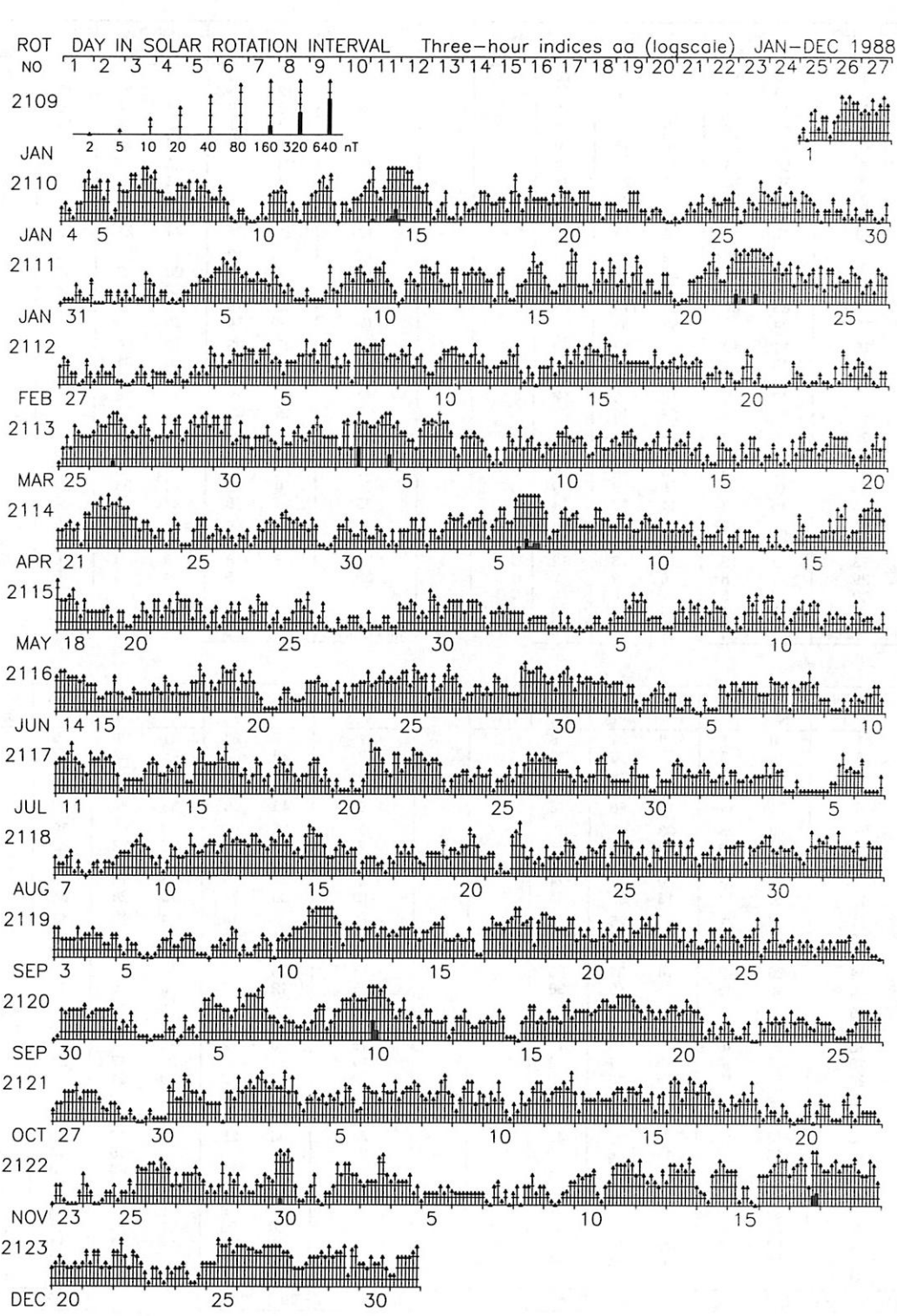
3.1.	**aa** indices	43
3.2.	**an, as, am** indices	53
3.3.	**Kp** indices	75
3.4.	**Dst** indices	87
3.5.	**AU, AL, AE** indices	107

SECTION 3

3.1. aa INDICES

- Musical Diagram of **aa** 1988 (graph) 45
- Half-daily and daily values 46
- Monthly and yearly averages of **aa**
  1868 - 1988 49
- Twelve-month running mean values of **aa**
  1868 - 1988 (graph) 52

MUSICAL DIAGRAM OF aa 1988



aa INDICES 1988

JANUARY 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	9	15	9	16	12	C
2	9	55	22	42	32	
3	45	16	27	35	31	
4	24	22	9	38	23	
5	27	28	32	24	28	
6	50	69	46	74	60	
7	39	24	36	27	31	
8	34	30	35	29	32	
9	13	12	19	6	12	K
10	13	6	4	15	9	C K
11	17	13	22	9	15	
12	34	34	26	43	34	
13	15	14	9	21	15	
14	83	87	51	119	85	
15	81	47	98	31	65	
16	11	10	9	12	10	C
17	16	13	9	20	14	K
18	28	15	14	30	22	
19	17	16	18	15	17	
20	24	17	22	19	21	
21	15	13	18	10	14	
22	16	13	9	20	15	K
23	7	5	8	4	6	C K *
24	11	7	5	13	9	C C *
25	16	12	11	17	14	C
26	20	11	9	23	16	
27	24	15	23	16	20	
28	11	13	17	8	12	C C
29	11	8	10	9	9	C C *
30	7	5	7	6	6	C C *
31	7	5	4	8	6	C C *
Mean values	23.8	21.1			22.4	

FEBRUARY 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	6	6	6	7	6	C C *
2	12	8	8	13	10	C C *
3	6	6	8	4	6	C C *
4	17	11	10	18	14	
5	42	36	42	36	39	
6	23	17	20	20	20	
7	14	5	13	6	10	C K
8	15	6	6	15	10	K K
9	25	19	17	27	22	
10	21	24	24	21	22	
11	26	12	12	26	19	
12	26	26	30	22	26	
13	25	21	22	24	23	
14	12	15	19	8	13	K
15	29	34	35	29	32	
16	37	33	10	60	35	
17	29	21	20	31	25	
18	43	23	31	35	33	
19	16	12	12	16	14	
20	15	7	4	18	11	C
21	38	42	48	32	40	
22	140	90	117	114	115	
23	50	34	56	28	42	
24	30	18	25	23	24	
25	29	18	24	23	24	
26	21	14	14	21	18	
27	14	8	14	8	11	C K
28	8	8	8	8	8	C C *
29	6	6	4	8	6	C C *
Mean values	26.8	20.0			23.3	

MARCH 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	9	7	8	8	8	C C *
2	14	9	8	16	12	K K
3	20	22	18	24	21	
4	34	26	29	31	30	
5	21	14	15	20	18	
6	48	25	33	40	36	
7	33	19	18	33	26	
8	43	31	42	32	37	
9	29	18	30	17	24	
10	30	17	13	35	24	
11	26	21	22	25	23	
12	23	19	12	29	21	
13	12	7	9	10	9	C *
14	26	19	14	31	23	
15	40	35	33	42	38	
16	22	18	24	16	20	
17	20	13	19	14	17	
18	24	10	18	16	17	
19	7	8	8	7	8	C C *
20	11	12	14	10	12	K K
21	5	4	2	6	4	C C *
22	7	5	6	6	6	C C *
23	13	10	6	17	12	K C
24	13	7	14	6	10	C K
25	21	24	13	32	22	
26	68	64	40	91	66	
27	59	30	42	47	44	
28	52	36	37	51	44	
29	56	61	48	69	58	
30	62	50	68	44	56	
31	29	20	21	28	25	
Mean values	28.3	21.3			24.8	

APRIL 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	27	23	21	29	25	
2	38	36	45	30	37	
3	69	75	41	104	72	
4	97	60	52	105	78	
5	45	25	36	34	35	
6	66	46	72	41	56	
7	25	19	22	22	22	
8	16	10	8	19	13	K
9	24	14	25	13	19	
10	30	21	23	28	26	
11	20	14	14	20	17	
12	31	18	23	26	25	
13	25	13	15	23	19	
14	20	13	16	17	17	
15	12	10	6	16	11	C K *
16	12	14	9	16	13	K K *
17	14	7	10	11	10	C *
18	20	12	19	13	16	
19	23	18	24	17	21	
20	17	12	8	21	15	
21	21	11	15	17	16	
22	60	64	58	66	62	
23	40	28	49	19	34	
24	18	8	11	15	13	C K
25	16	11	7	20	13	K K *
26	13	7	11	9	10	C K *
27	17	9	8	18	13	C
28	28	20	27	21	24	
29	15	7	18	4	11	C
30	19	10	16	13	14	C
Mean values	29.2	21.2			25.2	

MAY 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	13	8	11	10	10	C C
2	15	17	10	21	16	K
3	19	12	9	22	16	
4	30	19	23	26	25	
5	33	31	24	42	33	
6	107	113	126	95	110	
7	31	21	17	35	26	
8	27	24	16	35	25	
9	22	18	24	16	20	
10	24	17	23	18	21	
11	18	8	15	11	13	C
12	19	4	12	11	11	C C *
13	13	5	10	8	9	C C *
14	7	4	7	4	5	C C *
15	20	7	17	10	13	K K
16	27	24	24	28	26	
17	43	40	34	49	41	
18	38	26	40	25	32	
19	15	8	12	11	11	C
20	16	5	9	13	11	C C
21	25	14	17	22	19	
22	22	13	20	15	17	
23	19	8	11	16	13	C C
24	19	11	11	19	15	
25	16	9	8	17	13	K
26	19	7	18	9	13	K K
27	10	3	5	8	7	C C *
28	10	3	6	7	7	C C *
29	21	10	14	16	15	
30	31	14	27	19	23	
31	28	12	21	19	20	
Mean values	24.4	16.6			20.5	

JUNE 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	17	8	11	14	13	C K
2	13	5	9	9	9	C C *
3	9	3	7	5	6	C C *
4	9	2	4	7	6	C C *
5	26	9	10	26	18	
6	20	7	20	7	13	K
7	23	9	14	18	16	
8	19	9	16	13	14	C
9	22	9	7	25	16	
10	24	13	25	12	18	
11	23	10	16	17	17	
12	14	5	10	8	9	C K *
13	13	8	13	8	11	C
14	42	28	39	30	35	
15	27	7	17	17	17	
16	16	8	11	13	12	C
17	24	12	15	21	18	
18	32	18	15	35	25	
19	46	28	31	43	37	
20	27	13	33	8	20	
21	12	7	9	10	10	C K *
22	28	13	20	21	21	
23	25	11	17	19	18	
24	38	23	28	33	31	
25	47	31	37	41	39	
26	46	18	26	39	32	
27	27	8	20	16	18	
28	29	11	25	16	20	
29	55	44	49	50	50	
30	38	28	27	38	33	
Mean values	26.4	13.6			19.9	

JULY 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	35	22	31	26	29	
2	27	11	23	15	19	
3	19	7	9	17	13	C C
4	10	5	9	6	7	C C *
5	15	5	5	14	10	C K *
6	26	17	22	21	22	
7	21	18	20	18	19	
8	28	18	21	25	23	
9	12	2	7	7	7	C K *
10	19	7	10	15	13	C
11	38	34	33	39	36	
12	33	32	31	35	33	
13	15	5	9	11	10	C *
14	26	15	23	18	21	
15	30	25	17	38	28	
16	35	35	32	38	35	
17	21	11	12	19	16	
18	21	15	20	15	18	
19	22	15	20	17	18	
20	10	2	6	6	6	C *
21	41	37	49	30	39	
22	46	34	35	45	40	
23	25	17	30	12	21	
24	18	9	14	13	14	C
25	19	5	11	13	12	C
26	36	29	27	39	33	
27	25	18	29	13	21	
28	30	14	13	32	22	
29	20	8	10	18	14	
30	16	5	10	10	10	C
31	22	14	22	13	18	
Mean values	24.5	15.8			20.1	

AUGUST 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	19	11	16	13	15	
2	16	8	13	11	12	C *
3	20	9	18	11	14	C
4	9	2	6	5	6	C C *
5	17	16	7	27	17	
6	14	10	17	7	12	K
7	14	5	10	9	10	C C *
8	10	4	6	8	7	C C *
9	27	19	15	31	23	
10	20	8	13	15	14	
11	22	20	22	20	21	
12	34	35	26	44	35	
13	32	32	34	31	32	
14	40	32	44	28	36	
15	34	49	51	32	42	
16	23	14	22	15	19	
17	14	6	11	9	10	C K *
18	20	14	18	15	17	
19	19	15	14	20	17	
20	40	18	21	37	29	
21	17	11	12	16	14	
22	35	27	49	12	31	
23	22	22	16	28	22	
24	26	12	14	23	19	
25	31	29	29	32	30	
26	20	17	15	22	19	
27	32	18	29	21	25	
28	19	13	16	16	16	
29	30	18	28	19	24	
30	35	21	36	20	28	
31	32	18	15	35	25	
Mean values	23.9	17.2			20.5	

SEPTEMBER 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	38	26	31	33	32	
2	26	19	19	26	23	
3	20	13	18	15	17	
4	18	13	18	13	15	
5	11	6	10	6	8	C C *
6	12	6	5	13	9	C C *
7	11	9	13	7	10	C C *
8	16	8	8	16	12	C C
9	11	6	6	11	9	C C *
10	18	11	10	19	14	
11	64	67	51	80	66	
12	34	34	42	26	34	
13	26	17	23	20	22	
14	24	19	21	22	22	
15	29	20	24	25	25	
16	15	10	13	12	12	C
17	38	28	32	35	33	
18	55	40	58	38	48	
19	38	41	44	35	39	
20	25	13	19	19	19	
21	29	15	19	25	22	
22	31	34	36	29	32	
23	24	19	25	17	21	
24	20	11	13	18	16	
25	23	18	15	25	20	
26	21	10	12	19	16	
27	13	7	11	9	10	C K
28	14	9	10	13	12	C C
29	9	5	9	5	7	C C *
30	22	14	13	24	18	
Mean values	24.5	18.2			21.3	

OCTOBER 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	30	19	23	26	25	
2	16	6	12	10	11	C K *
3	9	6	4	10	7	C C *
4	18	10	8	21	14	
5	34	30	42	22	32	
6	60	64	58	67	62	
7	15	11	13	12	13	C
8	17	18	10	24	17	
9	36	40	26	49	38	
10	116	103	119	100	109	
11	27	19	31	15	23	
12	17	12	18	11	15	
13	17	10	16	11	13	C C
14	14	12	13	13	13	C C
15	17	15	9	23	16	
16	23	20	17	26	22	
17	31	23	24	30	27	
18	52	46	42	56	49	
19	24	22	26	20	23	
20	35	23	27	31	29	
21	17	8	13	12	12	C
22	9	5	8	6	7	C C *
23	14	13	14	13	14	C C
24	16	12	17	11	14	C
25	11	6	11	6	9	C C *
26	20	17	17	20	19	
27	23	16	14	25	20	
28	21	14	24	11	18	
29	8	4	8	4	6	C C *
30	14	14	6	22	14	
31	26	33	36	22	29	
Mean values	25.4	21.0			23.1	

NOVEMBER 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	17	11	12	17	14	
2	54	41	40	54	47	
3	44	39	36	47	41	
4	17	14	13	18	16	
5	19	23	18	24	21	
6	31	20	26	25	25	
7	36	28	28	37	32	
8	32	27	19	40	30	
9	25	26	19	32	26	
10	17	20	18	19	18	
11	26	22	14	35	24	
12	34	37	24	48	36	
13	19	17	18	18	18	
14	24	26	22	28	25	
15	28	14	23	19	21	
16	37	41	40	38	39	
17	20	26	33	13	23	
18	17	22	14	25	20	
19	7	9	8	8	8	C K *
20	8	6	4	10	7	C C *
21	13	11	11	13	12	C C
22	7	10	10	7	9	C C *
23	4	7	8	4	6	C C *
24	8	10	12	6	9	C C *
25	18	13	8	23	16	
26	42	34	39	37	38	
27	25	21	21	25	23	
28	15	19	10	24	17	
29	16	12	13	15	14	
30	54	73	64	64	64	
Mean values	23.8	22.7			23.2	

DECEMBER 1988	Day N	Day S	Half Day am	Half Day pm	Daily aa	Quiet Days
1	10	7	8	10	9	C
2	22	36	23	35	29	
3	39	23	15	47	31	
4	17	16	18	15	17	
5	9	8	7	10	9	C C *
6	9	7	8	8	8	C C *
7	8	7	7	8	7	C C *
8	12	10	9	14	11	C C
9	9	8	7	10	8	C K *
10	14	24	21	17	19	
11	35	42	28	49	38	
12	22	30	31	21	26	
13	42	37	35	44	40	
14	26	23	9	40	24	
15	17	16	25	8	17	
16	42	45	26	61	44	
17	54	96	44	106	75	
18	42	43	39	45	42	
19	40	39	42	36	39	
20	15	15	17	13	15	
21	21	21	24	18	21	
22	26	34	39	21	30	
23	12	7	10	9	9	C K *
24	11	10	12	9	10	C
25	34	42	29	48	38	
26	31	49	44	37	40	
27	32	39	46	25	35	
28	20	22	16	26	21	
29	37	31	33	34	34	
30	19	15	17	17	17	
31	21	26	16	31	24	
Mean values	24.0	26.7			25.4	

MONTHLY AND YEARLY **aa** 1868 - 1988

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual mean
1868	10.6	16.0	19.7	21.0	16.4	17.9	21.5	19.4	24.0	25.9	13.3	13.7	18.3
1869	19.2	23.6	22.3	29.5	23.1	19.2	17.4	19.9	29.8	17.9	14.7	14.6	20.9
1870	21.6	23.2	21.2	25.8	20.9	16.4	14.1	21.4	35.2	26.2	21.9	19.9	22.3
1871	19.3	24.8	21.4	31.2	17.2	17.1	21.5	23.5	17.7	20.0	28.1	15.7	21.4
1872	17.0	28.0	23.0	23.4	20.4	17.7	25.3	25.2	20.7	38.6	25.0	20.5	23.7
1873	29.4	20.6	24.1	20.8	20.8	25.8	20.6	18.8	19.3	16.6	14.6	12.1	20.3
1874	17.8	16.1	12.7	19.1	14.0	12.8	13.1	13.0	15.7	17.8	14.3	10.1	14.7
1875	10.0	13.5	12.7	12.7	13.0	10.1	11.8	8.7	13.1	11.9	9.8	8.5	11.3
1876	9.8	12.6	11.0	6.5	7.6	7.7	9.1	10.2	10.1	10.5	10.2	10.1	9.6
1877	9.3	9.6	10.4	8.9	13.0	8.9	7.8	7.6	7.4	6.9	11.6	6.8	9.0
1878	7.4	7.5	6.2	8.5	7.3	8.6	4.8	6.4	7.9	6.8	7.1	9.3	7.3
1879	6.2	5.8	8.6	5.6	6.2	5.9	5.8	8.0	8.9	7.0	7.1	9.3	7.1
1880	7.3	4.7	9.8	8.9	13.1	7.3	9.9	23.1	11.4	14.4	14.5	14.6	11.6
1881	15.1	12.8	13.2	11.4	8.5	10.7	12.2	7.8	17.9	14.0	20.2	20.3	13.7
1882	15.7	19.5	16.5	35.9	20.6	19.0	14.5	19.7	15.0	25.0	55.0	20.1	23.0
1883	15.4	26.7	23.3	17.8	13.9	18.5	21.5	12.4	19.5	13.7	17.6	12.0	17.6
1884	9.1	14.3	17.5	15.6	12.8	13.1	15.5	13.0	13.5	16.0	16.9	13.2	14.2
1885	13.2	15.5	13.3	14.0	21.2	14.2	13.0	17.7	22.1	15.9	13.7	12.1	15.5
1886	17.7	17.1	27.6	21.6	22.6	21.6	19.3	18.1	19.0	21.7	20.7	20.6	20.7
1887	16.9	22.9	15.2	20.6	17.3	12.6	12.5	17.2	18.9	14.1	14.6	15.2	16.4
1888	18.2	15.9	15.2	16.4	19.3	14.5	12.9	13.7	15.1	15.0	15.3	14.0	15.5
1889	9.8	11.0	13.9	11.6	10.2	9.9	13.5	12.6	14.6	13.6	18.5	11.8	12.6
1890	11.7	11.8	10.0	8.4	8.4	7.3	10.0	10.3	13.8	15.6	13.3	8.3	10.7
1891	10.4	14.2	20.6	22.5	23.7	11.7	11.2	15.0	22.3	20.7	16.5	16.2	17.1
1892	19.5	35.1	36.3	20.4	25.1	17.7	33.7	22.1	20.1	23.1	15.7	22.1	24.3
1893	18.2	19.1	18.4	14.0	12.0	17.1	14.5	18.5	19.5	20.9	18.5	13.9	17.0
1894	19.2	33.9	20.0	17.4	19.0	20.0	26.3	21.0	22.5	17.0	21.9	12.0	20.7
1895	15.4	20.8	23.0	20.7	16.6	17.6	17.9	10.5	15.9	22.7	22.5	14.5	18.1
1896	25.4	23.6	21.8	17.2	20.6	11.7	15.6	18.1	17.8	17.5	13.1	13.8	18.0
1897	12.0	14.0	14.2	22.2	14.6	12.0	9.3	10.7	11.0	13.8	12.6	17.2	13.6
1898	13.5	15.1	20.5	13.4	15.1	14.3	13.5	14.6	21.5	14.1	13.6	13.0	15.2
1899	14.3	17.8	15.6	14.2	15.9	13.5	11.6	11.4	13.6	9.4	8.7	12.1	13.1
1900	13.5	8.9	12.5	7.2	9.6	4.7	5.2	6.0	5.2	7.1	5.4	5.4	7.6
1901	7.3	7.0	6.5	5.2	6.2	6.0	5.6	6.1	6.0	5.4	5.6	6.4	6.1
1902	6.1	7.6	5.9	7.9	5.6	5.4	6.3	6.2	7.0	7.2	7.6	6.1	6.6
1903	6.5	5.9	6.7	10.3	7.8	11.3	10.8	14.1	14.0	26.3	16.3	13.5	12.0
1904	15.1	12.6	8.7	13.1	13.0	10.5	10.8	10.2	11.2	13.0	11.6	10.6	11.7
1905	16.0	20.3	16.6	16.6	10.6	13.8	11.8	16.8	16.3	11.2	20.1	10.7	15.0
1906	7.6	17.5	14.0	11.6	11.4	11.3	12.4	12.0	14.2	12.7	9.6	16.4	12.5
1907	16.5	25.3	14.3	12.1	16.8	14.9	16.9	15.5	16.8	18.5	14.6	11.5	16.1
1908	13.6	17.0	23.2	15.6	18.9	12.6	10.4	18.2	31.6	15.8	17.4	11.4	17.1
1909	24.8	17.0	19.8	12.1	18.3	11.5	12.6	17.6	27.6	19.4	11.6	13.8	17.2
1910	12.8	14.6	20.9	19.8	17.2	13.7	10.8	20.2	19.2	24.4	17.9	19.5	17.6
1911	21.3	23.7	21.5	21.1	16.6	13.6	15.3	11.9	12.2	12.5	10.6	11.0	15.9
1912	7.6	8.0	7.7	9.4	9.6	8.4	7.8	10.5	9.8	9.5	9.4	9.4	8.9
1913	10.3	9.5	9.9	9.8	9.0	7.0	7.0	6.7	10.0	10.7	7.6	6.6	8.7
1914	7.1	7.3	10.1	13.5	8.1	10.3	12.9	14.9	11.8	13.3	13.4	9.3	11.0
1915	10.9	13.5	15.0	15.3	13.9	17.9	11.2	14.7	17.0	21.3	24.9	12.4	15.7
1916	16.0	11.6	25.0	19.2	20.2	15.7	19.7	21.4	22.4	24.5	24.0	18.9	19.9
1917	25.1	19.1	16.2	16.7	15.9	12.7	14.6	28.1	16.1	20.2	14.8	19.8	18.3
1918	17.8	21.3	19.7	20.5	18.8	15.6	17.4	22.2	28.4	26.4	23.1	28.1	21.6
1919	27.8	26.5	30.7	21.3	27.5	13.9	14.9	22.7	25.3	26.9	14.3	18.4	22.5
1920	16.7	14.1	28.5	17.8	17.7	12.4	14.0	14.8	25.7	17.3	15.1	17.0	17.6
1921	11.7	10.6	15.6	17.2	40.5	12.4	13.3	14.6	12.4	16.2	16.2	17.8	16.6

MONTHLY AND YEARLY **aa** 1868 - 1988 (continued)

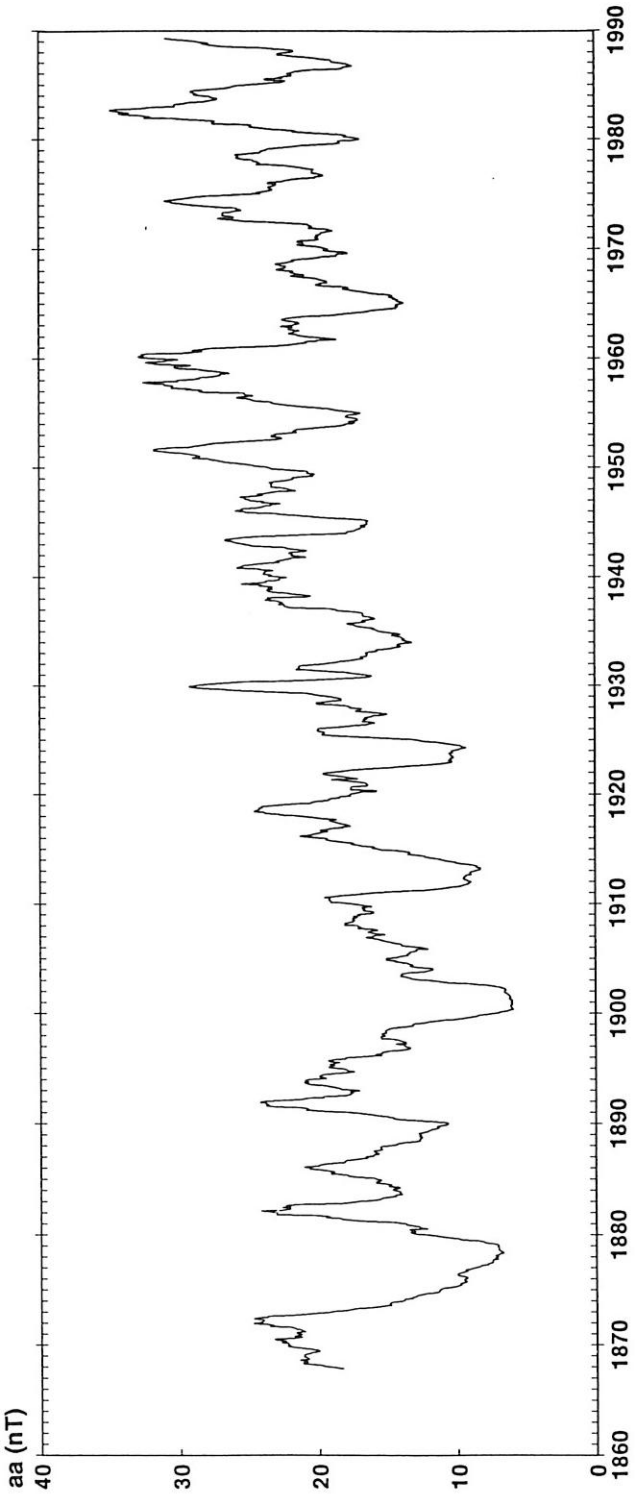
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual mean
1922	18.0	18.6	24.1	23.5	18.3	18.6	20.0	20.7	19.7	20.1	13.1	10.4	18.8
1923	10.2	13.7	12.1	10.0	10.1	11.1	8.4	7.3	10.7	12.6	7.8	9.6	10.3
1924	13.6	10.9	12.9	7.3	10.2	12.3	9.7	6.9	12.6	8.7	9.3	7.9	10.2
1925	9.4	8.6	8.6	10.8	11.0	17.7	11.8	13.6	18.0	21.7	13.2	12.9	13.1
1926	27.1	26.2	27.6	27.1	19.6	16.2	11.4	13.2	22.7	23.3	11.9	13.3	19.9
1927	15.5	15.2	20.7	15.6	16.8	11.2	16.5	18.5	20.9	24.7	8.0	15.8	16.7
1928	10.1	13.5	11.3	12.8	23.6	20.2	27.8	15.9	19.6	23.4	18.2	15.6	17.7
1929	13.0	24.0	26.2	13.9	16.3	14.7	18.6	15.9	21.5	25.5	22.7	21.0	19.4
1930	20.9	27.9	30.9	38.2	36.4	33.3	28.3	33.3	28.8	29.3	18.8	17.2	28.6
1931	13.0	15.4	12.9	9.9	12.0	14.7	13.1	17.7	21.2	27.3	23.7	21.1	16.8
1932	20.2	21.4	27.9	28.2	22.2	11.8	12.4	19.1	19.1	17.2	13.8	15.3	19.0
1933	15.9	18.4	19.2	21.1	17.5	13.6	12.3	14.2	18.4	16.8	16.0	13.0	16.3
1934	11.5	14.9	20.0	11.3	11.4	10.0	10.3	17.4	17.6	11.6	9.5	15.5	13.4
1935	15.6	16.5	17.8	13.6	11.6	16.4	12.5	9.9	20.8	20.2	15.6	17.7	15.7
1936	17.4	19.8	15.5	22.1	17.5	19.8	18.0	10.2	9.8	15.4	18.0	12.0	16.3
1937	12.2	22.2	18.6	26.3	18.6	18.9	18.8	14.7	14.7	27.8	19.4	16.5	19.0
1938	46.6	26.0	20.4	26.1	23.7	14.8	19.7	19.9	24.7	24.0	17.8	19.5	23.6
1939	13.5	21.7	27.0	36.1	27.8	22.8	26.1	23.0	19.2	28.4	14.6	18.6	23.2
1940	24.8	20.1	43.9	22.4	20.0	23.6	18.4	18.4	20.1	21.9	25.1	23.7	23.6
1941	21.9	27.6	42.9	21.6	19.1	17.4	27.9	22.3	38.2	17.5	23.6	19.3	24.9
1942	14.6	18.8	32.4	24.4	14.2	14.6	23.0	21.9	25.8	30.3	22.8	18.4	21.8
1943	18.1	17.1	21.0	21.9	24.5	21.2	24.4	41.0	35.3	32.8	29.6	23.3	25.9
1944	21.2	17.9	26.6	21.6	16.1	14.9	11.1	16.5	17.5	17.2	11.2	21.8	17.8
1945	16.1	16.4	25.0	19.1	15.4	11.1	15.3	12.1	15.6	17.9	12.0	20.2	16.4
1946	19.2	30.2	43.5	25.0	24.1	22.3	28.6	16.7	41.7	19.6	19.3	14.3	25.3
1947	20.6	17.1	37.9	23.3	19.1	21.1	21.4	32.9	39.1	31.3	20.7	17.9	25.3
1948	20.8	21.0	24.2	17.8	23.7	15.0	16.2	28.3	22.0	36.1	23.1	23.0	22.6
1949	29.8	20.4	24.7	17.6	22.4	17.9	11.8	19.2	17.8	32.8	24.6	15.1	21.2
1950	19.5	23.2	20.6	23.8	21.7	19.0	19.5	30.2	29.3	34.5	28.0	24.0	24.4
1951	23.1	29.2	28.5	32.1	25.5	23.2	25.2	29.7	44.4	30.3	25.7	28.2	28.7
1952	28.5	34.3	40.1	38.0	33.1	23.8	20.8	19.0	28.5	26.4	18.9	23.4	27.9
1953	22.3	21.2	27.4	22.7	21.4	18.4	22.5	26.1	29.0	22.4	20.2	12.6	22.2
1954	13.9	24.5	25.5	20.6	12.0	9.7	13.1	16.5	25.4	21.1	14.5	10.9	17.2
1955	19.3	18.2	23.6	21.1	16.7	15.1	12.3	14.3	19.1	17.8	19.9	14.1	17.6
1956	28.7	23.3	27.6	31.7	29.3	23.5	19.8	20.7	22.4	19.3	32.3	18.2	24.7
1957	28.7	26.8	36.7	28.8	18.1	29.1	21.7	20.7	57.0	24.0	29.5	31.7	29.3
1958	25.5	43.2	36.1	27.6	25.2	29.7	36.0	25.1	26.5	24.7	15.0	27.2	28.4
1959	24.3	35.9	29.9	24.2	25.7	21.6	42.5	31.2	36.1	28.2	32.1	30.8	30.2
1960	25.2	23.5	27.6	51.5	31.6	27.6	28.1	27.2	26.4	45.6	45.9	34.5	32.9
1961	20.6	25.1	22.0	21.8	22.3	20.1	36.0	18.5	20.7	23.3	17.3	21.1	22.4
1962	13.2	19.2	15.5	22.6	13.4	18.1	21.0	26.2	29.8	33.3	22.5	23.5	21.5
1963	19.3	15.3	14.9	18.2	20.4	20.5	20.8	22.5	40.2	23.5	20.7	18.9	21.3
1964	20.1	20.1	21.0	21.7	17.5	15.1	16.9	14.8	18.2	16.9	13.8	10.3	17.2
1965	11.8	16.3	14.3	12.6	10.5	15.7	14.8	16.8	17.5	13.1	11.7	13.8	14.0
1966	14.2	14.8	18.6	12.0	14.8	12.5	17.1	20.0	29.4	17.5	16.8	20.5	17.4
1967	18.9	19.8	13.8	15.5	33.1	18.6	14.4	17.5	24.7	17.8	18.9	24.5	19.8
1968	21.1	26.5	23.3	22.2	21.4	24.9	18.0	20.1	22.0	24.8	26.2	20.3	22.5
1969	17.8	25.8	27.3	23.6	25.2	16.7	15.0	15.3	23.9	17.2	18.7	13.8	20.0
1970	14.4	12.7	26.4	23.1	16.6	18.3	28.4	21.0	19.7	20.6	21.6	16.5	20.0
1971	23.5	21.2	21.1	23.9	21.1	17.0	15.2	17.1	21.4	22.2	18.8	18.6	20.1
1972	21.9	18.3	21.5	18.1	16.6	21.5	14.0	34.2	20.4	20.4	21.8	18.9	20.6
1973	26.1	32.7	36.9	39.6	26.1	27.3	20.9	20.6	22.8	28.2	20.7	19.9	26.8
1974	25.8	26.4	33.7	32.9	29.2	29.2	32.0	30.2	33.7	37.3	26.8	27.5	30.4
1975	27.6	31.1	32.0	24.3	22.7	20.7	21.7	18.1	16.9	20.2	29.3	21.1	23.8

MONTHLY AND YEARLY **aa** 1868 - 1988 (continued)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual mean
1976	23.3	28.5	33.4	25.4	23.7	17.5	18.4	17.7	23.7	20.4	16.9	18.6	22.3
1977	18.7	21.0	19.9	24.9	20.1	14.2	22.9	23.2	23.0	20.9	17.3	17.0	20.3
1978	24.6	26.2	25.9	31.3	31.2	28.3	19.9	25.6	27.0	20.8	24.6	22.0	25.6
1979	27.3	23.7	26.9	33.5	21.0	18.3	17.9	26.0	22.0	19.3	17.1	16.8	22.5
1980	19.3	17.6	12.8	18.7	15.7	20.3	17.1	16.0	14.4	22.3	23.7	22.1	18.3
1981	16.8	22.9	27.1	33.4	27.3	18.1	27.6	24.3	20.8	34.4	24.5	19.7	24.8
1982	23.5	49.3	27.6	32.2	26.2	31.5	42.4	32.0	45.9	28.9	33.7	34.5	33.8
1983	26.6	40.8	34.2	36.3	32.1	25.1	21.4	25.2	24.0	28.8	34.1	26.4	29.5
1984	23.8	26.5	31.3	33.1	27.5	24.0	26.7	26.2	33.2	33.7	31.5	29.4	28.9
1985	26.1	24.4	19.2	30.0	15.7	20.1	23.7	22.3	21.4	22.5	24.0	21.5	22.5
1986	22.7	40.5	21.3	14.4	18.9	16.0	16.5	22.6	25.0	18.8	21.5	15.4	21.0
1987	14.8	16.8	17.8	13.0	14.8	13.3	19.2	24.3	30.3	25.7	22.3	15.9	19.0
1988	22.4	23.3	24.8	25.2	20.5	19.9	20.1	20.5	21.3	23.1	23.2	25.4	22.5

Unit : nT

TWELVE - MONTH RUNNING MEAN VALUES OF **aa** 1868 - 1988



SECTION 3

3.2. an, as, am INDICES

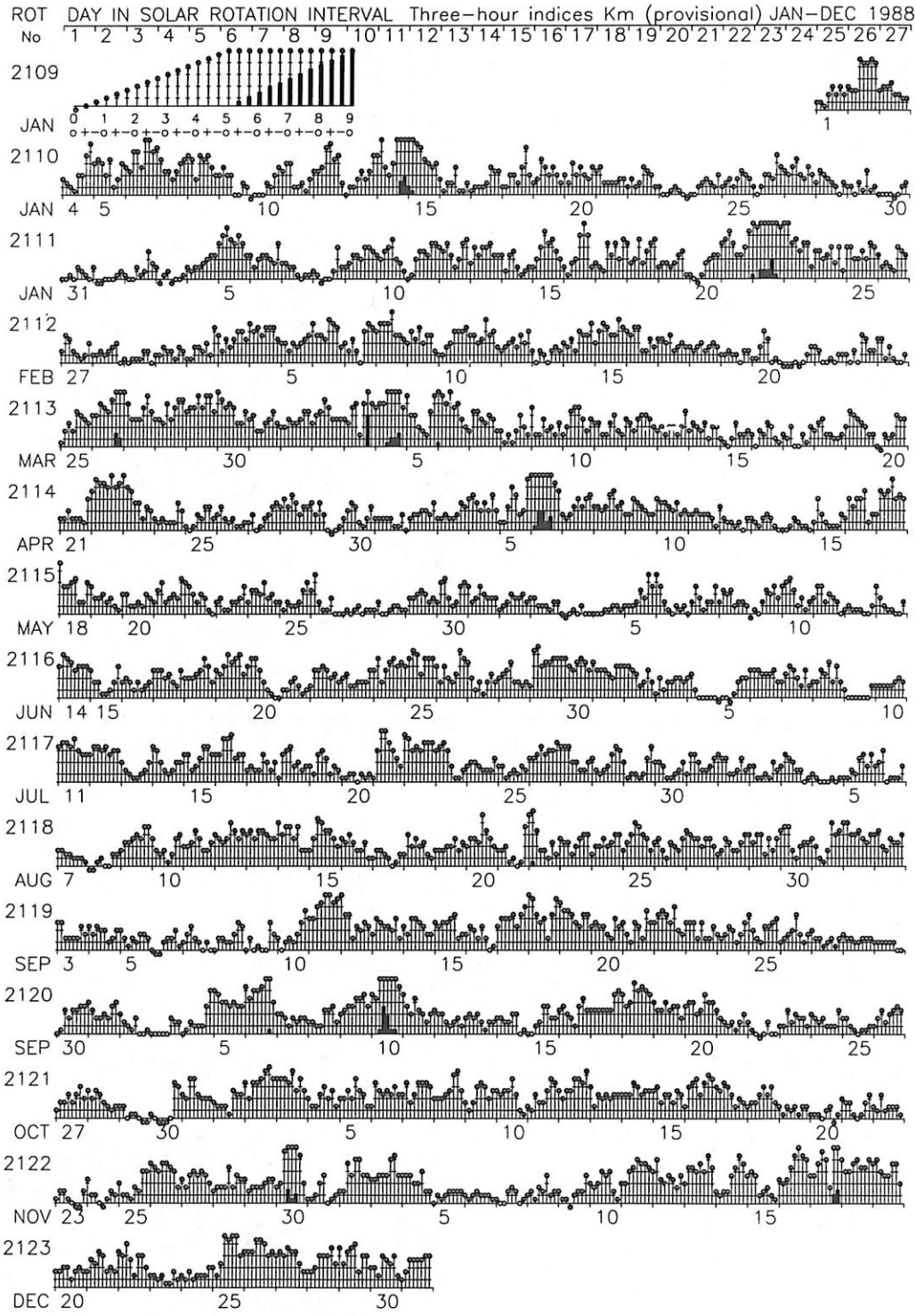
- Musical diagram of **Km** 1988 55
- Monthly tables of three-hour indices :

  an, **as**, **Kn**, **Ks** and daily **An**, **As** values 56
- Monthly tables of three-hour indices :

  am, **Km** and daily **Am** values 68
- Monthly and yearly mean values of **Am**

  1959 - 1988 74

MUSICAL DIAGRAM OF **Km** 1988



an , as INDICES 1988

JANUARY 1988																				
	Kn								σ n		an									An
1	1o	1-	1-	1+	2o	2-	2o	1+	2123	3304	6	5	4	10	15	11	15	10		10
2	2o	2-	2-	5-	4+	4+	5-	4-	1246	5443	14	12	11	76	69	63	71	49		46
3	2o	2+	2+	2+	1+	2-	1+	1+	3123	2356	14	17	17	19	10	11	10	9		13
4	2-	1+	1o	0+	2-	2o	3+	5-	4322	2223	11	9	7	3	13	14	37	75		21
5	3o	3+	3-	2o	3+	1+	1+	3+	1410	2123	31	35	24	15	38	8	10	36		25
6	3-	2o	3+	4-	3-	5o	5+	4o	2222	3332	22	14	38	46	25	102	106	53		51
7	4+	4-	2+	2+	2o	3-	3o	4-	2421	3442	67	45	19	17	14	22	27	43		32
8	3+	4-	1+	4-	4-	4-	3-	2o	2335	4531	37	43	10	50	47	47	21	14		34
9	2-	2+	2-	2+	0+	0+	1+	1o	2234	3220	12	19	13	17	3	2	9	6		10
10	0+	0o	0o	0o	1+	1o	2+	2+	2111	3133	2	1	1	1	9	7	17	20		7
11	2+	3+	3+	1o	1o	1o	1-	1+	4330	1132	20	39	37	6	7	7	4	8		16
12	2o	2o	3-	4+	5o	4-	4o	1+	4434	4254	15	14	22	62	103	41	52	8		40
13	0+	1-	1o	1+	2+	2-	2+	3+	2232	2242	2	5	6	10	19	11	17	37		13
14	3+	4+	2+	2-	3o	5o	6o	6+	1442	2343	37	70	20	13	28	91	167	196		78
15	6-	6-	5-	4+	4-	4-	3-	3o	6534	4434	136	129	84	69	42	42	22	32		70
16	2-	0+	2-	1+	3o	1o	1-	1+	2042	4122	13	3	13	9	29	6	5	9		11
17	0+	1o	1o	1-	2-	3-	2+	3-	3553	3344	3	7	7	4	12	26	19	22		13
18	1o	1-	2+	2o	1+	3o	4+	2o	2243	3264	6	5	19	14	10	27	66	15		20
19	1+	2-	4-	3-	2o	3-	2+	1+	1253	3234	10	12	42	25	14	21	17	9		19
20	2o	1+	3o	2o	3o	2o	2o	3-	4312	4223	16	10	28	15	27	15	14	24		19
21	2+	2+	1+	1+	1+	1o	2o	1+	6231	1242	20	19	10	8	10	7	14	10		12
22	1+	2-	1-	1o	3o	3-	2+	1-	5421	6232	8	12	5	7	32	21	17	5		13
23	1-	0+	0+	1-	1o	1o	0+	0o	2223	2341	4	2	2	4	6	7	3	1		4
24	0+	0+	1+	1+	2o	2-	1+	2o	1241	4214	2	2	8	8	16	13	8	15		9
25	1o	1+	2-	1o	2-	3-	2-	2-	4343	4533	6	10	13	6	13	22	13	13		12
26	1o	0o	1-	2+	2o	2-	4-	3-	4113	1242	7	1	5	17	16	13	44	22		16
27	2+	2+	3-	4-	2o	2-	3-	2+	6654	4231	17	18	25	45	16	12	26	17		22
28	1+	2+	2-	2-	1+	1+	1-	1o	2423	2221	8	19	11	13	8	8	4	7		10
29	1-	1o	0+	1o	1o	2+	1-	1+	3323	3423	5	6	2	7	6	20	5	8		7
30	1-	0+	0+	0+	0o	1-	1+	1+	2221	1233	4	2	3	2	1	4	8	9		4
31	0+	0+	1-	1-	1+	1o	1-	1-	1333	2123	2	3	5	4	9	7	4	4		5
											Monthly mean value of An									21.4

JANUARY 1988																				
	Ks								σ s		as									As
1	1+	1o	1o	2-	2+	2-	2+	2o	2203	4320	8	7	7	13	20	13	20	15		13
2	3-	2+	3-	5-	4o	5-	5-	5-	3131	2215	22	19	21	84	57	71	83	74		54
3	2o	3-	3-	3-	2-	2-	1o	1o	0222	1221	15	23	24	23	11	11	6	7		15
4	2-	2-	1o	1-	2+	2o	4o	5o	3323	2134	11	11	7	5	17	14	55	87		26
5	3+	3+	3+	2o	3+	1o	2o	3-	3332	3223	34	39	35	15	36	6	15	25		26
6	3-	3-	4+	4o	3o	5o	5o	4+	3242	3022	25	25	69	58	27	97	93	63		57
7	4+	3+	3-	2+	2-	2o	3o	3o	2421	2143	67	35	21	17	12	16	28	33		29
8	4-	3+	2o	3+	3+	4-	3-	2+	2212	1321	44	34	14	38	34	50	22	17		32
9	2o	3-	2+	2-	0o	0o	1o	1o	0411	1133	15	23	17	12	1	1	7	6		10
10	0o	0+	0+	0+	1+	1o	2o	3-	1222	1332	1	3	3	2	8	6	15	22		8
11	2+	3o	2+	1o	1o	2-	1-	2o	2121	1333	20	28	18	7	7	12	4	14		14
12	3-	3-	3-	4+	4o	3o	3+	1+	2221	1122	21	21	25	66	51	29	40	8		33
13	1-	1o	1+	2-	2o	2-	2+	4o	1332	2445	4	7	9	12	15	13	17	54		16
14	4o	5+	3-	2o	3o	5o	6-	6o	3431	2234	55	104	23	16	31	99	138	164		79
15	6-	5o	5-	4+	3o	3-	3-	3o	3322	2221	133	97	74	62	31	24	22	28		59
16	1+	1-	1o	2-	2-	0+	1-	1+	2322	3232	9	5	7	11	13	3	4	10		8
17	1-	1-	1o	1o	1+	2+	2o	2o	2523	3203	5	5	7	7	9	17	15	16		10
18	1+	1+	2-	2o	1+	2+	4o	2-	2411	2242	8	10	13	14	10	19	57	13		18
19	1+	2o	3o	3-	2o	3-	2o	1+	1222	2222	9	14	32	21	16	21	15	10		17
20	2o	1+	3o	2o	3-	2o	2-	3-	3121	2212	14	8	28	14	24	15	12	22		17
21	2o	3-	1+	2-	1o	1+	2-	2-	1422	2322	16	22	10	11	7	9	12	12		12
22	1o	2-	1o	1+	2+	2+	2o	1+	2242	3231	6	12	7	10	18	18	16	8		12
23	1o	1-	1-	1o	1o	0+	0o	0+	2322	2212	7	4	4	6	6	3	1	2		4
24	0+	1-	1-	1+	1+	1o	1o	2-	2321	1324	2	4	5	8	10	6	6	12		7
25	1-	1+	2-	1o	1+	2-	2o	2-	1232	3512	5	9	11	7	9	13	14	11		10
26	1o	0+	1+	2-	2-	1+	4-	3o	3213	1342	6	3	8	13	13	10	48	28		16
27	2+	2-	2+	3o	2-	1+	3-	2o	2323	1222	17	11	17	27	11	10	23	14		16
28	1+	2+	2+	2-	1+	1-	0+	1+	1331	4222	9	19	19	12	8	4	3	8		10
29	1+	1+	1-	1+	1-	2o	1-	1o	3422	2322	9	9	4	8	4	14	4	6		7
30	0+	1-	1-	1-	0o	0+	1-	1+	2323	0222	3	4	4	4	0	3	5	10		4
31	0+	0+	0+	0+	1+	1+	1-	0+	2021	3310	2	3	3	2	8	8	4	3		4
											Monthly mean value of As									20.7

FEBRUARY 1988																			
	Kn								σ n		an								An
1	1o	0o	0o	0+	0+	0+	1-	1o	4112	2114	7	1	1	2	3	2	5	6	3
2	1-	0+	0o	1o	1-	1o	3-	2-	3212	2532	5	3	1	7	5	7	25	11	8
3	1+	0o	1-	1+	0+	0+	0+	1-	3012	2232	8	0	5	8	2	3	2	5	4
4	1o	1-	1+	1+	2-	2o	2o	2+	0222	3335	7	5	8	10	12	15	14	20	11
5	3o	4+	5-	4+	3+	4o	3+	3-	3663	3323	33	62	84	64	39	52	39	21	49
6	2+	1+	2o	2+	2+	2o	2-	3o	2313	3133	19	10	16	20	19	15	12	33	18
7	2-	1+	1+	1+	1o	1-	1-	1o	4413	2321	13	9	8	10	7	4	5	7	8
8	1o	1-	0o	0+	1-	1+	3o	2-	2112	2253	6	5	1	3	5	10	30	11	9
9	1o	1+	2o	2+	2o	3+	3o	3-	2123	0432	7	8	14	18	15	34	33	21	19
10	2o	2o	3o	3o	4-	2+	2-	1o	1441	4211	16	16	30	31	46	19	13	6	22
11	0+	1-	2o	3o	3-	3-	4-	3+	2133	3345	2	5	16	28	26	21	43	37	22
12	3-	3-	3+	2+	2-	2o	3+	3+	1322	2142	26	26	37	19	12	16	38	39	27
13	1+	3o	3-	3o	3o	3+	2+	2+	2542	3322	9	33	22	33	30	39	20	17	25
14	2o	1o	2o	3-	1+	1o	1o	1+	2212	2312	14	6	16	23	10	6	7	10	12
15	2-	2o	3o	5-	4-	4o	3-	2-	4344	4223	11	16	33	71	41	53	24	13	33
16	1o	1-	2-	2o	4o	5o	4o	1+	1134	5763	6	4	12	16	59	93	52	10	32
17	2-	2-	1o	3+	2+	3+	2o	4-	3312	3214	11	11	6	37	17	39	14	48	23
18	3+	2-	2+	4+	2-	3-	3+	4-	4124	2455	38	12	17	61	12	26	39	42	31
19	1+	2o	2-	1+	2o	3-	3-	1o	2521	3341	8	14	12	10	15	22	23	7	14
20	0+	0+	0+	1-	2-	2+	2+	2+	2212	2333	3	2	2	4	12	17	17	17	9
21	3o	3+	4o	3+	3-	3-	3+	4o	1222	4154	31	39	56	35	25	21	35	60	38
22	6-	5-	6o	6o	6o	6o	5+	5-	5434	2563	126	84	157	151	149	171	113	85	130
23	5o	5o	4-	4-	3-	4-	3+	1+	4433	2352	90	98	43	45	26	42	36	10	49
24	3o	3-	2o	3-	3-	2-	3o	1+	4423	3145	27	22	14	22	26	12	30	9	20
25	3-	3-	2+	2o	3-	2o	3o	3-	3331	3154	23	26	19	16	22	15	29	23	22
26	3-	1+	2-	1+	1o	3o	3o	3-	3232	1533	21	10	11	10	7	31	30	22	18
27	1+	3-	2+	1+	1o	1o	1o	2o	4652	2324	10	23	18	8	7	7	6	15	12
28	1+	1o	1+	1-	1+	2-	2+	1-	4542	4252	8	7	9	5	10	12	17	4	9
29	1-	0+	1-	1-	1o	1+	1+	0+	2131	2321	4	2	4	5	6	10	10	2	5
											Monthly mean value of An								23.5

FEBRUARY 1988																			
	Ks								σ s		as								As
1	1+	0+	0o	1-	0+	0o	1o	1o	1211	2233	10	2	1	5	2	1	6	6	4
2	0+	0+	1-	1+	0+	1-	3-	2-	2221	0324	3	3	4	10	3	4	21	11	7
3	1+	0+	1-	1o	0o	0+	0+	1o	2322	1323	8	2	5	6	1	2	2	6	4
4	1+	1o	1+	1o	2-	2o	2+	2+	2332	2032	9	7	8	7	12	16	20	18	12
5	4-	4-	4o	3+	3+	4o	3+	2+	2241	1133	42	45	58	36	38	54	35	18	41
6	2+	1+	2o	3-	2+	2+	2-	3+	2322	1333	20	9	15	21	18	17	11	39	19
7	2-	2-	1+	1+	0+	0+	1-	1-	2211	3121	12	13	8	8	3	2	4	4	7
8	1o	1-	0o	0+	0+	1-	3o	1+	3201	3233	6	4	0	2	2	5	29	9	7
9	1+	2-	3-	3-	2o	3-	3o	3o	2222	2232	9	13	22	21	14	23	32	30	21
10	3-	2o	3-	3-	4-	2-	2-	1o	3522	2232	23	15	22	26	44	12	12	6	20
11	0+	1-	2-	2+	2+	2o	3o	3o	2124	3422	3	4	12	20	19	16	32	31	17
12	3o	2+	3+	3-	1+	2-	4-	4-	2232	2222	28	18	39	22	8	11	42	43	26
13	2o	3o	2+	3o	3o	3+	3-	3-	2322	1223	15	29	17	31	30	37	21	22	25
14	3-	1+	3-	3o	1+	0+	1-	1+	2221	1212	23	9	23	28	8	3	5	9	14
15	1+	2o	3o	4o	3o	3+	3-	2o	1345	2222	9	14	33	59	31	39	22	14	28
16	1+	1o	2-	2-	4-	5-	4o	1+	3121	3422	9	6	13	13	46	85	57	8	30
17	2o	1+	1o	3+	2o	3+	2o	4-	1213	2133	15	9	7	39	16	39	15	41	23
18	3+	2-	2o	3+	1+	2+	4-	4-	4213	1323	36	11	15	39	10	19	42	41	27
19	1+	2-	2-	1+	1+	2-	2+	1-	2321	2242	8	12	11	10	9	13	20	4	11
20	1-	0+	0o	1o	2-	2-	2+	2+	2203	2225	5	2	0	6	11	13	17	20	9
21	4-	4o	5-	3+	2o	2+	2+	5-	2222	2223	45	51	71	34	14	18	19	73	41
22	5-	5-	5+	5o	6-	6+	5+	4+	2423	2433	82	85	113	90	123	186	111	69	107
23	5-	5o	3+	4-	2+	3+	4-	1+	3433	2152	84	94	35	49	20	34	41	8	46
24	3-	3o	2o	2+	3o	1+	3o	1-	3214	3233	24	27	14	19	28	10	27	4	19
25	3o	3o	2-	2-	3-	2o	3+	3o	0112	1252	32	28	13	12	21	16	39	30	24
26	2+	1+	2-	2-	1-	3o	3-	2+	3222	2234	19	8	11	11	5	31	23	17	16
27	1+	2+	2o	1+	1o	0o	1-	2+	2633	2325	9	20	16	9	6	1	5	17	10
28	1o	1-	1o	1+	1+	1+	2-	0+	3312	2440	6	5	7	9	8	10	11	3	7
29	1-	0+	1-	1-	1-	1+	1+	0+	2212	2232	5	2	5	4	5	8	10	3	5
											Monthly mean value of As								21.6

MARCH 1988																		
	Kn								σ n		an							An
1	1o	1o	2-	1+	1+	1o	2-	1+	4133	4222	7	6	11	10	10	7	13	9	9
2	1-	0+	2o	2-	1+	2+	1o	3+	3243	2222	4	3	14	13	9	18	7	38	13
3	3-	1+	2+	1+	2+	3o	3o	2+	3332	3112	22	8	17	10	19	31	31	20	20
4	4-	3o	3+	3-	3+	3+	3o	2o	3342	3352	48	32	39	25	39	35	32	14	33
5	2+	2+	1+	2o	2-	2+	2+	3-	3523	2332	17	17	10	14	11	17	18	24	16
6	4o	3o	3-	2+	4+	4-	4-	2-	4323	6562	57	31	24	20	61	42	45	12	37
7	2o	1+	2o	1+	1-	3o	4-	3o	4321	2442	15	9	15	9	4	32	48	30	20
8	3o	4o	4o	4o	5-	3-	3-	2o	2122	3221	29	52	53	53	81	24	21	15	41
9	2o	3-	2o	4-	2o	3o	3-	1+	4324	2542	15	26	16	44	14	27	23	10	22
10	1o	1o	2-	2o	3o	3+	3o	3+	1134	2333	7	7	12	15	29	34	33	40	22
11	3-	3o	2o	2o	4o	2+	3o	2o	3423	4232	23	31	15	15	55	18	33	15	26
12	2-	1+	2o	3-	2-	3o	2o	3o	3233	2433	11	9	15	22	13	28	16	32	18
13	2-	0+	1+	1+	1-	2-	2o	1+	4221	2314	12	2	10	8	4	11	16	10	9
14	2o	2-	2+	1+	3o	3-	3o	4-	4432	2302	16	13	20	9	27	26	29	46	23
15	2o	3o	4-	3+	3-	3-	4+	4-	2332	4253	15	27	45	36	25	26	66	43	35
16	3o	3o	4-	4-	2-	2-	3-	2o	2154	2221	30	31	41	42	12	11	21	14	25
17	2o	3-	2+	3o	1+	2o	2+	2o	1642	2224	14	23	19	29	10	15	17	15	18
18	2-	1+	2o	2o	2-	2o	2o	2o	5221	2234	13	9	16	16	11	14	16	15	14
19	1o	1+	2-	1o	1+	1-	2-	1+	4333	3323	6	9	11	6	9	5	11	10	8
20	1-	1-	2o	3o	2+	1-	1o	0+	2131	1342	4	4	14	31	18	5	6	3	11
21	0o	0o	0o	0+	0+	1-	1+	2o	1112	1321	1	1	1	3	2	4	9	14	4
22	2-	1+	1-	1-	1o	1o	1+	1o	2212	1222	11	8	5	5	6	6	10	7	7
23	1o	1-	1+	1-	3o	2+	2-	2-	2222	1113	6	4	10	4	31	18	11	11	12
24	2+	2o	1o	2-	1o	1-	1o	1+	4313	2233	20	16	6	13	7	5	6	10	10
25	0+	2-	2+	2o	3+	3o	3-	2+	2141	2322	3	12	19	14	37	28	23	20	20
26	3-	3o	4-	4-	3+	4+	6o	6-	2333	2246	25	27	49	41	37	63	154	143	67
27	5o	4o	3o	3-	3-	4-	4+	3+	2343	2553	90	56	31	26	26	45	70	38	48
28	3-	3-	3-	4+	3-	3+	5-	4+	2226	3342	24	25	22	64	25	40	71	64	42
29	3o	4-	4o	5o	4-	4+	4+	3o	2644	3452	33	50	52	95	41	68	67	31	55
30	5o	4+	4-	4o	4-	2o	2+	3+	2343	3216	90	67	47	60	46	16	17	38	48
31	3-	3o	2-	2o	2+	3-	3+	2o	3422	4444	23	31	12	14	19	24	39	16	22
											Monthly mean value of An								24.4

MARCH 1988																		
	Ks								σ s		as							As
1	1-	1o	2-	2-	1o	1-	1+	1+	2323	3332	5	7	11	11	7	4	10	9	8
2	1-	1-	2-	2-	1o	2-	1o	3+	1343	2334	4	5	12	11	7	11	6	38	12
3	3o	2-	2+	2-	2o	3o	3+	2o	3332	2341	30	12	20	13	16	30	35	14	21
4	3o	3+	3o	3-	3o	3+	3+	3-	2341	0362	33	35	31	21	32	37	38	21	31
5	2o	2o	1o	2-	2-	2-	2o	3-	2342	3233	15	16	7	13	11	13	16	26	15
6	4-	3-	3-	2+	4-	3+	3+	1+	4321	4442	43	21	26	19	43	40	36	10	30
7	2-	1o	3-	1+	0o	3+	4-	4-	3342	1424	12	7	23	9	1	35	47	43	22
8	3o	4-	3+	3o	4+	3-	3-	2+	3440	2522	32	48	40	32	64	21	22	19	35
9	2o	3+	2+	3+	2-	3-	3-	1+	2131	2652	15	34	20	35	13	24	23	8	22
10	1o	1+	2o	2+	3o	3o	3-	3o	3115	0334	7	8	14	18	32	30	22	29	20
11	3-	2o	2o	3-	4-	3-	3o	2-	2212	2532	24	16	14	21	48	23	27	11	23
12	1o	2-	2-	2o	2-	2+	2o	3o	4231	2101	7	13	13	14	11	20	16	27	15
13	1+	0+	1o	1o	0+	1+	1+	1o	4312	2220	8	2	7	6	2	9	10	7	6
14	2-	1+	2+	1+	3o	2+	3-	4-	1313	3323	11	10	18	9	28	19	23	48	21
15	2+	3o	4-	4-	2+	2+	4o	3o	3213	3232	17	33	41	41	20	18	54	33	32
16	3o	3-	3o	3o	1+	1o	2+	2-	2232	2332	29	22	29	33	8	6	18	12	20
17	2+	2+	2-	3-	1+	1+	2o	1+	1322	2214	20	17	12	21	8	9	14	9	14
18	1+	1o	1+	2-	1-	1+	2-	1+	2322	1325	10	6	10	12	5	10	11	10	9
19	1-	1-	1o	1+	1o	0o	1-	1o	3314	3133	5	4	7	8	6	1	5	6	5
20	0+	1o	1+	3-	2+	0+	0+	0o	2322	4131	3	6	10	24	18	2	3	1	8
21	0o	0o	0o	0+	0o	0o	1-	1+	1111	1122	1	1	1	2	1	1	4	10	3
22	2-	1+	0+	0+	0+	0o	1-	1o	3421	2021	11	9	2	2	2	0	4	6	5
23	1-	0+	1o	0o	2+	2o	1o	1o	2131	1101	5	2	7	1	17	15	7	6	8
24	2o	2+	1-	1+	0+	0o	0o	0+	2441	2102	15	18	4	9	3	1	0	3	7
25	1-	2-	2o	2-	3o	3o	3-	2+	2331	2321	4	12	15	12	33	28	24	17	18
26	3o	3o	4o	4-	3+	4+	6-	6-	1333	2444	29	31	58	46	37	62	144	142	69
27	5o	4o	2+	2o	2+	3+	5-	3+	5424	1243	97	53	20	16	18	38	82	37	45
28	3-	3-	2o	4o	2+	4-	4+	5-	4216	1354	21	21	15	54	19	48	66	76	40
29	3+	4-	4-	5-	4-	5-	5-	4-	5433	2642	35	45	47	76	41	86	82	41	57
30	5o	4o	4o	4o	4o	2+	2o	3+	4375	4134	92	56	51	52	53	17	16	36	47
31	3o	3+	2o	2-	2o	2+	3+	2+	2113	2443	28	34	14	12	16	20	40	18	23
											Monthly mean value of As								22.3

an , as INDICES 1988 (continued)

APRIL 1988																				
	Kn								σn		an									An
1	2o	2o	2+	2+	3-	3-	3+	3o	5333	3243	14	16	19	20	22	25	34	33		23
2	3-	3+	3+	4+	4-	3-	3-	3-	3234	5433	21	35	38	66	49	21	25	21		35
3	3-	2+	4o	4-	2-	4o	7o	4+	2443	3452	21	19	53	50	11	56	282	65		70
4	4o	4o	5-	6-	6o	5+	6o	4-	5444	6463	53	60	72	136	148	120	173	47		101
5	4+	3o	3o	2o	2o	1+	4-	5-	3131	2246	65	31	32	16	15	10	42	81		37
6	5o	5o	4+	5o	4-	4+	3-	2+	5742	2332	92	88	68	91	46	63	22	19		61
7	2-	3+	4-	3-	3-	3o	3-	2o	2322	2333	11	35	42	25	23	30	26	14		26
8	1+	1-	2-	1-	2o	3o	2+	2o	2222	3233	10	4	12	5	15	29	17	14		13
9	4-	2-	2-	3-	2o	2o	2-	2+	2223	0152	47	11	12	24	15	16	11	19		19
10	1+	2o	3+	4-	4-	3o	2+	3-	1123	2412	8	16	39	48	47	27	17	22		28
11	3-	2+	2-	2-	3-	3o	2-	2-	3232	2322	21	17	12	11	25	30	11	11		17
12	2+	2o	2-	3-	3+	3+	3-	2o	3123	2231	20	16	11	26	39	38	23	16		24
13	2o	2o	2-	2+	2+	2-	2+	3o	1113	1224	15	16	11	20	20	13	17	30		18
14	2-	3-	2+	2o	3-	1+	2+	2+	3212	3143	13	21	17	15	22	8	19	19		17
15	1+	1o	1-	1+	2+	2o	2-	2-	2112	2112	8	7	5	9	20	14	13	13		11
16	2-	1-	2-	1+	2+	2+	1+	1+	2213	1313	11	4	13	10	18	17	8	8		11
17	1+	1o	2o	1o	1-	2o	1o	2o	2112	3121	9	6	14	6	5	14	7	16		10
18	2-	2o	2+	2-	2-	2-	1+	2-	4212	2322	11	15	20	12	11	11	10	12		13
19	2o	3+	3-	3o	3-	2+	2-	2-	3231	2322	16	37	26	32	26	18	12	11		22
20	0+	0o	2-	1o	2-	3o	3o	3-	3121	2312	3	1	11	7	12	31	27	22		14
21	2-	1+	2o	2-	2o	2o	1o	3o	3233	0211	11	9	15	11	15	14	7	33		14
22	4-	5-	4+	5-	4o	5o	4+	4o	2335	0021	44	76	64	80	54	92	62	60		67
23	5o	4o	4-	3-	3o	2o	2+	2+	3133	3135	88	57	47	26	32	14	19	19		38
24	1+	1o	2-	1+	1+	1+	3-	2+	3222	1234	10	7	13	8	8	10	21	19		12
25	1-	1-	1-	2o	2o	3-	2+	2-	3321	2133	5	4	5	14	14	22	19	12		12
26	2-	2+	2-	1+	2-	1o	1+	1+	5332	2213	12	19	12	9	11	7	8	8		11
27	1+	2-	1-	1-	2-	2-	3-	3-	2321	2221	8	13	4	5	11	13	25	26		13
28	2+	3-	2+	4-	3o	2o	3-	2+	3317	0224	18	25	18	41	29	15	24	18		24
29	3-	2-	3o	2o	1-	0+	0+	1+	3231	2232	22	13	32	14	4	3	3	9		13
30	2-	2o	3o	3-	2-	1+	2-	3-	3243	2122	11	15	30	24	11	8	12	22		17
											Monthly mean value of An									26.4

APRIL 1988																				
	Ks								σs		as									As
1	2o	2o	3o	2+	2o	3-	3+	4-	4543	2214	14	15	27	20	16	26	39	44		25
2	2+	3o	3+	4+	4-	3-	2+	3-	3334	3222	20	29	38	61	46	21	20	22		32
3	3-	2o	4-	4+	1+	4-	8-	4o	4424	1232	25	16	42	65	9	49	352	51		76
4	3+	4-	4-	5o	5+	6-	6-	4-	3421	5643	40	49	46	94	111	143	143	43		84
5	5-	3o	3o	2-	1o	1+	3+	5-	3112	0534	77	30	28	11	7	8	39	77		35
6	6-	5-	4-	5-	3+	4-	3o	2-	9533	1332	124	78	47	86	36	41	27	12		56
7	2-	3+	3o	2+	2o	3-	2o	2-	2321	2122	13	40	33	17	16	24	16	11		21
8	2-	1-	1o	0+	1+	3-	2-	1o	2221	2241	11	5	7	2	9	25	12	6		10
9	3+	1+	1+	2+	2-	2o	1-	2o	2213	1231	39	9	8	18	12	16	5	14		15
10	1+	2+	3o	3+	3+	2o	1+	2+	4132	3113	8	17	33	36	38	14	9	20		22
11	2+	2o	1+	1o	2-	3o	2-	1+	3212	2131	19	16	8	6	13	29	12	8		14
12	3-	2+	2-	3-	3o	3-	2+	2-	5123	3313	22	17	11	22	27	26	19	13		20
13	1+	2o	1+	1+	2-	1o	2-	3+	2112	4313	9	14	10	10	12	7	11	38		14
14	2-	2+	1+	2-	2+	0+	1+	1+	2212	4222	13	19	10	11	18	3	9	9		12
15	1-	0+	0o	0+	2+	1o	1-	1+	2211	5421	5	3	1	2	18	7	5	9		6
16	1+	0+	1+	1-	2+	2o	1-	0o	2211	3421	9	3	10	5	20	16	4	1		9
17	1o	1o	2o	0o	0o	1o	0+	2o	0221	0213	7	7	15	1	0	7	2	16		7
18	2-	2+	3-	1o	1-	0+	1-	1+	3540	2122	12	18	24	7	4	2	4	8		10
19	2-	3+	3o	2+	2o	2-	1o	1-	2211	1202	13	34	27	19	15	13	7	5		17
20	0o	0o	1+	1-	1o	3o	2o	2+	3234	3423	1	1	8	5	7	29	16	19		11
21	1+	1+	2o	1-	1o	0+	1-	3o	3231	1023	9	10	14	5	6	3	4	32		10
22	4o	5o	4+	4o	4o	5-	4o	4+	4544	3213	54	95	70	60	51	82	56	65		67
23	5o	4+	3+	2+	2+	1o	2o	2-	4421	1343	102	63	39	18	17	7	14	11		34
24	1+	1o	1o	1o	1-	1-	3-	1+	2211	3244	9	6	6	6	4	4	21	10		8
25	0+	0+	0+	1+	1o	2+	2+	1+	2122	4342	3	2	3	10	7	17	20	9		9
26	1+	2+	1+	1-	1-	0+	0o	1-	4313	2213	10	19	8	4	4	2	1	5		7
27	1-	1+	0+	0+	1o	1+	2-	3-	3313	4322	4	9	2	3	6	8	13	21		8
28	2+	3o	3-	3+	2+	2-	2o	2+	3123	3224	17	29	22	34	17	11	16	18		21
29	3-	1+	3-	2-	0o	0o	0o	0+	5332	0002	22	9	21	13	0	0	0	2		8
30	1+	2o	3-	2o	0+	0o	1-	2-	3321	3133	10	15	22	15	3	1	5	13		11
											Monthly mean value of As									22.6

	MAY	1988																	
	Kn								σ n		an								An
1	1+	2-	1+	2-	1+	1+	1o	2o	3322	3332	10	11	10	11	10	9	7	14	10
2	1-	1+	2-	2-	2o	2o	2o	3-	2331	3132	5	10	13	13	15	16	14	24	14
3	1+	2-	2o	1+	1+	2-	3-	2+	1242	3332	8	11	16	10	10	12	21	20	14
4	3o	3+	3-	2+	3o	2+	3+	2o	5423	2324	32	35	23	18	27	18	37	16	26
5	1+	1o	3-	4+	3+	2o	2+	5o	3424	2234	8	7	23	62	39	16	19	87	33
6	5+	6-	6+	6o	5+	6-	4+	4-	3328	6313	110	126	183	158	116	137	64	46	118
7	2-	2-	2o	3-	3+	3-	3o	3o	4204	3223	13	11	15	25	35	24	27	32	23
8	3-	2+	2o	2+	3+	4-	3-	3o	2312	2222	21	18	16	20	39	44	25	30	27
9	2-	2o	3+	3-	2+	2+	2+	2o	2342	2310	12	14	35	25	19	18	17	15	19
10	3+	3o	3-	3-	2+	3-	2o	2+	3212	2311	35	27	25	22	18	24	16	17	23
11	2o	2o	2+	2o	2o	2o	1+	1+	3222	1412	14	15	20	15	14	15	8	9	14
12	2+	2-	1+	1+	1+	1+	1-	1+	5233	3433	18	11	10	10	8	9	5	10	10
13	1+	1+	1o	2-	2o	2-	1o	1-	3313	3221	10	9	6	11	16	12	7	5	10
14	1o	1-	1+	1+	1+	1o	1o	1-	1323	1221	6	4	8	10	9	7	6	5	7
15	1+	3o	2-	2-	1+	1o	1o	2o	4033	4231	9	29	12	12	9	7	6	16	13
16	2-	3o	3-	3o	3o	4-	1+	2-	2232	2122	12	29	24	29	29	47	9	13	24
17	2-	4o	3+	4-	5-	3+	3o	3+	2622	3211	12	57	38	47	74	38	33	37	42
18	4o	3o	3o	3o	3+	2-	2-	3o	2323	2321	55	28	29	33	37	13	13	28	30
19	3-	2o	2o	2+	2-	2-	1+	1o	3112	1113	22	15	16	18	13	12	8	7	14
20	2o	2-	1+	1+	2o	1+	3-	2+	3333	1232	14	13	8	8	14	10	21	18	13
21	2-	2+	3o	2-	2o	2+	2+	4-	2242	4333	11	20	30	11	15	18	17	41	20
22	3o	3-	2o	2-	2-	2o	1o	1o	5412	2331	30	25	16	11	13	15	7	6	15
23	2-	2-	1+	1+	2-	2-	2o	3-	2122	2303	12	11	8	8	12	13	15	23	13
24	2-	2+	3-	2+	3o	2+	2+	2-	1532	1131	12	18	24	18	31	17	17	11	19
25	1+	1o	2-	1+	1+	2-	3-	3o	2121	3231	10	7	12	10	10	11	22	33	14
26	3-	4-	2-	1o	1+	2+	1o	0+	2313	1413	23	45	12	6	8	17	6	3	15
27	0+	1-	1-	1o	1+	1-	1o	1o	2331	3432	3	5	4	7	10	5	7	7	6
28	1o	1+	1-	1-	1o	1+	1+	1+	2312	1233	6	9	5	5	7	10	10	8	8
29	1o	2o	2o	2+	3-	3-	2-	2o	1323	2332	7	16	14	19	26	22	11	15	16
30	2-	3+	4-	2o	2-	2o	3o	3+	3331	2342	12	35	43	16	12	14	31	36	25
31	3o	2o	2o	3o	2+	2+	2o	2o	2333	2230	31	14	14	33	20	20	14	15	20
											Monthly mean value of An								21.1

	MAY	1988																	
	Ks								σ s		as								As
1	1o	1+	1+	1+	1-	0+	0+	1+	0313	2112	7	9	9	9	5	2	2	8	6
2	0+	1+	2-	1+	2+	2o	2-	3-	1522	4214	2	10	11	10	17	16	12	26	13
3	1o	1+	1+	1o	1o	1+	3o	2+	2112	3221	7	8	8	7	6	10	29	19	12
4	3o	4-	3-	2-	2o	2-	3o	2-	6543	2244	31	43	22	13	14	11	32	13	22
5	1-	1-	2+	4-	3o	1+	2-	5-	2434	2235	5	5	18	47	31	8	13	82	26
6	5o	5o	6+	7-	6-	6o	4+	4-	4323	2645	96	101	177	209	142	167	66	48	126
7	1+	1o	1+	2-	3o	2-	3o	3+	2323	5333	9	7	8	13	28	12	29	36	18
8	2+	2o	2-	2o	3o	3+	2o	3-	1222	3214	17	15	13	15	31	38	14	23	21
9	1+	1+	3-	3-	2o	2-	1+	1+	3342	0221	10	10	24	23	16	12	9	8	14
10	2+	3-	3-	2+	2-	2+	1o	2-	3221	2332	19	23	25	17	13	17	7	13	17
11	1+	1+	1+	2-	1+	1+	1o	0+	3323	1121	9	9	9	12	10	8	7	2	8
12	2+	1o	1-	0o	0+	1-	0o	1+	4421	2311	17	7	5	1	2	5	1	8	6
13	1o	1o	0o	1o	1o	1-	0+	0o	3131	3311	6	6	1	6	6	5	2	1	4
14	0o	0o	0+	1o	1-	0+	0+	0o	0125	2120	0	1	2	6	4	2	3	0	2
15	1-	3o	1+	0+	0o	0+	0+	1+	1242	1122	5	27	10	2	1	2	2	8	7
16	1o	3-	2+	3o	3o	3+	0+	2-	2445	3122	6	24	17	32	28	40	2	11	20
17	1+	4-	3+	4o	5-	3o	3+	3o	2324	2343	10	41	35	52	78	28	38	29	39
18	5o	2+	3-	3o	3+	1+	1-	3o	4134	6322	92	20	21	33	36	8	5	29	31
19	3-	1+	2-	2-	1o	1+	1-	0o	2223	2331	21	8	11	13	7	9	4	1	9
20	2o	2o	1o	1-	0+	0+	1+	1+	2123	2232	16	14	6	4	3	3	10	9	8
21	1o	2+	3-	1o	2-	2-	1+	3o	2152	3222	6	17	26	6	12	13	10	29	15
22	3o	3-	2o	1+	2+	1+	0+	0o	3241	4321	28	23	15	8	17	10	3	1	13
23	1+	2-	0+	0+	1-	1o	1+	3-	2421	2222	8	12	3	2	5	6	10	25	9
24	1+	2+	2o	1+	3-	1+	2-	1-	2411	4431	9	17	15	10	23	8	13	5	13
25	1+	1-	1-	1-	1-	1-	2-	3o	2232	4223	9	4	4	5	4	5	13	27	9
26	2o	3+	1+	0+	0+	1+	0o	0o	2412	1211	16	37	8	2	2	10	1	1	10
27	0o	1-	0o	0o	0o	0o	0o	1-	1201	2011	1	4	0	1	1	0	1	4	2
28	0+	1o	0o	0o	0o	0+	0+	0o	2110	1120	3	7	1	0	1	2	2	0	2
29	0o	1+	2-	2-	1+	1+	1-	1+	1132	1231	1	8	12	11	10	8	4	9	8
30	1o	3o	3-	1+	0+	0+	2-	3-	3132	2122	6	29	25	10	3	2	13	21	14
31	2o	1o	1+	2o	1+	1o	1o	1o	3323	2432	14	7	8	14	10	6	7	7	9
											Monthly mean value of As								16.5

JUNE 1988																		
	Kn								σn		an							An
1	1o	1+	2o	2o	2o	2+	2+	2-	0341	3222	6	8	14	16	14	17	18	11	13
2	2o	2o	1+	1+	1+	1+	2o	2o	1321	3234	14	14	8	9	10	10	14	15	12
3	1-	0+	1o	1+	1-	1+	1-	0+	3211	2132	4	2	6	8	5	8	4	3	5
4	1-	1-	1-	1o	1+	1+	1+	1+	2211	2222	4	5	4	6	9	10	9	9	7
5	1o	1+	1+	2o	3o	2+	4-	3o	3424	3331	7	9	9	14	28	17	49	28	20
6	4-	3-	1+	1+	1o	1+	1+	2-	4332	3333	49	21	9	9	6	10	9	11	16
7	1-	2-	3-	2o	1+	2-	2-	3-	1211	2342	5	11	25	16	8	11	12	21	14
8	2-	3-	2+	2+	2-	2-	2-	1+	2332	3223	11	21	18	19	11	11	12	9	14
9	0+	1o	1o	2-	3-	3-	3+	2+	2313	3223	2	6	6	12	21	22	34	20	15
10	3-	3o	4-	3-	1+	2o	1+	2-	1234	2332	26	30	46	21	10	16	9	13	21
11	2o	3-	3-	2o	3-	2-	2-	1-	2331	3341	14	24	26	14	21	12	13	5	16
12	1-	1+	1o	1+	1+	1o	1-	1+	2321	2323	5	9	7	8	8	6	5	10	7
13	3-	2o	1+	1o	1+	1-	1-	2-	2222	1222	23	15	8	7	8	5	5	11	10
14	3o	4+	4o	3+	3o	3o	3o	3+	4533	2214	30	63	51	35	31	27	30	36	38
15	2+	2-	2-	1+	1o	1+	2o	3o	4523	3344	18	13	13	9	7	9	15	32	15
16	2-	2o	2+	1+	2o	1+	2-	2-	4261	1321	13	16	17	9	15	8	11	13	13
17	3-	3-	3-	2o	3o	2o	2-	3-	2331	3335	21	23	24	16	27	14	11	26	20
18	2o	2+	2o	2+	3-	4o	4-	2+	2523	3431	15	18	14	19	26	55	41	17	26
19	3-	3-	3+	4o	4-	4o	4-	3-	2211	2364	23	25	34	56	49	52	47	25	39
20	3o	4o	4-	3-	2o	1+	1o	1o	1422	1231	31	52	47	24	14	10	7	6	24
21	1o	1+	1+	2o	2+	2-	1o	2-	1330	3121	6	8	9	15	18	13	7	11	11
22	2-	3-	3o	3o	3o	2+	3-	2o	2121	1321	13	24	32	31	33	18	25	16	24
23	2o	3-	1+	2-	2+	2+	2+	3o	3224	1321	16	21	8	11	17	18	19	28	17
24	3o	4o	2+	3o	4-	4o	3+	3+	1434	2122	28	55	17	29	42	57	36	39	38
25	3o	4-	4+	4-	3-	4o	4-	4+	3222	1355	31	47	65	50	24	51	49	61	47
26	3o	2o	3+	2+	2+	3o	4+	4-	3233	2431	32	14	39	18	17	27	64	45	32
27	3+	2o	1+	2o	1o	2+	3-	2o	3221	2223	38	15	8	16	7	19	23	15	18
28	2-	3-	3o	4-	2+	2+	1+	2o	4434	3422	13	22	29	47	20	20	10	15	22
29	2-	5-	5o	3+	3+	3+	4-	4-	1341	1331	13	73	90	36	34	40	48	47	48
30	4-	4-	3o	3o	3+	4-	3+	3-	4323	2133	46	47	31	31	38	49	40	25	38
											Monthly mean value of An								21.3

JUNE 1988																		
	Ks								σs		as							As
1	1-	1-	1o	2o	1+	1o	1+	1-	1313	1123	4	5	7	14	8	7	10	5	8
2	1+	1+	1-	1-	0+	0o	1o	1-	1322	1122	8	10	5	4	2	1	6	5	5
3	0o	0o	0o	0+	0o	0+	0o	0+	0012	0202	0	0	1	3	0	3	0	2	1
4	0o	0o	0o	0o	0o	0+	0+	0+	0011	1121	0	0	1	1	1	2	3	2	1
5	1-	0+	1-	1-	2-	1-	3o	3-	2321	2243	5	3	4	5	13	5	32	24	11
6	3o	3-	1o	0o	0o	0+	0+	0+	2611	0212	32	22	7	1	0	2	2	3	9
7	0o	1o	2+	1+	0o	1-	0+	3-	1143	1324	1	7	19	10	1	5	3	24	9
8	1o	2o	2-	2+	0+	1+	1+	1o	3624	2441	6	14	12	20	2	10	8	6	10
9	0o	0+	0o	1-	2o	1+	2+	1o	1202	5223	1	2	0	4	16	10	18	6	7
10	3-	3-	3o	2o	0+	1-	0o	1o	4502	2410	24	24	32	16	2	5	1	7	14
11	1+	2+	2+	1o	1+	1+	1-	0o	2332	1410	9	19	17	7	8	10	5	0	9
12	0+	1-	0o	0+	0o	0o	0o	0+	2212	0111	3	5	1	2	0	1	1	2	2
13	2+	1+	0+	0o	0o	0o	0o	1-	4210	0012	20	10	3	0	0	0	1	4	5
14	3+	4-	4-	3o	3-	3o	3-	3o	6423	4246	35	48	48	33	22	28	23	30	33
15	3-	1+	1+	0+	0o	1-	1+	3-	6342	1324	26	8	9	2	1	5	9	25	11
16	2-	2-	1+	1-	1+	1-	1+	1+	2221	3342	11	13	9	4	10	4	9	10	9
17	3o	3-	3-	2-	2o	1+	1+	3-	3431	4413	28	23	26	13	14	8	8	21	18
18	2-	2-	2o	2+	3-	3o	2+	1+	4434	4222	13	12	14	17	25	27	18	9	17
19	3o	2o	3-	4+	3o	3+	4o	2o	3122	1452	28	15	22	61	30	34	57	14	33
20	3o	4-	4-	2+	2-	0+	0o	0o	3431	3210	27	45	43	17	13	3	1	0	19
21	0o	1o	1-	2-	1+	0+	1-	0+	1523	2222	1	6	5	11	10	3	4	3	5
22	1o	2+	2+	3-	2+	2-	2o	2-	2412	4221	7	19	20	23	20	12	15	11	16
23	2-	2+	1+	1+	1o	1+	1o	2+	3212	3323	12	18	9	8	7	8	7	18	11
24	2+	3+	1o	2o	3+	3o	3-	3o	1202	3123	18	37	7	15	35	27	26	31	25
25	3o	4-	4+	4o	2-	3+	3+	3o	5463	2122	32	49	67	52	12	36	34	27	39
26	3+	1+	3-	2-	1+	2o	4+	4-	4212	1233	34	9	21	12	8	14	61	48	26
27	3o	2o	1-	1+	0+	1+	2o	2-	2221	3202	29	14	5	8	3	8	16	12	12
28	2o	2o	3-	3o	1o	1o	1o	1+	3533	1332	15	16	21	29	6	7	6	10	14
29	1+	4+	4+	3o	4-	3+	4o	4-	2231	4325	8	61	69	28	41	38	52	44	43
30	4o	4-	3o	2+	3+	3+	3o	3-	6311	1332	51	41	29	17	39	40	33	21	34
											Monthly mean value of As								15.2

JULY 1988																		
	Kn								σ n		an								An
1	3+	3-	3-	3-	2+	2+	3o	3o	3232	2301	36	25	26	23	19	19	29	33	26
2	3o	3o	3o	2+	2-	2o	2+	2o	5222	1223	33	31	27	20	13	15	19	15	22
3	1-	2-	1+	2o	2-	2o	3-	2o	2222	2442	5	13	9	15	12	16	21	15	13
4	2-	2-	1+	1-	0+	1o	1-	0+	3122	3343	11	13	9	5	3	7	5	3	7
5	0+	1-	1-	0+	1o	2o	3-	3-	2322	2222	2	5	5	3	7	14	22	21	10
6	3o	3o	3-	2+	3-	3-	3-	2o	1122	2323	30	31	26	19	25	23	22	15	24
7	2-	2+	3o	2+	2+	2-	2+	1+	3233	3332	13	18	29	20	19	12	19	9	17
8	2o	2+	3-	2+	3o	2o	3o	2o	2323	2344	14	17	23	18	29	16	31	16	21
9	1-	1-	1-	1-	1-	1o	1-	2-	3313	2332	5	5	5	5	4	6	5	12	6
10	1+	2-	2-	2-	2o	2+	3-	2o	4332	2122	9	11	11	12	15	17	22	14	14
11	4-	4-	3+	4-	4o	3+	3o	3o	1232	1231	44	50	40	46	56	35	28	28	41
12	2+	3+	4-	3o	3+	3o	3o	3o	2331	3120	19	37	41	33	35	28	30	29	32
13	2o	2-	1+	1+	1+	1+	2o	2+	2221	1333	14	11	8	8	8	10	14	20	12
14	3-	3-	2+	1+	2-	2o	2-	2o	2322	2413	25	26	18	10	11	15	13	15	17
15	3-	2+	2-	2o	2+	3+	3o	3o	3533	2431	21	20	12	15	20	35	33	31	23
16	3-	3o	4o	4+	5-	3-	3-	3-	2234	4312	25	31	59	66	82	23	26	22	42
17	2-	2o	1+	2-	3-	2+	2-	2o	2523	2323	11	15	10	13	25	17	12	16	15
18	1o	3o	3o	3o	2o	2+	2-	2o	2421	1334	7	29	29	27	16	18	11	16	19
19	2-	1+	3-	3+	3-	2-	2o	2-	2133	2342	13	9	26	37	25	11	16	12	19
20	1o	1+	1+	1o	1o	1+	1+	1+	1221	1332	7	8	10	7	6	9	9	10	8
21	1o	3o	5-	5o	4o	3o	2+	2o	2124	4121	7	33	84	90	52	31	20	16	42
22	4o	4o	3o	3+	3-	4-	4-	4-	1312	2432	57	57	27	37	24	43	45	42	42
23	3-	3+	3+	3+	2o	1o	1o	2-	3332	2222	24	35	39	35	15	7	6	12	22
24	2o	2+	2o	2o	2-	2-	2-	2+	1221	2232	15	20	16	16	13	11	12	19	15
25	2-	2o	1o	1+	2-	1+	2o	2o	2412	2212	13	16	7	9	11	10	16	14	12
26	3-	2+	2+	3o	3o	3+	3o	4-	5545	4646	22	19	20	32	27	37	27	43	28
27	3+	3o	3+	2o	2+	1+	2-	2+	5123	3223	39	31	39	14	17	10	13	19	23
28	2o	2-	1+	2-	2o	3-	3+	3+	2223	1133	16	11	9	13	14	26	34	35	20
29	2-	1o	1+	1+	1+	1+	3-	3+	2222	3123	12	7	8	8	8	8	21	36	14
30	2+	2o	2+	1o	1o	2-	1+	2o	1332	2333	17	15	17	7	7	11	10	16	13
31	1+	3-	3o	2o	2-	2o	2+	3-	1221	2314	8	25	28	16	13	15	17	21	18
											Monthly mean value of An								20.5

JULY 1988																		
	Ks								σ s		as								As
1	3o	3-	3-	3-	2o	2o	3+	3-	3232	1122	32	21	24	21	14	14	36	22	23
2	3-	3-	2+	2o	1o	1o	3-	1+	4222	1041	24	22	19	16	7	7	22	8	16
3	1-	2o	1o	1+	1+	2-	2-	2-	1512	3212	4	15	6	10	9	12	12	11	10
4	2+	3-	1-	0o	0o	0o	0o	0o	5311	1011	17	22	4	1	1	0	1	1	6
5	0o	0o	0o	0o	0o	1o	1+	1+	1000	0332	1	0	0	0	0	7	10	9	3
6	2o	3-	2+	2+	2o	2o	3-	1+	3234	1231	16	22	17	18	14	16	21	10	17
7	1+	2+	3-	3-	2-	1-	3-	1o	3454	2232	9	17	26	21	11	5	23	7	15
8	2-	1+	3-	2+	4-	1+	3-	1+	2445	2324	11	9	24	18	41	9	25	10	18
9	1+	0o	0o	0o	0o	0o	0o	1-	4010	0001	8	0	1	0	0	0	0	4	2
10	1o	1+	1o	1o	1o	1+	1+	1o	3431	3221	6	8	6	6	6	10	10	7	7
11	3o	3+	4-	3o	4o	3o	3-	2+	3550	4134	29	39	43	32	53	29	21	19	33
12	3o	4-	3+	3o	3+	2+	3o	3o	6212	4345	30	44	39	31	36	20	33	31	33
13	2o	1+	0+	0o	0o	0+	0+	2-	4323	0111	15	9	3	1	0	2	2	13	6
14	4-	3+	2o	1-	1-	1-	2+	2-	6613	3232	42	40	15	5	4	5	17	13	18
15	3-	3-	1+	1+	2+	3+	3+	2o	5612	4323	24	21	8	10	17	37	40	15	22
16	2+	3-	4-	3+	4o	2+	2+	3o	3232	3124	20	21	47	37	59	17	19	27	31
17	1o	1+	1o	1o	3-	2o	1-	2-	1322	4323	6	8	6	7	22	15	5	13	10
18	0+	3-	3-	4-	1+	2o	1+	1o	3533	2311	3	22	25	41	9	14	8	7	16
19	2-	1o	2+	3-	2o	1-	1o	1-	2332	4222	12	6	20	22	15	4	6	4	11
20	0+	0+	1-	1-	0o	0+	0o	0+	2121	1011	3	2	5	4	1	3	1	2	3
21	1-	3o	5-	4+	4-	3-	2o	1+	1331	3222	4	29	75	64	44	26	15	10	33
22	4+	4o	3o	3+	3o	4-	4-	4o	3334	3223	69	58	27	34	32	42	46	54	45
23	3+	3+	4-	3o	1+	0+	0+	1o	1563	4212	36	40	44	31	9	3	2	6	21
24	1+	2-	2+	2-	0+	1o	1+	2o	2313	1314	8	11	17	11	2	7	8	16	10
25	1+	1+	0+	1-	1-	1-	1o	1-	1323	2232	8	9	2	5	5	5	7	5	6
26	2o	2+	3-	3+	3-	3o	3+	4-	1344	2224	14	18	24	40	21	29	36	45	28
27	4-	4-	4-	2o	1+	1+	1o	2-	4432	3322	41	42	42	15	10	9	6	13	22
28	2+	1+	1-	1o	1+	3-	3+	3o	3132	2351	19	8	5	7	9	23	39	29	17
29	2+	1-	1o	1-	0+	0+	2o	3o	3232	1242	17	4	6	4	2	3	14	31	10
30	2o	2-	1+	0o	0o	1-	1-	2-	2131	1424	14	13	9	1	1	4	5	13	8
31	1o	2+	3-	2o	1o	0+	1+	2o	3333	2122	7	19	24	14	7	2	9	15	12
											Monthly mean value of As								16.5

AUGUST 1988																				
	Kn								σn		an									An
1	3-	2+	3-	1+	2-	2-	2+	2-	2231	2233	21	20	21	8	11	12	19	11		15
2	2-	2o	1o	1+	1+	1+	2o	2-	3221	2222	12	15	7	8	9	10	14	11		11
3	1+	3-	2+	2o	2-	2o	1o	1o	3334	2423	10	22	17	16	12	14	6	6		13
4	1o	1o	1-	0+	1-	1o	1o	1o	1320	1121	7	6	4	3	4	7	6	6		5
5	1-	1o	2-	1o	2+	2+	2o	3o	3331	1342	5	7	11	6	20	20	16	27		14
6	2o	2o	3+	1-	1o	1o	1+	2o	2323	1113	15	15	39	5	7	7	8	14		14
7	2o	2-	1+	2-	2-	1+	1+	1o	3333	3132	14	13	10	12	11	8	10	7		11
8	0+	0+	1o	2-	1o	1-	2-	2-	2212	1323	2	2	7	12	6	5	13	13		8
9	2-	3-	2+	3-	3+	3-	4-	3+	3133	3332	13	22	19	26	40	24	41	39		28
10	2+	2-	1+	2-	1o	2-	3o	3o	3223	2242	17	12	10	13	7	12	27	27		16
11	2-	2-	2+	3+	3-	2-	2+	3-	2414	3143	13	13	18	39	22	12	17	23		20
12	3o	3-	3-	3o	4o	3+	3-	3+	2222	3223	31	25	21	27	57	40	24	36		33
13	3o	3+	3-	3+	3o	3o	3o	3-	4223	1133	31	40	24	35	33	33	27	25		31
14	4o	3o	4o	4-	3o	4-	2o	2o	5123	1104	51	32	52	43	31	49	15	16		36
15	2o	3o	4+	4-	3+	3+	3-	2o	3433	3321	16	31	70	48	39	37	25	15		35
16	2+	2+	3+	2+	2o	2o	2+	1+	3342	1232	18	18	34	18	15	14	18	10		18
17	1+	1+	2o	2-	1o	1-	1o	1+	1321	1333	8	10	14	13	7	5	7	10		9
18	2-	3o	2o	3-	2+	2+	2-	1+	1456	3323	11	31	16	26	17	18	11	9		17
19	2-	2-	2-	2+	2o	3o	2o	2+	2322	0114	12	11	12	18	15	28	14	17		16
20	2+	3-	2+	3-	5-	3+	3o	2o	5403	1222	17	21	19	22	83	38	28	15		30
21	1+	2-	2+	1+	1+	1-	1o	4-	2222	1225	10	13	17	8	8	4	6	48		14
22	5-	5o	3o	2o	2+	2-	2+	2-	1233	2323	77	93	31	14	18	11	20	11		34
23	3-	2o	2+	1+	2o	3-	3o	3o	3322	1311	23	14	20	10	16	24	28	32		21
24	2-	2o	2o	3-	2+	3-	3o	3o	2123	3221	12	16	15	25	19	24	30	33		22
25	2-	2+	3o	4o	3+	3o	2+	2-	2213	2042	11	20	28	58	38	29	20	13		27
26	2+	3o	2-	1+	3-	2+	2o	3o	2222	3210	18	27	13	8	25	19	14	29		19
27	3o	3o	3-	3o	2+	3-	3o	2+	3123	2231	33	28	22	29	18	26	27	17		25
28	1+	2o	3-	2+	2o	2-	2+	3o	2233	1222	10	14	24	17	16	13	18	31		18
29	3o	2+	3o	3+	2-	3-	2-	3-	1311	2221	31	20	28	34	13	25	13	24		24
30	3o	3+	4-	2o	1+	2+	2+	2+	1243	3232	30	35	45	15	8	18	19	20		24
31	3-	2o	1o	1+	2o	4o	3o	3o	4111	4411	23	14	7	8	16	58	28	31		23
											Monthly mean value of An									20.4

AUGUST 1988																				
	Ks								σs		as									As
1	3-	2+	2o	1-	0+	1-	2+	1o	4311	2241	25	19	15	4	2	5	17	7		12
2	2o	2-	0+	0o	1-	0o	2o	1+	2321	2132	14	12	2	1	4	1	15	8		7
3	2o	3-	2+	2-	1+	0+	0o	0+	3342	4211	14	24	18	12	9	3	1	2		10
4	1o	1-	0+	0o	0o	0o	0o	1-	3311	1113	6	4	2	1	1	1	1	4		3
5	0+	0+	1+	1o	2+	3-	1o	2+	2231	3403	3	3	9	6	20	24	7	18		11
6	2-	2o	3-	0o	0o	0o	0+	1+	3121	0111	12	14	23	1	0	1	2	8		8
7	2-	1+	1o	1o	0+	0+	1-	0o	3111	0420	12	10	7	6	3	3	4	0		6
8	0o	0o	0+	0+	0o	0o	1-	1o	1112	1121	1	1	3	2	1	1	4	6		2
9	2-	2+	2+	2+	2+	3-	4o	4o	2221	2355	11	18	18	18	17	23	58	58		28
10	3-	1+	1+	2-	0+	1-	3-	3o	4222	1343	25	10	9	11	2	4	23	27		14
11	2o	2o	2+	3+	3-	1+	1-	2-	1513	5432	15	15	17	37	24	9	5	13		17
12	3o	3-	2+	3-	4o	3+	2+	3+	3323	3235	30	25	20	24	52	37	20	38		31
13	3+	3o	3-	3+	4-	3o	3-	2+	5222	4122	34	30	21	37	45	30	24	18		30
14	4-	3o	4-	4o	3-	3+	1+	1+	5422	2112	50	27	42	54	22	39	10	10		32
15	2-	2+	4o	4o	3o	3+	3-	2-	1234	3232	11	19	52	58	32	40	21	13		31
16	3-	2+	3-	2o	1+	1+	2+	1-	5532	3241	24	19	25	16	9	8	17	5		15
17	1-	2-	2-	1o	1-	0o	0o	1o	3420	2111	4	11	12	7	4	1	1	6		6
18	1+	3o	2o	2+	2-	2o	1+	1-	4523	4222	9	31	16	19	12	15	8	5		14
19	2-	2-	1+	2-	2o	2o	1+	2+	3312	1233	13	12	10	12	15	15	10	19		13
20	2-	3-	3o	2+	4+	3o	3-	2-	4551	5222	13	23	29	17	69	33	24	12		28
21	2-	2-	2-	0+	1-	0o	0+	3+	2332	4101	12	11	12	3	4	1	3	39		11
22	5o	5+	3+	1+	1+	0+	2o	1o	3342	1343	89	120	36	10	9	2	15	6		36
23	3o	3-	2+	1+	2-	3o	3o	3-	4511	2442	28	21	19	9	12	29	28	24		21
24	1+	2o	2-	2+	2-	1+	3-	3o	1323	1543	9	16	12	19	11	10	26	33		17
25	1+	2+	3-	4o	4-	3o	3o	2-	1223	4161	10	18	26	54	44	27	32	13		28
26	2+	3-	2-	1o	2o	2-	1+	3-	2321	3322	20	25	11	6	15	12	10	23		15
27	3+	3+	3-	3-	2-	2o	3-	2-	2423	2222	35	36	23	24	11	15	21	12		22
28	1+	2-	2+	2o	2-	2-	2+	3o	1222	2233	10	13	20	16	11	11	18	32		16
29	3o	2+	3+	3o	1o	3-	2-	3-	4152	3223	33	17	37	31	7	21	13	22		23
30	4-	4-	4-	2-	1-	2o	2+	2+	2352	2213	46	49	44	11	4	15	17	20		26
31	3o	2+	1o	0+	1o	4o	3o	3+	6202	2133	30	18	7	3	7	54	28	38		23
											Monthly mean value of As									17.9

SEPTEMBER 1988																			
	Kn								σ n		an								An
1	4o	4o	3o	3o	4-	3-	3-	3o	3321	3232	51	54	29	31	42	23	22	30	35
2	3-	3o	2o	2-	3-	2o	3-	3o	3213	3231	23	33	16	12	26	16	21	31	22
3	3-	2+	2-	2-	2-	2-	2+	2-	4221	2123	24	19	12	13	12	12	19	13	16
4	2o	2o	2+	2o	2o	1+	2-	2o	3122	1223	14	14	19	15	16	10	13	14	14
5	2-	1+	1o	1+	1+	3-	3-	2+	2224	2999	12	10	7	10	9	23	22	19	14
6	0+	0+	0+	1o	2-	1+	2+	1o	2111	3334	2	2	2	7	11	10	18	7	7
7	1o	2-	3-	2-	1+	1-	1o	1o	2222	3303	7	11	21	11	8	4	6	6	9
8	0+	2-	1+	1+	2-	2o	3o	2+	2223	2136	3	11	9	8	11	14	28	19	13
9	1-	1+	1-	1-	1-	1-	2+	2-	2112	2422	5	8	4	5	5	5	20	13	8
10	1+	1-	1o	1+	1+	2-	2+	3o	4323	3235	10	5	7	10	8	12	20	32	13
11	3o	3o	4o	4+	5o	5-	4+	5-	4467	6766	30	27	59	64	88	75	62	78	60
12	5-	3+	4-	2-	2+	2+	3-	3-	6433	2142	72	35	42	11	20	17	22	21	30
13	2-	3+	3-	3-	3-	2+	3o	2-	1313	3353	13	37	24	24	22	18	29	13	23
14	2+	2-	3+	3o	3-	3-	2-	2-	3334	3232	17	12	39	32	26	21	13	13	22
15	3o	3-	3-	3o	3+	3+	2-	2-	4523	5412	28	21	22	27	34	39	13	12	25
16	2-	2+	2-	1+	3-	2-	1-	1-	1242	2322	11	17	13	10	26	11	5	5	12
17	2o	3o	3o	3+	4-	3-	3+	4o	5533	3331	16	29	33	37	44	23	35	51	34
18	5o	5-	3+	3o	3+	2-	4-	4+	3302	3242	89	75	38	27	36	12	42	66	48
19	4+	3+	4-	3+	3-	2+	3+	3o	5334	3333	62	35	47	39	25	19	40	33	38
20	2+	3-	2o	2o	2o	2-	3o	2+	2303	2121	18	23	15	14	15	13	29	17	18
21	3o	2o	1o	2+	3-	2-	3+	3-	1213	2242	28	14	7	19	22	13	37	25	21
22	3-	4-	4-	3o	3o	4+	2+	2+	2212	3244	21	42	48	33	29	65	19	17	34
23	3-	3-	3-	2o	3-	1+	1+	3-	4111	2222	22	26	23	14	24	9	10	21	19
24	2-	1+	2-	2+	2+	1+	2-	3-	2124	1222	11	8	12	20	17	10	12	26	15
25	3+	2o	2-	1+	2+	2+	3-	3o	3123	2243	35	14	11	9	18	19	22	33	20
26	1o	1+	2-	2o	3+	2o	1+	2o	0222	3223	6	10	12	16	39	15	10	15	15
27	2o	1+	1+	1o	1+	2o	1o	1+	1033	3742	15	9	10	6	10	14	6	9	10
28	2-	1+	1o	1o	1+	2-	2-	2-	3221	3232	12	10	7	7	8	11	11	13	10
29	1o	1o	1+	1o	1+	2-	1o	0+	1112	4733	7	7	8	7	8	11	6	3	7
30	0+	1-	2+	2-	2+	3-	3o	3-	2313	2323	3	5	17	12	20	22	30	22	16
											Monthly mean value of An								20.9

SEPTEMBER 1988																			
	Ks								σ s		as								As
1	4+	4o	3+	3-	3o	3-	2+	3-	5351	3322	63	51	34	25	32	24	18	26	34
2	3o	3+	2o	2o	3-	3-	2+	3o	3324	2321	32	36	16	14	23	21	19	29	24
3	3-	3-	1+	1o	1o	1o	3-	2o	5221	0324	23	23	9	6	7	7	21	14	14
4	3-	2-	2+	2o	2o	1-	1o	2o	2212	1103	21	13	17	14	14	5	7	14	13
5	2o	1+	0o	1+	0+	0o	0o	0o	2113	2110	15	10	1	8	3	1	1	0	5
6	0+	0o	0o	1-	1o	1o	2o	0+	1102	1312	2	1	0	4	6	6	14	3	5
7	1o	2-	2-	1+	0+	0o	1-	0o	3343	2130	7	11	13	9	3	1	5	0	6
8	0+	1+	1o	1o	1-	2-	3-	2o	1121	4223	2	9	7	6	4	11	24	14	10
9	0+	1+	0+	0+	0+	0o	3-	2-	1122	3134	2	8	3	2	2	1	21	13	7
10	1+	0+	1o	1o	0+	1+	3-	4-	4114	2438	10	2	6	7	3	9	24	50	14
11	3o	3o	4+	4+	5+	5o	4+	5o	5144	4435	33	29	62	67	111	99	69	90	70
12	5+	4-	3o	1+	2+	2o	3-	2+	3333	2142	113	42	31	8	17	15	21	18	33
13	2-	3-	3-	2+	2-	2o	3-	1o	1454	2233	11	25	22	17	12	14	24	7	17
14	3-	2o	3-	3-	3-	2+	2-	2-	4134	4232	21	15	25	25	25	19	11	11	19
15	3-	2o	2+	2+	2+	3o	1+	1+	5345	3322	23	14	20	17	20	29	8	10	18
16	2-	2+	2o	1+	2o	1o	0o	0+	2371	1302	12	18	14	10	15	6	0	3	10
17	2+	3o	3o	3o	3+	2+	3o	4o	2631	1144	17	29	29	29	34	17	32	51	30
18	5-	5o	3+	3-	3o	1o	3+	5-	3242	1244	84	88	37	25	30	6	37	85	49
19	4+	4-	4-	3+	3o	2+	3+	4-	3342	3154	65	49	45	37	27	17	37	43	40
20	3-	3-	2+	2+	2-	1+	3o	2+	3333	4231	22	22	19	20	11	8	27	18	18
21	3-	2-	1+	3-	2o	1-	4-	2+	1133	2233	24	12	8	24	16	4	45	18	19
22	3o	3o	3+	3+	2+	4-	1+	1+	6242	3521	30	32	36	40	20	46	10	8	28
23	2+	2+	2+	1o	2+	1+	1+	2+	3330	2431	19	19	19	7	18	8	10	18	15
24	1+	1+	1+	2+	2-	1-	2o	2+	2231	2311	10	10	9	18	12	5	15	19	12
25	3+	2+	1+	1-	2o	2+	3-	3+	4113	2232	40	19	8	5	16	20	24	34	21
26	1-	1+	2-	2o	3+	1+	1-	1+	3123	4321	5	8	13	14	36	9	4	10	12
27	2o	1o	1o	0+	0+	1-	1-	1+	1011	1421	15	7	6	2	3	4	4	8	6
28	2-	1+	1+	1o	1-	1o	1+	1+	1310	2324	13	9	9	7	4	7	9	8	8
29	1o	1o	1o	1+	1-	0o	0o	0o	0321	2111	7	7	7	8	4	1	1	1	5
30	0+	1-	2+	2-	2+	2+	3-	2+	2323	4423	2	5	17	11	18	17	23	19	14
											Monthly mean value of As								19.2

OCTOBER 1988																		
	Kn								σ n		an							An
1	3o	2o	2+	2-	2o	2o	3-	3o	1232	4131	28	14	17	12	16	16	23	28	19
2	2+	1+	1+	1-	2-	1o	1-	1o	4333	4315	17	10	9	4	11	6	5	6	9
3	0o	0+	0+	0+	0+	2-	1+	1+	2121	3635	1	2	3	2	3	11	10	8	5
4	0+	1-	1+	1o	1+	1+	3-	4-	1221	1232	2	5	9	7	8	8	24	50	14
5	4o	4-	3o	3o	3-	3o	3-	3-	2312	3031	56	50	31	31	24	29	21	25	34
6	4+	3+	4-	4-	4+	5-	5o	3+	2222	2455	63	37	48	48	70	82	98	36	60
7	2o	2o	2-	1+	2o	2-	2-	2-	2321	2224	15	14	11	8	14	12	11	13	12
8	1+	1+	1o	1+	3-	3-	3-	2-	4213	2223	9	9	7	8	23	23	23	12	14
9	2o	2+	3-	3o	4-	4-	4o	3o	3222	3477	16	18	22	28	44	44	51	32	32
10	4-	3+	5o	7o	6+	5+	5o	4+	3322	3436	44	35	96	250	198	115	100	69	113
11	4o	3o	2+	4-	3-	2+	1+	2o	6425	4332	54	29	18	45	25	17	10	14	27
12	2+	2-	2+	2-	1o	1+	2-	1-	4232	2112	19	13	19	11	7	8	13	5	12
13	2-	2+	2-	2o	2-	1o	2-	1+	2323	4234	11	17	12	15	11	7	11	10	12
14	2-	2-	2-	1+	2o	2o	1-	1o	2322	1231	12	11	11	9	16	15	5	6	11
15	0o	0+	1+	1+	3o	3o	2o	2-	1212	3212	1	3	8	9	29	29	14	12	13
16	2+	2+	2-	1+	1+	3-	3+	2+	4123	1242	17	17	13	9	8	26	37	19	18
17	2+	2o	2o	2+	3-	3-	3+	4o	3013	3221	18	15	16	18	21	21	40	51	25
18	4-	3-	3o	4+	4o	5-	4-	4-	2212	3233	47	23	28	63	55	73	46	46	48
19	3-	3-	2o	3o	2+	3-	3-	2o	1311	3232	24	24	16	31	19	23	24	15	22
20	3-	3+	3o	2+	2+	4o	3o	3-	2213	4323	22	35	33	18	20	53	27	25	29
21	2+	2o	2-	1o	1+	1o	1+	2+	3142	3233	19	15	13	7	10	7	8	19	12
22	1+	1-	0+	0o	1-	1+	0+	1-	3111	1123	8	5	2	1	4	8	2	5	4
23	1o	1+	2o	1+	2+	2-	2-	1+	4323	3314	7	8	14	10	17	13	13	8	11
24	2o	2-	1+	1+	1o	1+	1o	2o	3233	2111	14	12	8	9	7	8	7	16	10
25	2-	1+	1o	1-	0+	1o	1-	1o	3223	3112	11	10	6	4	3	7	5	7	7
26	1-	1+	2o	1+	2o	2o	3-	2+	1222	2322	5	9	14	9	15	16	21	19	14
27	1o	2-	2-	2+	2-	2o	3o	2o	0121	3141	6	11	11	17	12	14	30	15	15
28	2+	2o	2+	2+	2-	1+	1-	1+	2422	2233	19	16	20	19	12	10	5	8	14
29	1+	1+	0+	1-	1o	0+	0o	0+	3522	2312	10	9	2	4	6	3	1	2	5
30	0+	1-	0o	0o	0o	0+	3o	3-	3211	1312	3	4	1	1	1	3	32	25	9
31	2-	2-	3+	4-	2+	2+	2o	2o	2254	1112	12	13	39	44	18	17	14	16	22
											Monthly mean value of An								21.0

OCTOBER 1988																		
	Ks								σ s		as							As
1	3+	3-	1+	2-	2o	1+	3-	3-	1222	3222	38	21	9	13	16	10	23	26	20
2	2o	1+	1o	1-	2-	0o	0+	1-	2132	3132	15	10	6	4	11	1	2	4	7
3	1-	0+	0o	0o	0o	1+	1+	1+	2111	0724	4	2	1	1	0	10	10	8	5
4	0+	0+	1+	1-	1-	0+	3o	4o	1122	2214	2	2	9	5	4	3	29	53	13
5	4o	4-	3o	3o	3o	3o	3-	3-	3221	1322	54	45	32	33	27	29	25	21	33
6	4+	3+	4o	4+	4+	6-	5+	3-	4231	2341	65	37	59	61	64	124	109	25	68
7	2+	2o	2-	1o	2-	1o	2-	2-	3122	2224	17	14	13	6	13	7	13	13	12
8	1o	1+	1o	1o	2+	2+	3-	1o	2411	2420	7	8	6	7	17	17	23	7	12
9	2-	2o	2+	3-	3+	3+	3o	2+	3353	5543	12	15	19	23	35	34	33	19	24
10	4-	4-	5+	7o	6+	5+	5+	4+	2543	1433	45	44	116	260	182	111	118	68	118
11	4-	2+	2-	3+	2o	2-	1+	2-	5224	3232	44	19	13	35	14	11	9	13	20
12	2o	2+	2-	1o	1o	1o	2-	1o	2323	1012	16	20	13	7	6	7	13	6	11
13	2o	2o	2-	2-	1o	0o	1o	1+	3333	1111	16	16	12	13	7	1	7	8	10
14	2-	2-	1o	1+	2o	2o	0+	1-	1301	4314	13	12	7	8	15	14	2	5	10
15	0+	0+	1o	1+	3-	3-	2-	2-	2212	3122	3	2	6	9	24	24	11	13	12
16	2+	3-	2o	2-	1o	3-	3+	2+	3332	0221	19	25	15	13	7	21	35	17	19
17	2+	3-	3-	2+	2+	2o	4-	4+	1223	3234	19	21	21	20	19	16	46	62	28
18	4-	3-	3o	5-	4o	4o	5-	4-	2223	1223	41	23	27	86	52	57	72	46	51
19	3o	2o	2+	3o	3-	3-	3-	2-	2212	2233	33	16	18	28	21	21	23	12	22
20	3-	3o	3o	2o	2+	3+	3o	3+	2311	3105	26	31	30	14	19	39	32	37	29
21	3-	2-	0+	1o	1o	0+	1+	2o	1320	2243	21	11	3	7	7	3	9	14	9
22	1+	0+	0+	0o	0o	1o	0+	0+	2211	0322	9	3	2	1	0	7	2	2	3
23	1-	1o	3-	1+	2-	1+	2-	1o	1121	1420	5	6	22	8	13	10	13	7	11
24	2o	1+	2-	2o	1o	1-	1+	2+	0232	2222	16	10	11	16	7	4	8	18	11
25	1+	2-	1+	1-	0o	0+	1-	1+	2122	1221	10	13	8	5	1	3	4	8	7
26	1+	2o	3-	2-	2o	2+	3-	2+	1222	1121	8	14	22	12	14	17	25	17	16
27	1+	2o	2-	2+	1+	3-	3+	2o	1421	1251	8	14	12	17	10	21	36	14	17
28	3-	2o	3-	2o	2-	1o	1o	1+	2111	1442	24	14	25	15	11	7	7	10	14
29	1+	1o	0+	1-	0+	0+	0o	0o	1223	3110	9	7	2	4	3	2	1	0	4
30	1-	0+	0o	0o	0o	0+	4-	3+	2210	0233	4	3	1	0	0	2	41	34	11
31	3-	2o	4-	4-	2o	2o	2o	2o	5142	2321	21	15	46	44	15	15	15	14	23
											Monthly mean value of As								21.0

NOVEMBER 1988																		
	Kn								σ n		an							An
1	2-	1o	1+	1+	1-	3o	2+	2+	2122	3132	11	7	9	10	5	28	19	18	13
2	4-	2-	4-	4-	4-	5-	5-	3+	5134	3453	44	13	44	46	48	77	82	39	49
3	4-	3+	4-	3+	5-	3-	4-	3o	3223	4253	45	37	42	40	81	25	48	27	43
4	2-	1+	1+	3-	3o	2o	3-	1+	2133	5241	13	8	9	23	31	15	23	8	16
5	2+	2o	3-	2+	4-	3-	2o	1o	4254	4321	19	14	23	18	44	25	15	6	21
6	1-	4-	3-	2+	3-	3-	3o	3-	1323	2353	5	41	25	20	23	21	28	23	23
7	2+	3+	2-	2+	3o	4-	4-	3+	3323	1364	19	34	12	20	33	43	41	36	30
8	3-	2+	2+	3-	3-	4-	4o	3o	4323	3445	21	17	17	22	26	44	56	27	29
9	2-	1o	2-	3+	4-	3+	2o	2+	6315	3213	11	6	11	35	41	37	15	19	22
10	3-	3-	3-	3o	4-	3-	1o	0+	5242	3222	26	21	23	28	46	21	7	3	22
11	1+	1o	2o	2-	2-	3o	4-	3+	2122	3132	8	6	14	11	11	28	45	38	20
12	3-	2o	2o	2+	4-	4o	3o	4+	4322	2004	23	14	16	19	41	54	29	61	32
13	3-	1+	2-	2o	2+	2+	2+	2o	4111	3330	25	8	13	14	19	17	18	15	16
14	2o	2+	2o	3o	3o	2o	2+	3-	2222	1323	15	17	14	31	31	16	19	21	21
15	3-	3o	2-	2+	2+	2-	2+	2+	3522	3322	21	27	12	19	20	13	19	19	19
16	1o	3-	3+	3+	2+	3o	4-	4-	2233	2133	7	23	39	39	19	33	49	42	31
17	3-	2+	3o	3o	2+	1o	2o	1+	2103	3131	25	17	29	28	18	7	14	8	18
18	1-	1+	2-	2o	3o	2+	3o	2o	1213	2351	5	8	11	15	30	18	30	14	16
19	1+	1-	1o	1-	1+	1o	1o	1+	2111	2121	10	4	7	5	8	7	7	8	7
20	1-	0+	0o	0o	1o	1+	0o	0+	2211	1212	4	3	0	1	7	10	1	3	4
21	2-	1+	2-	1-	1-	1o	2-	2o	2222	2132	12	10	11	4	4	6	11	15	9
22	1o	1-	2o	1+	1+	1o	1o	1-	4344	1112	7	4	14	9	8	6	7	4	7
23	0+	1+	1+	1-	1-	0o	0+	1+	2312	2231	2	9	8	4	4	1	3	8	5
24	2-	1o	1o	0o	0+	1-	1o	1-	1421	1311	13	6	6	1	2	4	7	5	6
25	1+	1-	1o	1-	2-	1+	3+	3-	3211	3252	10	4	6	5	11	8	34	23	13
26	3o	3+	3o	4-	4o	4-	3o	1+	1333	3351	33	34	30	47	58	43	32	8	36
27	2+	2-	2+	3+	3-	3o	3-	2-	4226	2632	20	12	20	36	25	32	22	12	22
28	1+	2-	2-	1+	3+	2-	3o	2+	1433	2241	8	13	12	10	39	11	27	18	17
29	2o	1+	2o	2o	2o	2o	2+	2+	4344	4233	16	8	14	15	14	15	17	19	15
30	2-	2+	4+	6-	5o	5+	4o	2-	3322	3323	12	17	66	133	92	117	54	12	63
											Monthly mean value of An								21.5

NOVEMBER 1988																			
	Ks								σ s		as								As
1	2-	2-	1+	1o	0+	3-	2o	2+	2212	2324	12	12	8	7	3	21	16	17	12
2	3o	2+	3-	3o	4-	4+	5-	4-	2434	1424	28	20	26	33	42	63	82	46	43
3	4o	4o	4-	3+	4o	2+	4-	3-	3331	2252	51	56	43	34	59	17	46	22	41
4	2o	1+	2-	2o	3o	2o	2+	1+	3232	1352	14	8	11	16	27	14	20	8	15
5	2-	2-	2+	2-	3+	2+	2+	1+	3362	5442	13	13	20	12	40	20	18	10	18
6	2-	3o	3-	2o	3-	2+	3o	2o	4232	3132	13	32	25	15	23	19	29	16	22
7	2+	3+	2-	2o	3+	3+	3+	3-	1312	2132	20	37	13	16	35	34	36	21	27
8	2-	2o	2o	2+	3-	4o	4+	2+	2243	2351	12	15	16	17	22	58	65	19	28
9	1+	1o	2-	3-	3+	3o	2-	3-	3215	4422	10	6	13	21	38	27	13	23	19
10	3-	2+	3o	3-	4-	2o	1+	1o	2522	2113	25	19	28	22	44	15	8	6	21
11	2-	1o	3-	2-	2-	3-	4o	3+	3222	2234	12	7	23	13	13	23	54	40	23
12	3-	2-	3-	3o	4-	4-	3+	4+	2220	1231	21	13	26	32	49	43	38	70	37
13	3o	2-	3-	2o	2+	2o	3-	2+	4220	1321	29	11	22	16	17	16	22	20	19
14	3-	3-	3-	4-	3o	2+	3o	3o	2223	2321	22	22	24	46	33	20	28	27	28
15	3-	3o	2o	3-	2+	2-	3-	2+	2311	3231	23	31	15	22	20	12	22	18	20
16	2-	3+	4-	4-	2+	3+	4+	3+	1322	3312	13	39	41	45	20	38	61	39	37
17	3o	3o	4-	3o	2o	1+	2+	2-	3534	2343	31	29	44	30	15	10	17	13	24
18	2o	2+	2-	2+	3-	2o	3o	2-	3413	2022	14	18	12	20	26	16	31	13	19
19	2-	1-	1+	1o	1+	0+	1+	2-	2332	1253	11	5	10	7	8	3	10	11	8
20	1o	1o	1o	0+	1o	1+	0o	1-	2220	1302	7	7	7	3	7	9	0	4	6
21	2o	2-	2-	1-	0+	1-	2-	3-	2222	2242	16	13	12	4	2	5	13	23	11
22	2-	2-	2+	1-	1+	1+	1+	1-	1332	1233	13	11	20	5	8	10	9	5	10
23	1+	2-	1+	1-	0+	0o	0o	1+	3423	1102	8	12	10	5	2	1	0	9	6
24	2+	1+	1o	0+	0o	1-	1+	1+	3332	1432	20	8	6	3	1	5	9	9	8
25	2+	1+	1o	1-	2-	1+	2+	3+	1422	2222	17	8	7	4	11	10	20	37	14
26	4+	4-	3+	3+	4-	3o	3-	2o	5324	2343	63	42	35	35	42	31	25	15	36
27	2+	2-	3-	3o	3-	3-	3-	2o	2221	3422	18	13	26	29	24	23	21	16	21
28	1+	1+	1+	2o	3o	2-	2+	3-	4331	3422	10	9	9	14	33	13	20	21	16
29	2+	1+	2-	1+	1+	2o	2o	2o	2321	4122	19	10	13	9	10	14	16	16	13
30	2-	2o	5-	6+	6-	6-	5-	2+	3223	3433	13	15	81	197	124	138	73	18	82
											Monthly mean value of As								22.8

DECEMBER 1988																				
	Kn								σ n		an									An
1	1-	1o	1+	2o	3o	1-	1-	1-	2412	0112	5	6	8	15	30	5	5	4		10
2	1+	1o	3+	2+	4o	4o	3-	3-	3031	3324	8	7	38	17	60	51	23	22		28
3	2+	3o	3-	3-	3-	5-	4+	3-	3533	2433	17	27	22	24	25	71	64	24		34
4	3-	3o	3o	2o	2o	3o	1+	1+	2154	1424	23	28	27	16	16	29	8	10		20
5	0+	1o	0+	1+	1+	1+	1o	1+	3333	3323	3	7	3	9	10	10	7	9		7
6	1+	1-	1o	1+	1-	1+	1+	1-	3343	2232	9	5	7	8	4	8	8	4		7
7	0+	0+	0+	1+	2-	1+	1-	1-	2233	2122	3	3	3	9	11	8	4	4		6
8	1o	1+	1o	1+	1+	2+	1+	1+	2344	1433	6	9	6	10	8	19	8	8		9
9	1o	0+	0o	0o	1-	1+	2-	2o	3111	1331	7	2	1	0	5	10	11	16		7
10	2-	1+	2-	3o	3o	3o	2-	1-	1334	3223	13	10	12	32	27	31	11	4		18
11	1+	1+	2o	3-	4o	4-	4-	3o	2312	2230	10	10	16	22	60	47	43	30		30
12	2+	4o	2o	2o	3-	2o	1+	2+	3733	5334	19	55	14	14	22	14	10	17		21
13	2o	3-	3o	3o	4o	3+	5-	3+	2301	2343	14	23	30	28	56	38	75	36		38
14	1+	1o	1+	1-	3-	3+	4o	4-	3432	3433	10	7	9	5	21	35	55	46		24
15	3-	3-	3-	1o	1+	2-	1o	0+	2534	3332	24	26	23	7	9	12	7	2		14
16	3-	2+	2o	3+	4o	5-	4o	4-	4332	2254	22	17	14	35	56	85	54	48		41
17	2+	2o	4o	5-	3+	2-	5+	5+	2144	4223	18	14	56	81	40	12	114	112		56
18	4-	3o	3o	4-	4+	3+	3+	4-	6143	2463	48	30	27	49	63	35	35	47		42
19	4-	4-	3o	3o	3-	4-	4-	2-	2342	2532	48	43	31	27	22	48	41	12		34
20	2-	2-	2-	2-	1o	2-	2o	2-	2323	3303	13	12	13	13	6	13	15	11		12
21	2-	3-	3-	3o	3-	2-	2-	1+	2633	2212	12	24	22	33	24	13	13	10		19
22	3o	3o	3o	2+	1+	3-	3+	2o	2122	2343	29	28	31	18	9	26	35	14		24
23	1+	1+	1-	1o	1-	1o	2-	1o	3523	3414	10	9	4	6	4	6	11	7		7
24	1o	1-	2-	2-	2-	1+	1+	2-	3244	3334	7	4	11	11	11	9	8	11		9
25	2-	2-	2+	5-	4+	4+	4+	3-	2345	4332	12	11	18	77	69	66	67	25		43
26	3o	3o	3+	5-	5-	4o	3o	3o	1335	6323	28	29	37	77	74	53	31	32		45
27	3o	3+	3o	4-	3+	3+	3-	1+	4335	3232	29	37	30	48	36	34	23	9		31
28	1+	2-	2-	3+	3+	3+	4-	2o	2312	4231	10	13	13	35	36	35	46	16		26
29	4-	2o	3+	3+	4-	2-	3o	3+	3222	3342	41	15	38	38	45	12	32	36		32
30	2+	2+	1+	4-	3-	2+	3o	1+	2332	3333	18	17	10	42	23	20	27	10		21
31	1+	2-	2o	3-	3-	3-	3+	3o	3334	3334	8	12	14	22	24	25	36	32		22
											Monthly mean value of An									23.8

DECEMBER 1988																				
	Ks								σ s		as									As
1	0+	0+	1o	2-	2o	0o	0+	1+	2312	3123	2	3	7	13	16	1	3	8		7
2	1+	1+	4-	3o	4-	4-	3-	3-	1322	3132	8	10	44	29	46	50	26	23		30
3	2+	2o	2+	2+	3-	4-	4o	3-	1212	2202	19	14	19	20	22	48	59	23		28
4	3-	3-	3-	2o	2o	3-	1+	1+	2221	0231	23	24	21	15	16	26	10	8		18
5	0+	1o	1o	1o	1o	1+	1+	1+	1122	1432	2	6	6	6	6	10	9	10		7
6	1o	1-	1o	1+	1+	1-	1-	1-	3312	3422	6	4	7	10	8	5	5	5		6
7	1o	0+	0o	1o	2-	1+	0+	1-	1215	2133	6	3	1	7	12	9	2	5		6
8	1+	1o	0o	2-	1+	3-	1-	1+	1012	1222	9	7	1	11	8	23	5	10		9
9	1+	1o	1o	0+	1o	1+	1o	3-	2121	0334	9	7	7	2	7	10	6	25		9
10	2+	2+	2+	3-	3-	3-	1o	1-	2432	2412	17	17	20	26	24	22	7	5		17
11	2+	2+	3+	4o	4-	4o	4o	4-	4142	2232	19	17	39	51	47	52	56	45		41
12	3+	4o	3-	2+	3o	3-	2o	3o	3311	2232	36	58	26	19	27	23	15	31		29
13	2+	4-	4-	3+	3+	3o	4o	3+	3333	3331	17	49	49	37	37	28	54	37		39
14	1+	1o	1+	1+	3o	3+	4+	4-	2322	1322	10	6	8	10	31	37	68	49		27
15	3-	3o	3-	1o	1o	2-	1o	1-	1234	1445	26	27	26	6	7	13	7	5		15
16	2o	2o	2+	3o	4+	5o	5-	5-	0130	3213	16	15	20	32	68	90	74	72		48
17	3-	3+	3+	5-	4+	1+	6o	7-	2433	1133	26	35	40	74	62	9	171	202		77
18	4+	3+	3+	4-	4-	3+	3+	4+	2111	2124	64	34	37	49	46	36	38	67		46
19	4-	5-	3-	3-	3-	4-	4-	2+	3413	2333	47	72	26	23	24	45	46	20		38
20	2-	1+	2+	2o	1+	2-	2+	2o	2342	1221	12	10	19	16	8	13	17	15		14
21	2o	3-	2o	3+	3o	2-	2+	2-	2331	1212	14	22	15	35	29	13	18	12		20
22	3+	3o	5-	3o	1+	3o	3-	2o	2133	2133	39	31	73	28	9	31	23	14		31
23	1+	1o	1+	1+	1-	0+	2o	1-	4441	3212	9	6	8	10	5	2	14	5		7
24	1+	1+	2-	0+	1o	1+	1+	2o	1432	5123	8	9	13	3	6	8	8	16		9
25	2+	1+	2+	5-	4+	5-	5-	3o	2313	2251	17	9	17	75	69	79	74	31		46
26	4-	3+	4-	4o	4o	4o	3o	3+	2332	2301	50	40	42	54	56	57	32	37		46
27	3o	3+	3+	4-	3+	3+	2+	2-	1343	1113	28	38	37	46	37	34	18	12		31
28	2+	2o	2o	3o	3-	3o	3+	3-	3223	2313	17	14	15	28	25	29	36	21		23
29	4-	3-	3o	4-	4o	1+	3-	3-	3213	2221	41	24	31	44	59	10	25	26		33
30	2o	2o	2-	3-	2+	2+	3o	1+	3122	1222	14	15	11	24	19	17	27	10		17
31	1o	1+	3o	3-	2+	3-	3o	3o	2332	3210	6	9	28	23	20	26	28	32		22
											Monthly mean value of As									25.7

am INDICES 1988

JANUARY 1988																				
	Km								Σ Km	am									Am	Am2
1	1o	1o	1-	2-	2+	2-	2+	2-	12.3	7	6	5	11	18	12	17	12		11	16
2	2+	2o	2o	5-	4+	4+	5-	4+	28.7	18	15	16	80	63	67	77	61		50	33
3	2o	2+	2+	3-	2-	2-	1+	1+	15.3	14	20	20	21	11	11	8	8		14	26
4	2-	1+	1o	1-	2o	2o	4-	5-	17.0	11	10	7	4	15	14	46	81		24	21
5	3o	3+	3o	2o	3+	1o	2-	3o	20.3	33	37	29	15	37	7	13	31		25	32
6	3-	2+	4o	4o	3-	5o	5o	4o	29.7	24	20	53	52	26	99	100	58		54	42
7	4+	3+	2+	2+	2-	2+	3o	3+	22.7	67	40	20	17	13	19	27	38		30	41
8	4-	3+	2-	4-	3+	4-	3-	2o	24.0	41	38	12	44	40	49	21	15		33	26
9	2o	3-	2o	2o	0+	0+	1+	1o	11.7	14	21	15	14	2	2	8	6		10	13
10	0o	0+	0+	0+	1+	1o	2o	3-	8.0	1	2	2	2	9	6	16	21		7	10
11	2+	3o	3o	1o	1o	1+	1-	2-	14.0	20	33	27	7	7	10	4	11		15	18
12	2+	2+	3-	4+	5-	3+	4-	1+	24.7	18	17	23	64	77	35	46	8		36	22
13	0+	1o	1o	2-	2+	2-	2+	4-	14.0	3	6	7	11	17	12	17	46		15	28
14	4-	5o	3-	2o	3o	5o	6o	6+	33.7	46	87	21	15	29	95	153	180		78	69
15	6-	5+	5-	4+	3+	3o	3-	3o	32.0	134	113	79	66	36	33	22	30		64	63
16	2-	1-	1+	1+	3-	1-	1-	1+	10.3	11	4	10	10	21	5	5	10		10	14
17	1-	1o	1o	1o	1+	3-	2+	2+	12.3	4	6	7	6	10	22	17	19		11	11
18	1o	1o	2o	2o	1+	3-	4+	2o	16.3	7	7	16	14	10	23	62	14		19	19
19	1+	2-	3+	3-	2o	3-	2o	1+	17.0	10	13	37	23	15	21	16	10		18	20
20	2o	1+	3o	2o	3-	2o	2-	3-	17.3	15	9	28	15	25	15	13	23		18	16
21	2+	3-	1+	1+	1+	1+	2-	2-	13.7	18	21	10	9	9	8	13	11		12	13
22	1o	2-	1o	1+	3-	2+	2o	1o	13.0	7	12	6	8	25	20	16	6		13	10
23	1o	0+	0+	1-	1o	1-	0+	0o	4.3	6	3	3	5	6	5	2	1		4	7
24	0+	0+	1o	1+	2-	1+	1o	2o	9.0	2	3	6	8	13	9	7	14		8	7
25	1o	1+	2-	1o	2-	2+	2o	2-	12.7	6	9	12	6	11	17	14	12		11	10
26	1o	0+	1o	2o	2o	2-	4-	3-	14.3	6	2	6	15	14	11	46	25		16	17
27	2+	2o	3-	3+	2o	2-	3-	2o	18.7	17	15	21	36	14	11	24	15		19	19
28	1+	2+	2o	2-	1+	1o	0+	1+	11.3	9	19	15	12	8	6	3	8		10	11
29	1o	1o	0+	1+	1-	2+	1-	1o	8.3	7	7	3	8	5	17	5	7		7	6
30	0+	0+	0+	0+	0o	0+	1o	1+	4.0	3	3	3	3	1	3	6	10		4	5
31	0+	0+	1-	0+	1+	1o	1-	0+	5.0	2	3	4	3	9	7	4	3		4	4
										Monthly mean value of Am									21.0	

FEBRUARY 1988																				
	Km								Σ Km	am									Am	Am2
1	1+	0o	0o	0+	0+	0+	1-	1o	4.0	8	1	1	3	3	2	5	6		4	4
2	1-	0+	0+	1+	1-	1o	3-	2-	8.7	4	3	2	8	4	6	23	11		8	6
3	1+	0o	1-	1o	0o	0+	0+	1-	4.3	8	1	5	7	1	2	2	5		4	7
4	1+	1o	1+	1+	2-	2o	2+	2+	13.3	8	6	8	8	12	15	17	19		12	20
5	3+	4o	5-	4-	3+	4o	3+	2+	28.7	37	53	71	50	38	53	37	20		45	30
6	2+	1+	2o	2+	2+	2o	2-	3+	17.3	19	10	15	20	18	16	11	36		18	21
7	2-	2-	1+	1+	1-	0+	1-	1-	8.3	13	11	8	9	5	3	4	5		7	10
8	1o	1-	0o	0+	0+	1o	3o	1+	7.7	6	4	1	2	3	7	30	10		8	9
9	1+	2-	2+	2+	2o	3o	3o	3-	18.3	8	11	18	19	14	28	33	25		20	18
10	2+	2o	3-	3o	4-	2o	2-	1o	18.3	19	16	26	28	45	15	12	6		21	20
11	0+	1-	2o	3-	3-	2+	3+	3+	17.3	3	5	14	24	22	19	38	34		20	22
12	3o	3-	3+	2+	1+	2o	3+	4-	21.7	27	22	38	20	10	14	40	41		27	26
13	2-	3o	2+	3o	3o	3+	2+	2+	21.0	12	31	19	32	30	38	20	19		25	24
14	2+	1o	2+	3-	1+	1-	1o	1+	12.7	19	7	19	25	9	4	6	10		12	21
15	1+	2o	3o	4+	3+	4-	3-	2o	22.3	10	15	33	65	36	46	23	14		30	19
16	1+	1-	2-	2o	4o	5o	4o	1+	20.0	8	5	12	14	52	89	54	9		30	27
17	2-	1+	1o	3+	2+	3+	2o	4-	18.7	13	10	6	38	17	39	14	45		23	31
18	3+	2-	2o	4-	2-	3-	3+	4-	22.0	37	12	16	50	11	22	40	41		29	24
19	1+	2-	2-	1+	2-	2+	3-	1-	13.3	8	13	11	10	12	18	22	5		12	14
20	1-	0+	0o	1-	2-	2o	2+	2+	10.0	4	2	1	5	12	15	17	18		9	20
21	3+	4-	4+	3+	2+	2+	3o	4+	26.7	38	45	64	34	19	19	27	67		39	51
22	5+	5-	6-	6-	6-	6+	5+	5-	43.3	104	85	135	121	136	178	112	77		119	84
23	5o	5o	3+	4-	3-	3+	3+	1+	27.7	87	96	39	47	23	38	38	9		47	60
24	3-	3-	2o	2+	3o	2-	3o	1o	18.3	26	24	14	20	27	11	28	7		20	22
25	3o	3o	2o	2o	3-	2o	3+	3o	21.0	27	27	16	14	21	16	34	27		23	19
26	2+	1+	2-	1+	1o	3o	3-	2+	15.7	20	9	11	10	6	31	26	19		17	18
27	1+	3-	2+	1+	1o	1-	1o	2o	12.3	10	21	17	8	6	4	6	16		11	12
28	1o	1o	1+	1o	1+	2-	2o	0+	9.7	7	6	8	7	9	11	14	3		8	7
29	1-	0+	1-	1-	1-	1+	1+	0+	6.0	4	2	4	5	5	9	10	3		5	7
										Monthly mean value of Am									22.4	

am INDICES 1988 (continued)

MARCH 1988																		
	Km								Σ Km	am							Am	Am2
1	1o	1o	2-	1+	1+	1-	2-	1+	10.0	6	6	11	10	8	5	11	9	8	8
2	1-	1-	2-	2-	1+	2o	1o	3+	12.3	4	4	13	12	8	15	7	38	13	13
3	3-	1+	2+	2-	2+	3o	3o	2+	18.7	26	10	18	12	18	31	33	17	21	23
4	4-	3o	3+	3-	3+	3+	3+	2+	25.0	41	33	35	23	35	36	35	17	32	26
5	2o	2o	1+	2o	2-	2o	2+	3-	16.0	16	16	8	14	11	15	17	25	15	23
6	4-	3-	3-	2+	4o	4-	3+	2-	24.0	50	26	25	20	52	41	40	11	33	24
7	2o	1+	2+	1+	0+	3o	4-	3+	17.3	14	8	19	9	3	33	48	37	21	30
8	3o	4-	4-	4-	5-	3-	3-	2+	26.3	30	50	46	42	72	23	22	17	38	33
9	2o	3o	2+	3+	2o	3-	3-	1+	19.3	15	30	18	39	14	25	23	9	22	22
10	1o	1o	2-	2o	3o	3o	3o	3+	18.0	7	7	13	16	30	32	28	35	21	20
11	3-	3-	2o	2+	4o	3-	3o	2-	21.0	23	24	14	18	51	21	30	13	24	23
12	1+	2-	2o	2+	2-	3-	2o	3o	16.7	9	11	14	18	12	24	16	29	17	17
13	1+	0+	1+	1o	0+	1+	2-	1+	8.7	10	2	8	7	3	10	13	9	8	12
14	2o	2-	2+	1+	3o	3-	3-	4-	19.3	14	11	19	9	27	22	26	47	22	21
15	2o	3o	4-	3+	3-	3-	4o	3+	24.7	16	30	43	38	23	22	60	38	34	33
16	3o	3-	3+	3+	1+	1+	2+	2-	19.0	30	26	35	37	10	9	19	13	22	25
17	2+	2+	2o	3-	1+	2-	2o	2-	16.0	17	20	15	25	9	12	15	12	16	14
18	2-	1+	2-	2o	1+	2-	2o	2-	13.3	12	8	13	14	8	12	14	12	12	11
19	1o	1o	1+	1o	1o	0+	1+	1+	8.3	6	6	9	7	7	3	8	8	7	9
20	1-	1-	2-	3o	2+	0+	1-	0+	9.7	4	5	12	27	18	3	5	2	10	7
21	0o	0o	0o	0+	0o	0+	1o	2-	3.3	1	1	1	3	1	2	7	12	4	5
22	2-	1+	0+	0+	1-	0+	1o	1o	6.7	11	8	3	3	4	3	7	6	6	5
23	1o	0+	1+	0+	3-	2+	1+	1+	10.7	6	3	8	3	24	17	9	8	10	9
24	2+	2+	1-	2-	1-	0+	0+	1o	9.3	17	17	5	11	5	3	3	7	9	11
25	1-	2-	2+	2-	3+	3o	3-	2+	17.7	4	12	17	13	35	28	24	19	19	20
26	3o	3o	4o	4-	3+	4+	6o	6-	33.0	27	29	53	43	37	63	149	142	68	53
27	5o	4o	3-	3-	3-	4-	5-	3+	28.7	94	54	26	21	22	42	76	37	47	55
28	3-	3-	2+	4o	3-	4-	4+	4+	26.7	23	23	18	59	22	44	69	70	41	45
29	3+	4-	4-	5-	4-	5-	5-	3+	31.7	34	47	50	86	41	77	74	36	56	57
30	5o	4+	4-	4o	4-	2+	2+	3+	28.7	91	61	49	56	50	17	17	37	47	43
31	3-	3o	2-	2-	2+	3-	3+	2+	19.7	26	33	13	13	18	22	39	17	23	23
										Monthly mean value of Am								23.3	

APRIL 1988																		
	Km								Σ Km	am							Am	Am2
1	2o	2o	3-	2+	2+	3-	3+	3+	20.7	14	16	23	20	19	25	37	39	24	28
2	2+	3o	3+	4+	4-	3-	3-	3-	24.7	20	32	38	63	47	21	22	22	33	33
3	3-	2+	4-	4o	1+	4o	7+	4o	29.3	23	17	47	58	10	53	317	58	73	61
4	4-	4o	4o	5+	6-	6-	6o	4-	38.0	46	54	59	115	130	132	158	45	92	83
5	5-	3o	3o	2o	2-	1+	3+	5-	23.7	71	30	30	14	11	9	40	79	36	68
6	5+	5-	4o	5o	4-	4o	3-	2o	31.3	108	83	58	88	41	52	24	15	59	45
7	2-	3+	3+	3-	2+	3o	3-	2-	20.7	12	37	37	21	20	27	21	13	24	22
8	2-	1-	1+	1-	2-	3o	2o	1+	12.3	11	5	9	4	12	27	14	10	12	16
9	4-	1+	1+	3-	2-	2o	1+	2+	16.3	43	10	10	21	13	16	8	17	17	19
10	1+	2o	3+	4-	4-	3-	2-	3-	21.0	8	16	36	42	42	21	13	21	25	19
11	2+	2+	1+	1+	2+	3o	2-	1+	15.7	20	17	10	8	19	29	12	10	16	18
12	3-	2+	2-	3-	3o	3o	3-	2o	20.0	21	17	11	24	33	32	21	14	22	18
13	2-	2o	1+	2o	2o	1+	2o	3+	15.7	12	15	10	15	16	10	14	34	16	18
14	2-	2+	2o	2-	2+	1o	2o	2o	15.0	13	20	14	13	20	6	14	14	14	13
15	1o	1-	0+	1o	2+	1+	1+	2-	9.7	6	5	3	6	19	10	9	11	9	10
16	1+	0+	2-	1+	2+	2o	1o	1-	10.7	10	3	11	8	19	16	6	5	10	10
17	1+	1o	2o	0+	0+	1+	1-	2o	9.0	8	7	14	3	3	10	4	16	8	11
18	2-	2+	3-	1+	1+	1o	1o	1+	12.7	11	17	22	10	8	6	7	10	11	14
19	2o	3+	3o	3-	2+	2o	1+	1+	18.0	15	35	27	26	20	15	9	8	19	13
20	0+	0o	1+	1o	1+	3o	3-	3-	12.3	2	1	9	6	9	30	22	21	13	12
21	1+	1+	2o	1+	1+	1+	1o	3o	12.7	10	10	14	8	10	9	6	32	12	28
22	4-	5-	4+	4+	4o	5o	4o	4+	34.3	49	85	67	70	52	87	59	62	66	51
23	5o	4o	4-	3-	3-	1+	2+	2o	23.7	95	60	43	22	25	10	17	15	36	36
24	1+	1o	1+	1o	1o	1o	3-	2o	11.3	10	6	9	7	6	7	21	14	10	11
25	1-	0+	1-	2-	1+	2+	2+	1+	10.7	4	3	4	12	10	19	19	10	10	11
26	2-	2+	1+	1o	1+	1-	1-	1o	10.0	11	19	10	6	8	4	4	7	9	9
27	1o	2-	0+	1-	1+	2-	2+	3-	11.7	6	11	3	4	8	11	19	23	11	13
28	2+	3o	2+	3+	3-	2-	2+	2+	20.0	17	27	20	38	23	13	20	18	22	19
29	3-	2-	3-	2-	0+	0o	0+	1-	10.0	22	11	26	13	2	1	2	5	10	14
30	1+	2o	3-	2+	1o	1-	1+	2+	13.7	10	15	26	19	7	5	9	18	14	10
										Monthly mean value of Am								24.4	

am INDICES 1988 (continued)

	MAY	1988																		
	Km								Σ Km	am								Am	Am2
1	1+	1+	1+	1+	1+	1-	1-	2-	9.7	9	10	10	10	8	5	4	11	8	9
2	0+	1+	2-	2-	2o	2o	2-	3-	13.3	3	10	12	12	16	16	13	25	13	11
3	1+	1+	2-	1+	1+	2-	3-	2+	13.7	8	10	12	8	8	11	25	20	13	18
4	3o	3+	3-	2o	3-	2o	3+	2o	21.0	31	39	23	15	21	15	34	15	24	21
5	1o	1o	2+	4o	3+	2-	2o	5-	20.0	6	6	20	54	35	12	16	85	29	56
6	5o	5+	6+	6+	6-	6o	4+	4-	42.7	103	114	180	183	129	152	65	47	122	73
7	2-	1+	2-	2+	3o	2+	3o	3+	18.7	11	9	11	19	32	18	28	34	20	39
8	2+	2+	2o	2+	3+	4-	2+	3-	21.0	19	17	14	17	35	41	20	26	24	24
9	2-	2-	3o	3-	2+	2o	2-	2-	16.7	11	12	29	24	17	15	13	11	17	22
10	3o	3-	3-	2+	2o	3-	2-	2o	19.0	27	25	25	19	15	21	11	15	20	17
11	2-	2-	2o	2-	2-	2-	1+	1-	12.3	11	12	15	13	12	11	8	5	11	12
12	2+	1+	1o	1o	1-	1o	0+	1+	9.0	17	9	7	6	5	7	3	9	8	8
13	1+	1o	1-	1+	2-	1+	1-	0+	8.3	8	7	4	9	11	9	4	3	7	6
14	0+	0+	1-	1+	1o	1-	1-	0+	5.3	3	3	5	8	6	4	4	3	5	7
15	1o	3o	2-	1o	1-	1-	1-	2-	10.3	7	28	11	7	5	4	4	12	10	11
16	1+	3o	2+	3o	3o	4-	1o	2-	19.0	9	27	20	30	28	43	6	12	22	22
17	2-	4-	3+	4-	5-	3o	3+	3o	26.3	11	49	37	50	76	33	35	33	41	36
18	5-	3-	3-	3o	3+	1+	1+	3o	22.0	74	24	25	33	37	10	9	29	30	30
19	3-	2-	2-	2o	1+	2-	1o	1-	12.7	22	12	13	16	10	11	6	4	12	14
20	2o	2o	1o	1o	1+	1o	2o	2-	12.0	15	14	7	6	8	7	15	13	11	11
21	1+	2+	3o	1+	2-	2o	2-	3+	16.7	9	18	28	9	13	15	13	35	18	16
22	3o	3-	2o	1+	2o	2-	1-	0+	13.7	29	24	15	10	15	12	5	3	14	14
23	1+	2-	1-	1-	1+	1+	2-	3-	11.3	10	12	5	5	9	9	12	24	11	11
24	1+	2+	2+	2o	3o	2-	2o	1+	16.0	10	17	20	14	27	12	15	8	15	13
25	1+	1-	1+	1o	1o	1+	2+	3o	12.0	9	5	8	7	7	8	17	30	11	14
26	2+	4-	1+	1-	1-	2-	0+	0+	11.0	20	41	10	4	5	13	3	2	12	11
27	0+	1-	0+	1-	1o	0+	1-	1-	4.7	2	5	2	4	6	2	4	5	4	5
28	1-	1+	0+	0+	1-	1o	1o	1-	6.0	5	8	3	3	4	6	6	4	5	6
29	1-	2-	2-	2o	2+	2o	1+	2-	13.3	4	12	13	15	18	15	8	12	12	13
30	1+	3o	3+	2-	1o	1+	3-	3o	17.3	9	32	34	13	7	8	22	29	19	17
31	3-	1+	2-	3-	2o	2-	2-	2-	15.3	22	10	11	24	15	13	11	11	15	14
										Monthly mean value of Am								18.7	

	JUNE	1988																		
	Km								Σ Km	am								Am	Am2
1	1-	1o	1+	2o	2-	2-	2o	1+	11.7	5	7	10	15	11	12	14	8	10	11
2	2-	2-	1o	1o	1o	1-	1+	1+	9.7	11	12	6	7	6	5	10	10	8	8
3	0+	0o	0+	1-	0+	1o	0+	0+	3.3	2	1	3	5	3	6	2	2	3	4
4	0+	0+	0+	1-	1-	1o	1o	1-	5.0	2	3	2	4	5	6	6	5	4	5
5	1o	1o	1o	1+	2+	2-	4-	3-	14.7	6	6	6	9	20	11	41	26	16	14
6	4-	3-	1+	1-	0+	1o	1-	1o	11.3	41	21	8	5	3	6	5	7	12	15
7	0+	1+	3-	2-	1-	1+	1+	3-	12.0	3	9	22	13	5	8	8	22	11	11
8	1+	2+	2o	2+	1o	1+	1+	1o	12.7	9	17	15	19	6	10	10	7	12	10
9	0o	1-	0+	1+	2+	2o	3-	2-	11.0	1	4	3	8	18	16	26	13	11	14
10	3-	3o	3+	2+	1o	2-	1-	1+	16.0	25	27	39	18	6	11	5	10	18	17
11	2-	3-	3-	1+	2o	2-	1+	0+	13.7	12	22	21	10	14	11	9	3	13	10
12	1-	1o	1-	1-	1-	0+	0+	1o	5.3	4	7	4	5	4	3	3	6	5	7
13	3-	2-	1o	1-	1-	0+	0+	1+	8.7	21	13	6	4	4	3	3	8	8	16
14	3o	4o	4-	3+	3-	3o	3o	3o	25.7	33	55	49	34	26	27	27	33	36	22
15	3-	2-	2-	1-	1-	1o	2-	3o	13.0	22	11	11	5	4	7	12	29	13	16
16	2-	2o	2-	1o	2-	1o	1+	2-	12.0	12	14	13	6	12	6	10	12	11	14
17	3-	3-	3-	2o	2+	2-	1+	3-	18.0	25	23	25	14	20	11	10	24	19	16
18	2o	2o	2o	2+	3-	4-	3o	2-	19.3	14	15	14	18	25	41	30	13	21	23
19	3-	2+	3o	4o	3+	4-	4o	2+	25.3	26	20	28	58	39	43	52	20	36	34
20	3o	4-	4-	3-	2-	1o	1-	0+	16.7	29	49	45	21	13	7	4	3	21	22
21	0+	1o	1o	2-	2o	1+	1-	1o	9.0	3	7	7	13	14	8	5	7	8	11
22	1+	3-	3-	3o	3-	2o	2+	2-	18.3	10	22	26	27	26	15	20	13	20	15
23	2o	2+	1+	1+	2-	2-	2-	3-	14.7	14	20	8	9	12	13	13	23	14	18
24	3-	4-	2-	3-	3+	4-	3o	3+	24.0	23	46	12	22	38	42	31	35	31	32
25	3o	4-	4+	4o	2+	4-	4-	4-	28.3	32	48	66	51	18	43	41	44	43	36
26	3o	2-	3o	2o	2-	2+	4+	4-	21.7	33	12	30	15	12	20	62	47	29	28
27	3+	2o	1o	2-	1-	2-	2+	2-	14.3	34	15	6	12	5	13	19	13	15	22
28	2o	2+	3-	3+	2-	2-	1+	2-	16.7	14	19	25	38	13	13	8	12	18	24
29	1+	4+	5-	3o	3+	3+	4-	4-	27.3	10	67	79	32	38	39	50	45	45	35
30	4-	4-	3o	3-	3+	4-	3+	3-	26.0	48	44	30	24	39	44	37	23	36	35
										Monthly mean value of Am								18.1	

JULY 1988																				
	Km								Σ Km	am									Am	Am2
1	3+	3-	3-	3-	2+	2o	3o	3o	21.7	34	23	25	22	17	16	32	27		25	27
2	3o	3o	3-	2+	1+	2-	3-	2-	18.3	28	27	23	18	10	11	21	11		19	17
3	1-	2o	1o	2-	2-	2o	2o	2-	12.7	4	14	7	13	11	14	16	13		12	12
4	2o	2+	1o	0+	0+	0+	0+	0+	7.0	14	18	7	3	2	3	3	2		7	7
5	0o	0+	0+	0o	1-	2-	2o	2o	7.0	1	3	2	1	4	11	16	15		7	9
6	3-	3-	3-	2+	2+	2+	3-	2-	19.3	23	26	21	18	19	20	22	13		20	18
7	2-	2+	3o	3-	2o	1+	3-	1+	17.0	11	17	27	21	15	9	21	8		16	17
8	2-	2-	3-	2+	3+	2-	3o	2-	18.0	13	13	24	18	35	13	28	13		20	14
9	1o	0+	0+	0+	0+	0+	0+	1+	4.3	7	3	3	3	2	3	3	8		4	10
10	1+	1+	1+	1+	1+	2-	2o	2-	12.0	8	10	8	9	10	13	16	11		11	16
11	3+	4-	4-	3+	4o	3o	3-	3-	26.3	36	44	41	39	54	32	25	23		37	30
12	3-	3+	3+	3o	3+	3-	3o	3o	24.3	24	40	40	32	36	24	32	30		32	27
13	2o	1+	1o	1-	1-	1o	1+	2o	10.0	14	10	6	5	4	6	8	16		9	18
14	3+	3o	2o	1+	1o	1+	2o	2o	16.0	34	33	16	8	7	10	15	14		17	15
15	3-	3-	1+	2-	2+	3+	3+	3-	20.0	22	21	10	13	18	36	36	23		22	24
16	3-	3-	4o	4o	4+	2+	3-	3-	25.3	23	26	53	52	70	20	23	24		36	28
17	1+	2-	1+	1+	3-	2o	1+	2o	13.7	9	11	8	10	23	16	9	14		13	21
18	1-	3-	3o	3+	2-	2o	1+	2-	16.3	5	25	27	34	13	16	9	11		18	17
19	2-	1o	3-	3o	2+	1o	2-	1+	14.7	12	7	23	29	20	7	11	8		15	12
20	1-	1-	1o	1o	0+	1o	1-	1o	6.3	5	5	7	6	3	6	5	6		5	18
21	1-	3o	5-	5-	4-	3o	2+	2-	23.7	5	31	80	77	48	28	18	13		38	31
22	4+	4o	3o	3+	3o	4-	4-	4-	28.7	63	58	27	35	28	43	46	48		44	37
23	3o	3+	4-	3o	2-	1-	1-	1+	17.3	30	38	42	33	12	5	4	9		22	25
24	2-	2o	2o	2-	1+	1+	1+	2+	13.7	12	15	16	13	8	9	10	17		13	10
25	2-	2-	1-	1o	1+	1o	2-	1+	10.3	11	12	5	7	8	7	11	10		9	13
26	2+	2+	3-	3+	3-	3o	3o	4-	23.0	18	18	22	36	24	33	31	44		28	25
27	3+	3+	3+	2o	2o	1+	1+	2o	18.7	40	36	40	14	14	9	10	16		22	22
28	2+	1+	1o	1+	2-	3-	3+	3o	16.7	17	9	7	10	11	25	36	32		18	14
29	2o	1-	1o	1o	1-	1o	2+	3+	12.0	14	5	7	6	5	6	18	34		12	15
30	2o	2o	2-	1-	1-	1o	1+	2o	11.3	15	14	13	4	4	7	8	15		10	13
31	1o	3-	3-	2o	1+	1+	2-	2+	15.0	7	22	26	15	10	9	13	18		15	14
										Monthly mean value of Am									18.4	

AUGUST 1988																				
	Km								Σ Km	am									Am	Am2
1	3-	2+	2+	1o	1o	1+	2+	1+	14.3	23	20	18	6	7	8	18	9		14	12
2	2-	2-	1-	1-	1o	1-	2o	1+	9.7	13	13	5	4	7	5	15	9		9	11
3	2-	3-	2+	2o	1+	1+	0+	1-	12.3	12	23	17	14	10	8	3	4		11	9
4	1o	1-	0+	0+	0+	1-	0+	1-	4.3	6	5	3	2	2	4	3	5		4	5
5	1-	1-	1+	1o	2+	3-	2-	3-	13.0	4	5	10	6	20	22	11	22		13	11
6	2-	2o	3o	0+	1-	1-	1-	2-	10.7	13	14	31	3	4	4	5	11		11	13
7	2-	2-	1+	1+	1o	1o	1o	1-	9.7	13	11	8	9	7	6	7	4		8	6
8	0o	0o	1-	1o	0+	0+	1+	1+	5.0	1	1	5	7	3	3	8	9		5	8
9	2-	2+	2+	3-	3o	3-	4-	4-	22.0	12	20	19	22	29	24	49	49		28	19
10	3-	2-	1+	2-	1-	1+	3-	3o	15.0	21	11	10	12	5	8	25	27		15	22
11	2o	2o	2+	3+	3-	2-	2-	2+	18.0	14	14	17	38	23	11	11	18		18	19
12	3o	3-	2+	3-	4o	3+	3-	3+	24.0	30	25	20	25	54	38	22	37		31	28
13	3o	3+	3-	3+	3+	3o	3-	3-	24.0	33	35	22	36	39	32	25	22		31	36
14	4o	3o	4-	4-	3-	4-	2-	2-	24.0	51	30	47	49	26	44	12	13		34	34
15	2-	3-	4+	4o	3+	3+	3-	2o	24.0	13	25	61	53	36	39	23	14		33	28
16	3-	2+	3o	2+	2-	2-	2+	1o	17.0	21	19	29	17	12	11	17	7		17	18
17	1o	2-	2-	1+	1o	0+	1-	1+	9.0	6	11	13	10	6	3	4	8		8	12
18	1+	3o	2o	3-	2o	2+	1+	1o	15.7	10	31	16	22	14	17	9	7		16	12
19	2-	2-	2-	2o	2o	3-	2-	2+	15.7	13	12	11	15	15	21	12	18		15	15
20	2o	3-	3-	2+	5-	3+	3-	2o	22.3	15	22	24	19	76	35	26	14		29	21
21	2-	2-	2o	1-	1o	0+	1-	4-	11.7	11	12	14	5	6	3	4	43		12	30
22	5-	5+	3+	2-	2-	1o	2+	1+	21.3	83	106	34	12	13	7	18	9		35	26
23	3-	2+	2+	1+	2o	3-	3o	3o	19.3	26	18	20	9	14	26	28	28		21	17
24	1+	2o	2o	3-	2o	2+	3o	3o	18.3	10	16	14	22	15	17	28	33		19	23
25	2-	2+	3o	4o	4-	3o	3-	2-	22.0	11	19	27	56	41	28	26	13		28	24
26	2+	3-	2-	1o	2+	2o	2-	3-	16.3	19	26	12	7	20	16	12	26		17	23
27	3+	3o	3-	3-	2o	3-	3-	2o	21.0	34	32	22	26	14	21	24	14		23	20
28	1+	2-	3-	2+	2-	2-	2+	3o	16.7	10	13	22	17	13	12	18	31		17	20
29	3o	2+	3o	3o	1+	3-	2-	3-	19.7	32	19	32	33	10	23	13	23		23	25
30	3+	4-	4-	2-	1o	2o	2+	2+	20.0	38	42	45	13	6	16	18	20		25	20
31	3-	2o	1o	1-	2-	4o	3o	3+	18.3	26	16	7	5	11	56	28	35		23	26
										Monthly mean value of Am									19.1	

SEPTEMBER 1988																				
	Km								Σ Km	am									Am	Am2
1	4o	4o	3o	3o	3+	3-	2+	3o	25.3	57	53	32	28	37	24	20	28		35	31
2	3o	3+	2o	2-	3-	2+	2+	3o	20.3	27	34	16	13	25	18	20	30		23	22
3	3-	3-	1+	1+	1+	1+	2+	2-	14.7	24	21	10	10	10	9	20	13		15	17
4	2+	2-	2+	2o	2o	1o	1+	2o	14.7	17	13	18	15	15	7	10	14		14	12
5	2o	1+	1-	1+	1o	2-	2-	1+	11.0	14	10	4	9	6	12	12	10		10	8
6	0+	0o	0o	1o	1+	1+	2o	1-	6.7	2	1	1	6	8	8	16	5		6	8
7	1o	2-	2+	1+	1o	0+	1o	0+	9.0	7	11	17	10	6	2	6	3		8	8
8	0+	1+	1+	1o	1o	2-	3-	2+	11.7	3	10	8	7	7	12	26	17		11	8
9	0+	1+	0+	1-	0+	0+	3-	2-	7.7	3	8	3	4	3	3	21	13		7	9
10	1+	0+	1o	1+	1o	2-	3-	4-	13.0	10	3	6	9	6	11	22	41		14	21
11	3o	3o	4o	4+	5o	5o	4+	5-	33.3	31	28	60	66	99	87	65	84		65	49
12	5o	3+	3+	1+	2+	2o	3-	2+	22.3	92	38	37	9	19	16	22	20		32	42
13	2-	3o	3-	2+	2+	2o	3o	1+	18.3	12	31	23	20	17	16	27	10		20	20
14	2+	2-	3o	3o	3-	2+	2-	2-	18.3	19	13	32	28	25	20	12	12		20	20
15	3-	2+	3-	3-	3o	3+	1+	2-	19.7	26	18	21	22	27	34	10	11		21	18
16	2-	2+	2o	1+	2+	1+	0+	1-	12.0	11	18	14	10	20	8	2	4		11	17
17	2+	3o	3o	3o	3+	2+	3+	4o	24.3	17	29	31	33	39	20	34	51		32	32
18	5o	5-	3+	3-	3o	1+	3+	5-	28.0	87	81	37	26	33	9	39	76		49	45
19	4+	4-	4-	3+	3-	2+	3+	3+	26.7	63	42	46	38	26	18	39	38		39	34
20	2+	3-	2+	2+	2-	1+	3o	2+	18.0	20	23	17	17	13	10	28	18		18	21
21	3-	2-	1o	3-	2+	1+	4-	3-	18.0	26	13	7	21	19	9	41	22		20	23
22	3-	3+	4-	3+	3-	4o	2o	2-	23.3	26	37	42	37	24	56	14	12		31	26
23	3-	3-	3-	1+	3-	1+	1+	2+	17.0	21	23	21	10	21	9	10	19		17	18
24	2-	1+	2-	2+	2o	1o	2-	3-	14.3	11	9	11	19	14	7	13	22		13	15
25	3+	2o	1+	1o	2+	2+	3-	3o	18.0	38	16	9	7	17	20	23	33		20	16
26	1o	1+	2-	2o	3+	2-	1o	2-	13.7	6	9	12	15	38	12	7	12		14	15
27	2o	1+	1+	1-	1o	1+	1-	1+	9.7	15	8	8	4	7	9	5	8		8	11
28	2-	1+	1+	1o	1o	1+	1+	1+	10.3	12	9	8	7	6	9	10	10		9	8
29	1o	1o	1o	1o	1o	1o	0+	0+	6.7	7	7	7	7	6	6	3	2		6	7
30	0+	1-	2+	2-	2+	2+	3-	3-	15.0	3	5	17	11	19	19	26	21		15	13
										Monthly mean value of Am									20.0	

OCTOBER 1988																				
	Km								Σ Km	am									Am	Am2
1	3o	2+	2-	2-	2o	2-	3-	3o	18.0	33	18	13	13	16	13	23	27		20	17
2	2o	1+	1o	1-	2-	0+	0+	1-	8.0	16	10	7	4	11	3	3	5		7	9
3	0+	0+	0+	0+	0+	2-	1+	1+	6.0	2	2	2	2	2	11	10	8		5	5
4	0+	1-	1+	1o	1o	1o	3-	4o	12.0	2	4	9	6	6	6	26	51		14	19
5	4o	4-	3o	3o	3-	3o	3-	3-	24.7	55	47	32	32	25	29	23	24		33	35
6	4+	3+	4o	4o	4+	5o	5+	3o	33.3	64	37	53	55	67	103	104	31		64	42
7	2o	2o	2-	1o	2-	1+	2-	2-	13.0	16	14	12	7	13	10	12	13		12	27
8	1+	1+	1o	1o	2+	2+	3-	1+	13.3	8	9	7	7	20	20	23	9		13	14
9	2o	2+	3-	3-	3+	3+	4-	3-	22.7	14	17	21	26	39	39	42	25		28	46
10	4-	3+	5+	7o	6+	5+	5+	4+	40.7	44	40	106	255	190	113	109	68		116	75
11	4-	3-	2o	3+	2+	2o	1+	2o	19.3	49	24	15	40	19	14	10	14		23	45
12	2+	2o	2o	1+	1o	1+	2-	1o	12.7	18	16	16	9	7	8	13	6		12	13
13	2-	2o	2-	2o	1+	1-	1+	1+	12.0	13	16	12	14	9	4	9	9		11	10
14	2-	2-	1+	1+	2o	2o	0+	1-	11.0	12	12	9	9	15	14	3	5		10	8
15	0+	0+	1o	1+	3-	3-	2-	2-	11.7	2	2	7	9	26	26	12	13		12	12
16	2+	3-	2o	2-	1o	3-	3+	2+	18.0	18	21	14	11	7	24	36	18		19	19
17	2+	2+	2+	2+	2+	2+	4-	4o	21.7	19	18	18	19	20	19	43	56		27	29
18	4-	3-	3o	5-	4o	4+	4o	4-	30.0	44	23	27	74	53	65	59	46		49	39
19	3o	2+	2+	3o	2+	3-	3-	2-	20.0	29	20	17	30	20	22	23	13		22	31
20	3-	3o	3o	2o	2+	4-	3o	3o	22.7	24	33	31	16	19	46	29	31		29	22
21	2+	2-	1+	1o	1+	1-	1+	2o	11.7	20	13	8	7	8	5	9	16		11	14
22	1+	1-	0+	0o	0+	1+	0+	0+	4.7	9	4	2	1	2	8	2	3		4	7
23	1o	1o	2+	1+	2o	2-	2-	1o	12.0	6	7	18	9	15	12	13	7		11	9
24	2o	2-	1+	2-	1o	1o	1o	2+	12.0	15	11	10	12	7	6	7	17		11	10
25	2-	2-	1o	1-	0+	1-	1-	1o	7.7	11	11	7	5	2	5	5	7		7	9
26	1o	2-	2+	1+	2o	2+	3-	2+	15.7	7	11	18	10	15	17	23	18		15	12
27	1o	2-	2-	2+	2-	2+	3o	2o	15.7	7	13	11	17	11	17	33	15		16	17
28	3-	2o	3-	2+	2-	1+	1o	1+	15.0	22	15	23	17	12	8	6	9		14	13
29	1+	1+	0+	1-	1-	0+	0o	0o	4.7	9	8	2	4	5	3	1	1		4	5
30	1-	0+	0o	0o	0o	0+	3+	3o	7.7	4	3	1	1	1	3	37	29		10	13
31	2+	2o	4-	4-	2+	2o	2o	2o	20.0	17	14	43	44	17	16	15	15		23	18
										Monthly mean value of Am									20.9	

am INDICES 1988 (continued)

NOVEMBER 1988																				
	Km								Σ Km	am									Am	Am2
1	2-	1+	1+	1+	1-	3-	2+	2+	13.7	12	10	8	8	4	24	17	17	13	18
2	3+	2o	3+	3+	4-	4+	5-	4-	28.3	36	16	35	39	45	70	82	43	46	38
3	4-	4-	4-	3+	4+	3-	4-	3-	27.7	48	47	42	37	70	21	47	25	42	39
4	2o	1+	1+	2+	3o	2o	3-	1+	16.0	14	8	10	20	29	14	22	8	16	22
5	2o	2o	3-	2o	4-	3-	2+	1+	18.7	16	14	21	15	42	22	17	8	19	20
6	1+	3+	3-	2+	3-	2+	3o	2+	20.0	9	36	25	18	23	20	29	19	22	22
7	2+	3+	2-	2+	3+	3+	3+	3o	22.7	19	35	12	18	34	38	39	28	28	24
8	2o	2o	2o	2+	3-	4o	4+	3-	22.0	16	16	16	19	24	51	61	23	28	26
9	2-	1o	2-	3o	3+	3o	2o	3-	18.3	11	6	12	28	39	32	14	21	20	26
10	3-	2+	3-	3-	4-	2+	1o	1-	18.0	26	20	25	25	45	18	7	4	21	20
11	1+	1o	2+	2-	2-	3-	4-	3+	17.7	10	6	19	12	12	25	50	39	22	21
12	3-	2o	3-	3-	4-	4-	3+	4+	25.0	22	14	21	25	45	49	34	66	35	29
13	3o	1+	2+	2o	2+	2o	2+	2+	17.7	27	9	17	15	18	16	20	17	17	27
14	2+	2+	2+	3+	3o	2+	3-	3-	21.0	18	19	19	39	32	18	24	24	24	22
15	3-	3o	2-	2+	2+	2-	3-	2+	18.7	22	29	13	20	20	12	21	19	20	24
16	1+	3o	3+	4-	2+	3+	4o	4-	24.7	10	31	40	42	19	35	55	41	34	29
17	3o	3-	3+	3o	2+	1+	2o	2-	19.3	28	23	37	29	17	8	15	11	21	23
18	1+	2-	2-	2+	3o	2+	3o	2-	17.0	9	13	12	17	28	17	31	13	18	14
19	1+	1-	1+	1o	1+	1-	1+	1+	9.0	10	4	8	6	8	5	8	9	7	10
20	1-	1-	1-	0+	1o	1+	0o	1-	5.3	5	5	4	2	7	10	1	4	5	7
21	2o	2-	2-	1-	0+	1-	2-	2+	11.0	14	12	12	4	3	5	12	19	10	9
22	1+	1o	2+	1o	1+	1+	1+	1-	10.3	10	7	17	7	8	8	8	5	9	9
23	1-	1+	1+	1-	0+	0o	0o	1+	5.7	5	10	9	4	3	1	1	8	5	6
24	2+	1o	1o	0+	0o	1-	1+	1o	7.7	17	7	6	2	1	4	8	7	7	6
25	2o	1o	1o	1-	2-	1+	3o	3o	13.7	14	6	7	5	11	9	27	30	14	18
26	4-	3+	3o	4-	4-	3+	3o	2-	25.3	48	38	32	41	50	37	28	11	36	28
27	2+	2-	3-	3o	3-	3o	3-	2o	20.0	19	12	23	32	24	27	21	14	22	21
28	1+	2-	2-	2-	3+	2-	3-	2+	16.3	9	11	11	12	36	12	23	20	17	17
29	2+	1+	2-	2-	2-	2o	2+	2+	15.3	17	9	13	12	12	14	17	18	14	29
30	2-	2o	5-	6o	5+	6-	4+	2o	31.7	13	16	73	165	108	128	63	15	73	42
										Monthly mean value of Am								22.1	

DECEMBER 1988																				
	Km								Σ Km	am									Am	Am2
1	1-	1-	1o	2o	3-	0+	1-	1o	9.0	4	4	7	14	23	3	4	6	8	29
2	1+	1+	4-	3-	4o	4o	3-	3-	22.3	8	8	41	23	53	51	25	23	29	22
3	2+	2+	3-	3-	3-	4o	4+	3-	23.7	18	20	21	22	24	59	62	23	31	31
4	3-	3-	3-	2o	2o	3o	1+	1+	17.7	23	26	24	16	16	27	9	9	19	21
5	0+	1o	1-	1o	1+	1+	1+	1+	8.3	3	6	4	7	8	10	8	9	7	9
6	1o	1-	1o	1+	1o	1o	1o	1-	7.7	7	4	7	9	6	7	7	5	7	7
7	1-	0+	0+	1+	2-	1+	0+	1-	6.7	5	3	2	8	11	8	3	4	6	6
8	1o	1+	1-	2-	1+	3-	1o	1+	11.0	7	8	4	11	8	21	7	9	9	7
9	1+	1-	1-	0o	1o	1+	1+	3-	9.0	8	4	4	1	6	10	8	21	8	11
10	2o	2-	2o	3o	3-	3o	1+	1-	16.3	15	13	16	29	25	27	9	5	17	17
11	2o	2o	3o	3+	4o	4-	4-	3+	25.0	14	14	27	37	53	49	50	37	35	29
12	3o	4o	2+	2o	3-	2+	2-	3-	20.7	28	57	20	16	25	18	12	24	25	32
13	2o	3+	3+	3o	4-	3o	4+	3+	26.0	16	36	39	33	47	33	65	36	38	26
14	1+	1o	1+	1+	3-	3+	4+	4-	19.0	10	6	9	8	26	36	61	48	26	29
15	3-	3o	3-	1o	1+	2-	1o	1-	14.0	25	27	24	6	8	13	7	4	14	23
16	2+	2o	2+	3+	4+	5o	4+	4o	27.7	19	16	17	34	62	88	64	60	45	35
17	3-	3-	4-	5-	4o	2-	6-	6o	31.0	22	25	48	78	51	11	143	157	67	61
18	4o	3o	3o	4-	4o	3+	3+	4o	28.3	56	32	32	49	54	35	37	57	44	55
19	4-	4o	3o	3-	3-	4-	4-	2o	25.3	47	58	28	25	23	46	43	16	36	33
20	2-	2-	2o	2o	1o	2-	2o	2-	13.7	13	11	16	15	7	13	16	13	13	20
21	2-	3-	2+	3+	3o	2-	2o	2-	18.3	13	23	19	34	27	13	15	11	19	21
22	3+	3o	4o	3-	1+	3o	3o	2o	22.3	34	29	52	23	9	28	29	14	27	20
23	1+	1+	1o	1+	1-	1-	2-	1o	9.0	9	8	6	8	4	4	12	6	7	11
24	1+	1o	2-	1o	1+	1+	1+	2o	11.0	8	6	12	7	9	9	8	14	9	14
25	2o	1+	2+	5-	4+	5-	5-	3o	27.0	15	10	17	76	69	72	71	28	45	36
26	3+	3+	3+	4+	4+	4o	3o	3+	29.0	39	35	40	65	65	55	32	34	46	47
27	3o	3+	3o	4-	3+	3+	2+	2-	23.7	29	38	33	47	36	34	20	11	31	32
28	2-	2-	2o	3o	3o	3o	4-	2+	20.3	13	13	14	32	31	32	41	18	24	27
29	4-	2+	3+	4-	4o	2-	3o	3o	24.7	41	19	34	41	52	11	29	31	32	28
30	2o	2o	1+	3o	3-	2+	3o	1+	17.7	16	16	10	33	21	18	27	10	19	21
31	1o	2-	3-	3-	3-	3-	3o	3o	19.3	7	11	21	22	22	25	32	32	22	22
										Monthly mean value of Am								24.6	

MONTHLY AND YEARLY **am** 1959 - 1988

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual mean
1959	25.5	35.8	30.2	24.2	25.6	22.8	42.2	31.6	37.0	28.3	33.0	31.7	30.6
1960	25.7	23.5	27.3	53.5	31.5	27.4	27.4	27.9	27.1	45.0	44.5	32.2	32.7
1961	19.5	24.1	21.3	20.7	21.1	20.3	34.4	17.8	19.4	22.0	15.7	19.6	21.3
1962	13.0	18.4	14.0	21.6	12.8	17.1	19.9	24.9	27.8	29.9	20.4	21.1	20.1
1963	17.3	13.9	13.2	15.4	17.9	17.9	19.5	21.2	38.0	22.2	19.0	16.9	19.4
1964	17.9	17.5	19.0	19.7	15.9	13.7	15.4	13.3	16.2	15.0	12.5	9.3	15.4
1965	10.9	14.7	13.2	11.5	9.8	14.9	13.6	14.8	16.2	11.8	10.9	12.3	12.9
1966	12.8	13.2	17.8	11.1	14.0	11.6	15.4	18.2	28.2	16.2	15.4	18.5	16.1
1967	17.7	18.4	12.0	14.0	32.8	17.8	12.8	15.3	24.0	16.8	17.4	23.2	18.5
1968	19.3	25.1	21.9	20.2	21.5	24.3	16.4	18.5	21.1	24.1	25.1	17.7	21.2
1969	15.3	23.5	26.1	22.4	23.6	15.7	12.4	13.5	21.7	14.5	16.9	11.9	18.1
1970	12.5	11.2	24.9	21.0	14.1	16.2	25.5	18.5	17.6	19.2	19.9	14.9	18.0
1971	21.0	19.0	18.4	23.2	20.3	15.8	13.8	15.9	20.1	19.4	17.0	18.2	18.5
1972	20.6	16.9	18.9	17.3	16.2	21.0	12.9	32.2	19.4	19.4	21.1	16.9	19.4
1973	25.0	29.8	34.9	39.5	25.9	26.5	20.4	20.1	21.9	27.4	20.1	19.2	25.8
1974	24.1	25.2	33.7	31.5	28.0	27.2	33.2	30.3	33.5	37.2	27.1	26.1	29.8
1975	25.9	29.5	30.8	24.7	23.3	19.8	21.4	17.9	15.9	18.4	28.8	20.3	23.0
1976	22.0	26.8	33.4	26.4	22.9	16.9	16.2	16.0	21.8	19.2	15.2	18.1	21.2
1977	18.5	20.0	18.7	25.0	18.9	13.9	22.9	22.6	23.9	20.7	16.9	16.8	19.9
1978	24.6	25.4	25.9	32.2	32.5	28.3	18.9	24.3	26.8	19.7	24.3	22.1	25.4
1979	26.5	24.2	27.6	35.3	21.6	17.4	17.9	25.9	21.1	18.6	16.9	16.2	22.4
1980	18.0	17.9	11.8	17.3	15.1	19.4	16.1	15.8	13.7	22.6	22.4	22.5	17.7
1981	16.4	23.3	28.4	35.9	28.3	17.7	28.7	24.2	19.8	34.5	24.9	18.6	25.1
1982	20.7	48.2	26.8	31.8	26.0	32.1	43.7	32.2	50.4	29.0	34.5	35.6	34.1
1983	25.7	39.3	34.3	35.2	32.0	24.1	21.8	25.8	23.0	27.3	32.0	24.1	28.6
1984	20.6	25.7	30.5	34.1	26.5	23.8	26.8	25.7	33.1	33.3	31.5	28.0	28.3
1985	25.0	23.3	17.8	30.3	14.8	19.4	24.4	22.3	20.8	23.0	23.5	21.4	22.1
1986	21.3	40.5	20.7	13.4	18.4	15.2	15.0	22.5	25.6	18.0	20.7	14.7	20.4
1987	13.5	16.6	16.9	11.8	13.5	12.8	17.3	23.5	29.7	24.7	21.3	14.9	18.0
1988	21.0	22.4	23.3	24.4	18.7	18.1	18.4	19.1	20.0	20.9	22.1	24.6	21.1

Unit : nT

SECTION 3

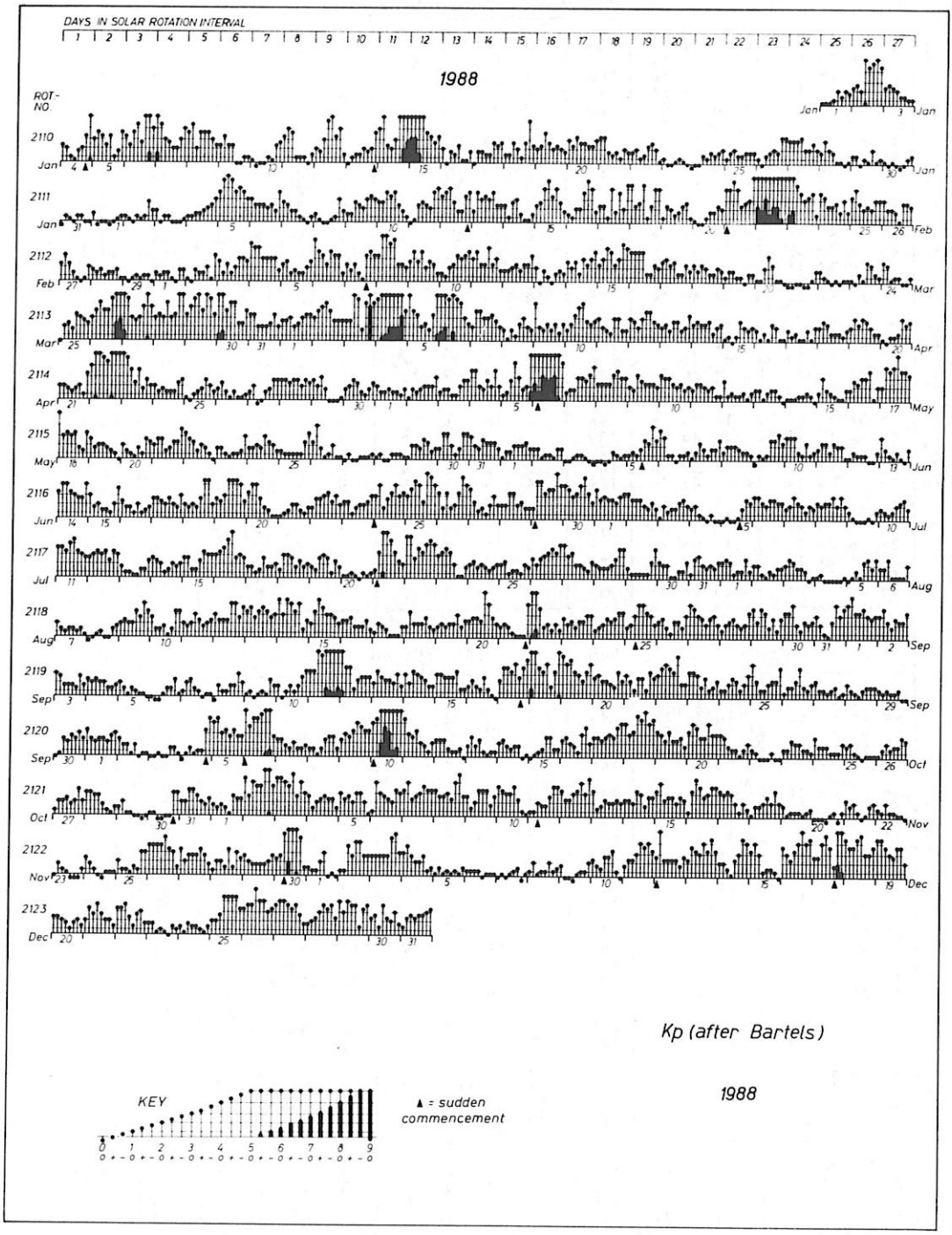
3.3. Kp INDICES

- Musical diagram of **Kp** 1988 77
- Monthly tables of three-hour indices :

  Kp, **ap** and daily **Ap** and **Cp** values 78
- Frequencies of **Kp** indices 84
- Monthly and yearly mean values of **Ap**

  1932 - 1988 85

MUSICAL DIAGRAM OF **Kp** 1988



Kp INDICES 1988

	Kp								Sum	Jan 1988				ap				Sum	Ap	Cp
1	1-	1-	1-	1o	2o	1+	2o	2-	10o	3	3	3	4	7	5	7	6	38	5	0.2
2	2+	3-	2o	5+	4+	5-	5o	4+	31-	9	12	7	56	32	39	48	32	235	29	1.3
3	2+	3-	2+	2o	1+	1+	1o	1o	14o	9	12	9	7	5	5	4	4	55	7	0.3
4	2+	2o	1o	1-	2-	2o	3+	5+	18+	9	7	4	3	6	7	18	56	110	14	0.8
5	3o	4-	3+	2+	3+	1o	2-	4-	22o	15	22	18	9	18	4	6	22	114	14	0.8
6	3+	2+	4-	4+	3-	5o	6o	4o	31+	18	9	22	32	12	48	80	27	248	31	1.3
7	6o	4+	3o	3-	2o	2o	3o	4o	27o	80	32	15	12	7	7	15	27	195	24	1.2
8	4-	4+	2o	4-	4-	4-	3o	2+	26+	22	32	7	22	22	22	15	9	151	19	1.0
9	2+	3+	2+	2+	0+	0+	1o	1o	13o	9	18	9	9	2	2	4	4	57	7	0.4
10	1-	0o	0+	0+	1o	1-	2+	3-	8o	3	0	2	2	4	3	9	12	35	4	0.2
11	3+	4o	4-	1o	1o	1o	0+	1+	16-	18	27	22	4	4	4	2	5	86	11	0.6
12	2o	2-	3o	5-	5o	3+	4o	1+	25o	7	6	15	39	48	18	27	5	165	21	1.1
13	0+	1o	1+	1+	2o	2-	2o	4-	13+	2	4	5	5	7	6	7	22	58	7	0.4
14	4o	5o	2+	2o	3o	5o	6+	7o	35-	27	48	9	7	15	48	94	132	380	48	1.6
15	7+	7+	6o	5o	4-	3+	3-	3+	39-	154	154	80	48	22	18	12	18	506	63	1.7
16	2o	0+	2-	1+	2+	1-	1-	2-	11-	7	2	6	5	9	3	3	6	41	5	0.2
17	0+	2-	2-	1+	1+	3-	2+	3-	14o	2	6	6	5	5	12	9	12	57	7	0.4
18	1+	1+	3-	2o	1o	3-	5-	2+	18o	5	5	12	7	4	12	39	9	93	12	0.7
19	2o	2+	4-	3-	2o	2+	2o	2-	19-	7	9	22	12	7	9	7	6	79	10	0.6
20	3o	2+	3+	3-	3-	2+	2+	3o	22-	15	9	18	12	12	9	9	15	99	12	0.7
21	3+	3+	2-	1+	2-	1o	2o	2-	16o	18	18	6	5	6	4	7	6	70	9	0.5
22	2-	2o	1o	1+	2+	3-	2o	1-	14-	6	7	4	5	9	12	7	3	53	7	0.3
23	1o	0+	0+	1-	1o	1-	0+	0o	4+	4	2	2	3	4	3	2	0	20	2	0.0
24	0+	0+	1+	1o	2-	1+	2-	2o	10-	2	2	5	4	6	5	6	7	37	5	0.2
25	1o	2-	2o	1+	1+	2-	2-	2-	12+	4	6	7	5	5	6	6	6	45	6	0.3
26	1o	0+	1+	2-	2o	2-	3+	3+	15-	4	2	5	6	7	6	18	18	66	8	0.4
27	3o	3o	3o	3+	2o	2o	3-	2o	21o	15	15	15	18	7	7	12	7	96	12	0.7
28	2-	3o	2o	2-	1-	1-	0+	1-	11-	6	15	7	6	3	3	2	3	45	6	0.3
29	1+	1+	0+	1o	1-	2o	1-	1o	8+	5	5	2	4	3	7	3	4	33	4	0.1
30	1-	0+	1-	0+	0o	0+	1o	1+	5-	3	2	3	2	0	2	4	5	21	3	0.0
31	0o	1o	1-	0+	1o	1o	0+	0+	5-	0	4	3	2	4	4	2	2	21	3	0.0

	Kp								Sum	Feb 1988				ap				Sum	Ap	Cp
1	1+	0o	0+	0+	0o	0+	1-	1o	4o	5	0	2	2	0	2	3	4	18	2	0.0
2	1o	1-	0+	1o	1-	1o	3-	2-	9o	4	3	2	4	3	4	12	6	38	5	0.2
3	2-	0+	1o	1o	0+	0+	0+	1-	6-	6	2	4	4	2	2	2	3	25	3	0.1
4	1o	1o	1+	1+	2-	2o	2+	3o	14-	4	4	5	5	6	7	9	15	55	7	0.3
5	4-	5-	5o	5-	4-	4o	4-	3o	32+	22	39	48	39	22	27	22	15	234	29	1.3
6	3o	2+	2+	2+	2o	2+	2-	4-	20-	15	9	9	9	7	9	6	22	86	11	0.6
7	3-	2+	2-	2-	1o	1-	0+	1o	11+	12	9	6	6	4	3	2	4	46	6	0.3
8	1+	1-	0+	0+	1-	1o	3o	2-	9o	5	3	2	2	3	4	15	6	40	5	0.2
9	1+	1+	3-	2+	2o	3o	3+	3o	19o	5	5	12	9	7	15	18	15	86	11	0.6
10	3-	3-	4-	3+	4-	2+	2-	1o	21o	12	12	22	18	22	9	6	4	105	13	0.8
11	0+	1-	2+	3-	2+	2o	4-	4o	18o	2	3	9	12	9	7	22	27	91	11	0.7
12	3+	4-	4o	3-	2-	2-	3+	4-	24o	18	22	27	12	6	6	18	22	131	16	0.9
13	2-	4-	3o	3+	3o	4-	2+	2+	23o	6	22	15	18	15	22	9	9	116	14	0.8
14	2+	1o	3-	3o	1+	1-	1-	1+	13o	9	4	12	15	5	3	3	5	56	7	0.4
15	2+	3-	4o	5-	3+	4o	3-	2-	25+	9	12	27	39	18	27	12	6	150	19	1.0
16	1+	1o	2o	2o	4-	5-	4o	2-	20+	5	4	7	7	22	39	27	6	117	15	0.8
17	2+	2+	1o	4o	2-	4-	2o	4+	21+	9	9	4	27	6	22	7	32	116	14	0.8
18	4+	2+	3-	4+	1o	2+	4o	4o	25o	32	9	12	32	4	9	27	27	152	19	1.0
19	1o	2+	2o	1+	2-	2+	3-	1o	14+	4	9	7	5	6	9	12	4	56	7	0.4
20	1-	0+	0+	1o	2-	2-	2+	2o	10o	3	2	2	4	6	6	9	7	39	5	0.2
21	4o	4o	5-	4o	2+	3-	3o	5o	30-	27	27	39	27	9	12	15	48	204	26	1.2
22	7-	6+	7+	6o	7-	7-	6-	5o	50+	111	94	154	80	111	111	67	48	776	97	1.9
23	6o	6+	4+	4-	3o	3+	4-	1+	32-	80	94	32	22	15	18	22	5	288	36	1.4
24	4-	3+	2+	2+	3-	2-	3o	2-	21-	22	18	9	9	12	6	15	6	97	12	0.7
25	3+	4o	3-	2o	2+	2o	3o	3o	22+	18	27	12	7	9	7	15	15	110	14	0.8
26	3o	2o	2o	2-	1-	3-	3-	2+	17o	15	7	7	6	3	12	12	9	71	9	0.5
27	2+	3+	2+	1+	1-	0+	1-	2o	13o	9	18	9	5	3	2	3	7	56	7	0.4
28	2-	1+	2-	1o	1+	1+	2-	1-	11-	6	5	6	4	5	5	6	3	40	5	0.2
29	1-	0+	1-	1o	1-	1o	1o	0+	6-	3	2	3	4	3	4	4	2	25	3	0.1

Kp INDICES 1988 (continued)

	Kp								Sum
1	1+	1o	1+	1+	1-	0+	2-	2-	9+
2	1-	0+	2-	1+	1+	2o	1-	3+	11+
3	3-	1+	2+	1+	2o	3o	3o	3-	18+
4	4+	4o	4o	3o	3o	3o	3o	2-	26o
5	2+	3-	1+	2-	1+	1+	2o	3-	15+
6	5-	4-	3+	2+	4-	3+	3+	1+	26-
7	2+	2-	2+	1+	1-	3+	4-	3+	19-
8	3+	5o	5o	4+	5-	2+	2+	2o	29o
9	3-	4-	3-	4-	2o	3-	2+	1+	21o
10	1+	1o	2o	2+	3+	3o	3+	4-	20o
11	3o	4-	2+	2+	4o	2+	3o	2-	22+
12	2-	2-	2o	2+	2-	2+	2+	3+	17+
13	2o	0+	2-	1o	0+	1+	2-	1+	10-
14	3-	2o	3-	1+	3o	2+	3o	4-	21-
15	2+	3o	4o	4-	2+	3o	4+	4o	27-
16	4-	4-	4-	4-	1+	1+	2+	2o	22-
17	3-	3o	2+	3-	1+	1+	2+	2-	17+
18	2+	2-	2+	2o	1+	1+	2o	2-	15-
19	1o	2-	2-	1o	1o	0+	1+	1+	9+
20	1-	1-	2o	3+	2+	1-	1-	0+	11-
21	0o	0o	0+	0+	0o	0o	1-	2-	3o
22	2-	1o	1-	0+	1-	0+	1-	1-	6o
23	1-	0+	1+	1-	3-	2+	1+	1o	10+
24	3-	2+	1-	1o	1o	0+	0+	1o	9+
25	0+	2o	2+	2-	3+	3o	3-	2+	18-
26	3o	4-	4+	4-	4-	5-	7-	7o	37-
27	6o	5-	3o	3-	3o	4o	5+	4o	33-
28	3o	3+	3o	4+	3o	3+	5o	5o	30o
29	3+	4o	5-	5o	4-	5o	5-	3+	34-
30	6-	6o	4-	4+	4+	2+	2+	4-	32+
31	3+	3+	2o	2o	2o	2+	3+	2o	20+

Mar 1988	ap				Sum	Ap	Cp
1	5	4	5	5	3	2	6	6	36	4	0.2
2	3	2	6	5	5	7	3	18	49	6	0.3
3	12	5	9	5	7	15	15	12	80	10	0.6
4	32	27	27	15	15	15	15	6	152	19	1.0
5	9	12	5	6	5	5	7	12	61	8	0.4
6	39	22	18	9	22	18	18	5	151	19	1.0
7	9	6	9	5	3	18	22	18	90	11	0.6
8	18	48	48	32	39	9	9	7	210	26	1.2
9	12	22	12	22	7	12	9	5	101	13	0.7
10	5	4	7	9	18	15	18	22	98	12	0.7
11	15	22	9	9	27	9	15	6	112	14	0.8
12	6	6	7	9	6	9	9	18	70	9	0.5
13	7	2	6	4	2	5	6	5	37	5	0.2
14	12	7	12	5	15	9	15	22	97	12	0.7
15	9	15	27	22	9	15	32	27	156	20	1.0
16	22	22	22	22	5	5	9	7	114	14	0.8
17	12	15	9	12	5	5	9	6	73	9	0.5
18	9	6	9	7	5	5	7	6	54	7	0.3
19	4	6	6	4	4	2	5	5	36	4	0.2
20	3	3	7	18	9	3	3	2	48	6	0.3
21	0	0	2	2	0	0	3	6	13	2	0.0
22	6	4	3	2	3	2	3	3	26	3	0.1
23	3	2	5	3	12	9	5	4	43	5	0.2
24	12	9	3	4	4	2	2	4	40	5	0.2
25	2	7	9	6	18	15	12	9	78	10	0.5
26	15	22	32	22	22	39	111	132	395	49	1.6
27	80	39	15	12	15	27	56	27	271	34	1.3
28	15	18	15	32	15	18	48	48	209	26	1.2
29	18	27	39	48	22	48	39	18	259	32	1.3
30	67	80	22	32	32	9	9	22	273	34	1.3
31	18	18	7	7	7	9	18	7	91	11	0.7

	Kp								Sum
1	3-	3-	3o	2o	2+	3o	3+	3+	22+
2	3o	4-	4o	4+	4-	3-	3-	3-	27-
3	3-	3-	5o	5-	2-	4+	8o	4+	33+
4	5-	5+	6-	6+	6+	6+	7+	4-	46-
5	5o	4-	3+	2o	2+	2-	3+	6-	27o
6	6o	6+	5-	6o	5-	4+	3o	2+	37+
7	2o	4-	4-	3o	3o	3+	3-	2o	23+
8	2-	1-	2-	1o	2+	3o	2o	2-	14o
9	4+	2o	2-	2+	2-	2+	1+	2+	18o
10	2-	2+	3+	4o	4+	3-	2+	3-	23+
11	3o	2o	2-	1+	3o	3o	2-	2-	17+
12	3o	3-	2o	3o	4-	4-	3-	2+	23o
13	2o	2+	2-	3-	3-	2-	2o	3+	18+
14	2+	3-	2+	2+	3-	1+	2o	2+	18o
15	1-	1o	0+	1o	3-	2o	2-	2o	11+
16	2-	1-	1+	1-	2+	2o	1-	1-	10o
17	2-	1o	1+	1-	1-	2-	1-	2o	10-
18	2o	3-	2+	1+	1+	1+	1o	2-	14-
19	2o	3o	2+	3o	3-	2o	1+	1+	18-
20	1-	0+	1o	1o	1+	3o	2+	3-	12+
21	2o	2o	2-	1+	2-	2o	1o	3+	15o
22	4o	5+	5o	5-	4+	5+	5o	5o	39-
23	5o	5-	4-	2+	4-	2-	3-	2o	26-
24	2o	1+	2-	1+	1+	1+	2+	3-	14o
25	1-	0+	1o	1+	2-	3-	2o	1+	11o
26	2-	2+	1+	1-	1+	1-	1-	1o	10-
27	1+	2o	0o	0+	1+	2-	3-	3-	12o
28	3-	3-	2+	3-	3-	2o	3-	2+	20o
29	3-	2o	3o	2-	0+	0+	0+	1-	11o
30	2-	2o	3-	2+	1+	1o	2-	2+	15o

Apr 1988	ap				Sum	Ap	Cp
1	12	12	15	7	9	15	18	18	106	13	0.8
2	15	22	27	32	22	12	12	12	154	19	1.0
3	12	12	48	39	6	32	207	32	388	48	1.6
4	39	56	67	94	94	94	154	22	620	78	1.8
5	48	22	18	7	9	6	18	67	195	24	1.2
6	80	94	39	80	39	32	15	9	388	48	1.6
7	7	22	22	15	15	18	12	7	118	15	0.8
8	6	3	6	4	9	15	7	6	56	7	0.4
9	32	7	6	9	6	9	5	9	83	10	0.6
10	6	9	18	27	32	12	9	12	125	16	0.9
11	15	7	6	5	15	15	6	6	75	9	0.5
12	15	12	7	15	22	22	12	9	114	14	0.8
13	7	9	6	12	12	6	7	18	77	10	0.5
14	9	12	9	9	12	5	7	9	72	9	0.5
15	3	4	2	4	12	7	6	7	45	6	0.3
16	6	3	5	3	9	7	3	3	39	5	0.2
17	6	4	5	3	3	6	3	7	37	5	0.2
18	7	12	9	5	5	5	4	6	53	7	0.3
19	7	15	9	15	12	7	5	5	75	9	0.5
20	3	2	4	4	5	15	9	12	54	7	0.3
21	7	7	6	5	6	7	4	18	60	8	0.4
22	27	56	48	39	32	56	48	48	354	44	1.5
23	48	39	22	9	22	6	12	7	165	21	1.1
24	7	5	6	5	5	5	9	12	54	7	0.3
25	3	2	4	5	6	12	7	5	44	6	0.2
26	6	9	5	3	5	3	3	4	38	5	0.2
27	5	7	0	2	5	6	12	12	49	6	0.3
28	12	12	9	12	12	7	12	9	85	11	0.6
29	12	7	15	6	2	2	2	3	49	6	0.3
30	6	7	12	9	5	4	6	9	58	7	0.4

Kp INDICES 1988 (continued)

	Kp								Sum	May 1988	ap				Sum	Ap	Cp
1	2o	1+	1+	2-	1+	1+	1o	2-	12-	7	5	5	6	5	5	4	6	43	5	0.2
2	1-	2-	1+	2-	2o	2o	2o	3o	14+	3	6	5	6	7	7	7	15	56	7	0.4
3	1+	2-	2-	1o	1o	2o	3-	3-	14o	5	6	6	4	4	7	12	12	56	7	0.4
4	4-	4-	2o	2-	3-	2o	4-	2o	21+	22	22	7	6	12	7	22	7	105	13	0.8
5	1o	1+	3-	4+	3o	2-	2o	6o	22o	4	5	12	32	15	6	7	80	161	20	1.0
6	7-	6o	7+	7o	7o	7+	5+	4+	51o	111	80	154	132	132	154	56	32	851	106	1.9
7	1+	2-	2-	3o	3o	3-	3+	4o	21-	5	6	6	15	15	12	18	27	104	13	0.7
8	2+	2+	2+	2+	3+	4-	3o	3o	22+	9	9	9	9	18	22	15	15	106	13	0.8
9	2o	2-	3+	3-	2+	2+	2+	2o	19-	7	6	18	12	9	9	9	7	77	10	0.5
10	3+	3o	3o	2+	2o	2+	2-	2o	20-	18	15	15	9	7	9	6	7	86	11	0.6
11	2-	2+	2+	2o	2-	2o	1o	1o	14o	6	9	9	7	6	7	4	4	52	6	0.3
12	3-	1o	1+	1o	1o	1+	1-	1+	10+	12	4	5	4	4	5	3	5	42	5	0.2
13	2-	2-	1-	1+	2-	2-	1o	0+	10o	6	6	3	5	6	6	4	2	38	5	0.2
14	1-	1-	1-	1o	1o	1+	1o	0+	7-	3	3	3	4	4	5	4	2	28	4	0.1
15	1+	3o	2-	1+	1o	1-	1-	2-	11+	5	15	6	5	4	3	3	6	47	6	0.3
16	2-	3-	2+	3o	3o	4-	1-	2o	19o	6	12	9	15	15	22	3	7	89	11	0.6
17	2o	4o	4-	4o	5o	4-	4-	3+	29+	7	27	22	27	48	22	22	18	193	24	1.2
18	5o	3o	3+	3o	3+	2-	1+	3+	24o	48	15	18	15	18	6	5	18	143	18	1.0
19	3-	2-	2o	2o	2-	1+	1o	0+	13-	12	6	7	7	6	5	4	2	49	6	0.3
20	2o	1+	1o	1-	2-	1o	3-	2+	13-	7	5	4	3	6	4	12	9	50	6	0.3
21	2o	3-	3-	1+	2-	2+	2+	4-	19-	7	12	12	5	6	9	9	22	82	10	0.6
22	3+	3-	2+	1+	2o	2-	1o	0+	15-	18	12	9	5	7	6	4	2	63	8	0.4
23	2-	2-	1o	1-	1o	1o	1+	3o	11+	6	6	4	3	4	4	5	15	47	6	0.3
24	2-	2-	2o	2-	3o	2+	2o	1+	16-	6	6	7	6	15	9	7	5	61	8	0.4
25	1+	1o	1o	1o	1o	1o	2+	3+	12o	5	4	4	4	4	4	9	18	52	6	0.3
26	2+	4o	2-	1-	1o	2o	1-	1-	13o	9	27	6	3	4	7	3	3	62	8	0.4
27	0+	1o	0+	0+	1-	1-	1-	1o	5o	2	4	2	2	3	3	3	4	23	3	0.1
28	1-	1o	0+	0+	1o	1o	1o	1-	6o	3	4	2	2	4	4	4	3	26	3	0.1
29	1-	2o	2o	2-	3-	2+	1+	2-	14+	3	7	7	6	12	9	5	6	55	7	0.3
30	2-	3+	3+	2o	1o	2-	3+	3+	20-	6	18	18	7	4	6	18	18	95	12	0.7
31	3o	2o	2-	3-	2+	2+	2+	2-	18o	15	7	6	12	9	9	9	6	73	9	0.5

	Kp								Sum	Jun 1988	ap				Sum	Ap	Cp
1	1-	1+	1+	2o	2o	2o	2+	2-	13+	3	5	5	7	7	7	9	6	49	6	0.3
2	2-	2-	1-	1o	1o	1-	2-	2-	10o	6	6	3	4	4	3	6	6	38	5	0.2
3	0+	0+	1-	1o	1o	1-	0+	0o	4+	2	2	3	4	4	3	2	0	20	2	0.0
4	0+	0+	0o	0+	1+	1o	1-	1o	5o	2	2	0	2	5	4	3	4	22	3	0.0
5	1o	1+	1o	2-	3-	2+	4o	3-	17-	4	5	4	6	12	9	27	12	79	10	0.6
6	4-	3o	1o	1o	0+	1o	1o	1+	12+	22	15	4	4	2	4	4	5	60	8	0.4
7	1-	1+	2+	2-	1o	2-	2-	3-	13o	3	5	9	6	4	6	6	12	51	6	0.3
8	1+	2o	2o	2o	2-	1+	1+	1o	13-	5	7	7	7	6	5	5	4	46	6	0.3
9	0o	1o	1-	1o	3-	3-	3+	2+	14-	0	4	3	4	12	12	18	9	62	8	0.4
10	3o	3o	3o	1+	1o	2+	1o	1+	16o	15	15	15	5	4	9	4	5	72	9	0.5
11	2-	2+	2+	1+	2+	2o	2o	1-	15-	6	9	9	5	9	7	7	3	55	7	0.3
12	1-	1+	1o	1o	1o	0+	0+	1+	7o	3	5	4	4	4	2	2	5	29	4	0.1
13	3o	2-	1o	1-	1+	1-	0+	2-	10+	15	6	4	3	5	3	2	6	44	6	0.2
14	3+	4o	4o	3+	3o	3-	3-	4o	27o	18	27	27	18	15	12	12	27	156	20	1.0
15	3o	2-	2o	1+	1+	1o	2o	4-	16o	15	6	7	5	5	4	7	22	71	9	0.5
16	2+	2-	2-	1o	2o	1o	1+	2-	13-	9	6	6	4	7	4	5	6	47	6	0.3
17	3-	3-	2+	2o	3-	2o	2-	3o	19o	12	12	9	7	12	7	6	15	80	10	0.6
18	2o	2-	2o	2-	3-	4+	4+	2o	21-	7	6	7	6	12	32	32	7	109	14	0.8
19	3-	2+	3o	4+	4+	4+	4o	2+	27+	12	9	15	32	32	32	27	9	168	21	1.1
20	3+	4o	4o	3-	2-	1+	1-	1-	18+	18	27	27	12	6	5	3	3	101	13	0.7
21	1-	1o	1+	2o	2o	1+	1o	2-	11o	3	4	5	7	7	5	4	6	41	5	0.2
22	2-	3-	3-	3o	3+	2+	3o	2o	21-	6	12	12	15	18	9	15	7	94	12	0.7
23	2+	2+	1o	2-	2o	2o	2+	3o	17-	9	9	4	6	7	7	9	15	66	8	0.4
24	3o	4o	2-	3-	3+	4o	3o	3+	25o	15	27	6	12	18	27	15	18	138	17	0.9
25	3o	4-	4+	4o	2+	5o	5-	4o	31o	15	22	32	27	9	48	39	27	219	27	1.2
26	3+	2-	3+	2-	2o	3+	5-	4o	24o	18	6	18	6	7	18	39	27	139	17	0.9
27	4-	2+	1+	2-	1o	2o	3o	2o	17o	22	9	5	6	4	7	15	7	75	9	0.5
28	2o	2o	3+	3+	2o	2+	2-	2-	18+	7	7	18	18	7	9	6	6	78	10	0.5
29	2-	4+	4+	3+	4-	4-	5o	4o	30o	6	32	32	18	22	22	48	27	207	26	1.2
30	4o	4-	3o	3+	4o	5-	3+	2+	28+	27	22	15	18	27	39	18	9	175	22	1.1

Kp INDICES 1988 (continued)

	Kp	Sum	Jul 1988	ap	Sum	Ap	Cp
1	4- 3- 3o 3- 3- 2+ 3o 3+	23+	22 12 15 12	12 9 15 18	115	14	0.8
2	3+ 3- 3- 3- 2o 2- 2+ 2-	19o	18 12 12 12	7 6 9 6	82	10	0.6
3	1- 2o 1+ 2- 2- 2+ 3- 2o	14+	3 7 5 6	6 9 12 7	55	7	0.3
4	2- 2o 1o 1- 0+ 1o 0+ 0+	7+	6 7 4 3	2 4 2 2	30	4	0.1
5	0+ 1- 0+ 0+ 1- 2- 3- 2+	9o	2 3 2 2	3 6 12 9	39	5	0.2
6	3o 3o 2+ 2o 3- 3- 2+ 2+	20+	15 15 9 7	12 12 9 9	88	11	0.6
7	2- 2o 3o 2+ 2o 1+ 2o 2-	16o	6 7 15 9	7 5 7 6	62	8	0.4
8	2+ 2o 2+ 2+ 3o 2o 3o 2o	19o	9 7 9 9	15 7 15 7	78	10	0.5
9	1+ 1- 0+ 0+ 0+ 1- 0+ 1+	5+	5 3 2 2	2 3 2 5	24	3	0.1
10	2- 1+ 1o 1+ 2o 2+ 3- 2-	14o	6 5 4 5	7 9 12 6	54	7	0.3
11	4- 4- 3+ 4o 4+ 3+ 3o 3-	28o	22 22 18 27	32 18 15 12	166	21	1.1
12	3- 3o 3+ 3o 3+ 2+ 3+ 3o	24o	12 15 18 15	18 9 18 15	120	15	0.8
13	2- 1o 1o 1- 1- 1+ 1+ 2+	10o	6 4 4 3	3 5 5 9	39	5	0.2
14	3- 2+ 2o 1o 1+ 2o 2- 2o	15o	12 9 7 4	5 7 6 7	57	7	0.4
15	3- 3- 1+ 1+ 2+ 3+ 3o 3o	20-	12 12 5 5	9 18 15 15	91	11	0.7
16	3o 3+ 4- 4+ 5o 3- 3o 3-	28-	15 18 22 32	48 12 15 12	174	22	1.1
17	2- 2- 1o 1+ 3- 2- 2- 2o	14-	6 6 4 5	12 6 6 7	52	6	0.3
18	1+ 3o 3o 3- 2- 2+ 2- 2o	18-	5 15 15 12	6 9 6 7	75	9	0.5
19	2- 1+ 3- 3o 3- 1o 2+ 2-	16+	6 5 12 15	12 4 9 6	69	9	0.5
20	1- 1- 1o 1- 0+ 1o 1- 1o	6o	3 3 4 3	2 4 3 4	26	3	0.1
21	1+ 3+ 6- 5o 4+ 3+ 2+ 2o	27+	5 18 67 48	32 18 9 7	204	26	1.2
22	5- 5- 3- 4- 3+ 4o 4+ 4o	31+	39 39 12 22	18 27 32 27	216	27	1.2
23	3o 3+ 4- 3+ 2o 1- 1- 2-	18+	15 18 22 18	7 3 3 6	92	12	0.7
24	2o 2+ 2- 2o 2- 1+ 2- 2o	15-	7 9 6 7	6 5 6 7	53	7	0.3
25	2o 2+ 1o 1+ 1+ 1o 2o 2-	13-	7 9 4 5	5 4 7 6	47	6	0.3
26	3- 2o 3- 3o 3+ 4- 3+ 4o	25-	12 7 12 15	18 22 18 27	131	16	0.9
27	4o 3o 3+ 2o 2o 2- 1+ 2+	20-	27 15 18 7	7 6 5 9	94	12	0.7
28	2o 2- 2- 2- 2o 3- 4- 4-	19o	7 6 6 6	7 12 22 22	88	11	0.6
29	2- 1o 1o 1o 1o 1o 2+ 4-	13-	6 4 4 4	4 4 9 22	57	7	0.4
30	2+ 2o 2o 1- 1- 1+ 1+ 2+	13-	9 7 7 3	3 5 5 9	48	6	0.3
31	1o 3- 3o 2o 2- 2o 2- 2+	16+	4 12 15 7	6 7 6 9	66	8	0.4

	Kp	Sum	Aug 1988	ap	Sum	Ap	Cp
1	2+ 3- 2+ 1o 1+ 1+ 3- 1+	15o	9 12 9 4	5 5 12 5	61	8	0.4
2	2o 2o 1o 1- 1+ 1o 2- 2-	11+	7 7 4 3	5 4 6 6	42	5	0.2
3	2o 3- 2+ 2- 2- 1+ 0+ 1-	13-	7 12 9 6	6 5 2 3	50	6	0.3
4	1- 1o 0+ 0+ 0+ 0+ 0+ 1-	4o	3 4 2 2	2 2 2 3	20	2	0.0
5	0+ 1- 1+ 1- 2+ 3- 2- 3-	12+	2 3 5 3	9 12 6 12	52	6	0.3
6	2- 2- 3- 1- 1- 1- 1- 2o	11-	6 6 12 3	3 3 3 7	43	5	0.2
7	2o 1+ 1o 1+ 1+ 1o 1+ 1-	10o	7 5 4 5	5 4 5 3	38	5	0.2
8	0o 0+ 1- 1o 0+ 0+ 1+ 2-	6-	0 2 3 4	2 2 5 6	24	3	0.1
9	2o 2+ 2o 2o 3+ 3- 4o 3+	22-	7 9 7 7	18 12 27 18	105	13	0.8
10	3- 1+ 1+ 2- 1- 1+ 3+ 3+	16-	12 5 5 6	3 5 18 18	72	9	0.5
11	2o 2- 2o 3o 2+ 2- 2o 2+	17o	7 6 7 15	9 6 7 9	66	8	0.4
12	3o 2+ 2+ 2+ 4o 4o 3- 4-	24+	15 9 9 9	27 27 12 22	130	16	0.9
13	3+ 4- 3- 3+ 4- 3+ 3- 3o	26-	18 22 12 18	22 18 12 15	137	17	0.9
14	4+ 3o 4+ 4o 3+ 4o 1+ 2+	27-	32 15 32 27	18 27 5 9	165	21	1.1
15	2o 3+ 4+ 4- 3o 3o 3- 2o	24o	7 18 32 22	15 15 12 7	128	16	0.9
16	2+ 2+ 3- 2- 2- 2- 2+ 1+	16o	9 9 12 6	6 6 9 5	62	8	0.4
17	1o 2o 2- 1+ 1- 1- 1- 2-	10-	4 7 6 5	3 3 3 6	37	5	0.2
18	2- 3+ 2o 2o 2o 3- 2- 1+	17-	6 18 7 7	7 12 6 5	68	8	0.5
19	2- 2o 2- 2o 2o 3o 2- 2+	16+	6 7 6 7	7 15 6 9	63	8	0.4
20	2+ 3- 3- 2+ 5o 4o 3- 2o	24-	9 12 12 9	48 27 12 7	136	17	0.9
21	2- 2o 2- 1o 1- 1- 1- 4o	12+	6 7 6 4	3 3 3 27	59	7	0.4
22	5+ 6o 4- 2- 2o 1+ 2o 1+	23+	56 80 22 6	7 5 7 5	188	24	1.1
23	3- 2o 2+ 2- 2+ 2+ 3o 3o	19+	12 7 9 6	9 9 15 15	82	10	0.6
24	1+ 2- 2o 3- 2+ 3- 3+ 3+	19+	5 6 7 12	9 12 18 18	87	11	0.6
25	2- 2o 3o 4o 4o 3+ 3o 2o	23o	6 7 15 27	27 18 15 7	122	15	0.9
26	2+ 3- 2- 1o 2+ 2+ 2- 3o	17o	9 12 6 4	9 9 6 15	70	9	0.5
27	4o 4- 3o 3- 2o 3- 3o 2o	23o	27 22 15 12	7 12 15 7	117	15	0.8
28	1+ 2o 2+ 3- 2o 2- 2o 3+	17+	5 7 9 12	7 6 7 18	71	9	0.5
29	4- 2+ 4- 3+ 2- 3- 1+ 3-	21+	22 9 22 18	6 12 5 12	106	13	0.8
30	3+ 3+ 4o 2o 1+ 2+ 2o 2+	21-	18 18 27 7	5 9 7 9	100	12	0.7
31	3o 2o 1o 1- 2+ 4o 3o 4-	20-	15 7 4 3	9 27 15 22	102	13	0.7

Kp INDICES 1988 (continued)

	Kp								Sum	Sep 1988	ap				Sum	Ap	Cp
1	4o	5-	3+	3+	4-	3o	3-	3o	28-	27	39	18	18	22	15	12	15	166	21	1.1
2	3o	4-	2+	2-	3-	2+	2+	3+	21+	15	22	9	6	12	9	9	18	100	12	0.7
3	3o	3-	2-	2-	2-	1+	3-	2-	16+	15	12	6	6	6	5	12	6	68	8	0.5
4	2+	2o	2+	2o	2o	1+	1+	2-	15o	9	7	9	7	7	5	5	6	55	7	0.3
5	2o	1+	1-	1+	1o	1-	1-	0+	8o	7	5	3	5	4	3	3	2	32	4	0.1
6	0+	0o	0o	1-	1+	1+	2+	1-	7-	2	0	0	3	5	5	9	3	27	3	0.1
7	1o	2o	2+	1+	1o	0+	1-	1-	9+	4	7	9	5	4	2	3	3	37	5	0.2
8	0o	2-	1o	1o	2-	2-	3o	2o	12o	0	6	4	4	6	6	15	7	48	6	0.3
9	1-	1o	0+	1-	1o	1-	2+	2-	8+	3	4	2	3	4	3	9	6	34	4	0.1
10	2-	0+	1o	2-	1o	2-	3-	3+	13+	6	2	4	6	4	6	12	18	58	7	0.4
11	3+	3+	5o	5-	6o	6-	5+	6o	39+	18	18	48	39	80	67	56	80	406	51	1.6
12	6-	4-	4-	1+	2+	3-	3-	3-	25-	67	22	22	5	9	12	12	12	161	20	1.0
13	2o	3+	3-	2+	2+	2o	3o	2-	19+	7	18	12	9	9	7	15	6	83	10	0.6
14	3o	2o	3+	3o	3-	2+	2-	2-	20-	15	7	18	15	12	9	6	6	88	11	0.6
15	3o	3o	3-	3-	3-	3+	1+	1+	20o	15	15	12	12	12	18	5	5	94	12	0.7
16	2-	2+	2-	1+	3-	1+	1-	0+	12o	6	9	6	5	12	5	3	2	48	6	0.3
17	2+	4-	4-	3+	4o	3-	4-	4+	28-	9	22	22	18	27	12	22	32	164	20	1.0
18	6o	5o	4-	3+	4o	2-	3+	5+	32+	80	48	22	18	27	6	18	56	275	34	1.4
19	5-	4o	4+	3+	3o	2+	3+	4o	29o	39	27	32	18	15	9	18	27	185	23	1.1
20	3-	3o	2+	2+	2o	2-	3+	2+	20-	12	15	9	9	7	6	18	9	85	11	0.6
21	3o	2+	1+	3-	3-	1+	3+	3-	19+	15	9	5	12	12	5	18	12	88	11	0.6
22	3o	4-	4o	4-	3+	5-	2o	2o	26+	15	22	27	22	18	39	7	7	157	20	1.0
23	3+	3+	3o	2-	3-	1+	2-	2+	19+	18	18	15	6	12	5	6	9	89	11	0.6
24	1+	1+	2o	3-	2+	1+	2o	3o	16o	5	5	7	12	9	5	7	15	65	8	0.4
25	4o	2+	1+	1+	2o	2+	2+	4-	19+	27	9	5	5	7	9	9	22	93	12	0.7
26	1o	2-	2-	2+	4-	2-	1+	2o	15+	4	6	6	9	22	6	5	7	65	8	0.4
27	2+	1+	1+	1o	1+	2-	1-	1o	11-	9	5	5	4	5	6	3	4	41	5	0.2
28	2o	1+	1o	1-	1+	2-	2-	2-	11+	7	5	4	3	5	6	6	6	42	5	0.2
29	1+	1o	1+	1o	1o	1+	0+	0+	8-	5	4	5	4	4	5	2	2	31	4	0.1
30	0+	1-	2+	2o	3-	2+	3o	2+	16-	2	3	9	7	12	9	15	9	66	8	0.4

	Kp								Sum	Oct 1988	ap				Sum	Ap	Cp
1	3+	2+	2o	2+	2+	2o	3-	3o	20o	18	9	7	9	9	7	12	15	86	11	0.6
2	2+	2-	2-	1-	2-	0+	1-	1-	10-	9	6	6	3	6	2	3	3	38	5	0.2
3	0+	0+	1-	0+	0+	1+	1+	1-	5+	2	2	3	2	2	5	5	3	24	3	0.1
4	0o	1-	1+	1-	1o	1o	3+	4+	12+	0	3	5	3	4	4	18	32	69	9	0.5
5	4o	4+	3o	3+	3-	3+	3-	3-	26o	27	32	15	18	12	18	12	12	146	18	1.0
6	5o	4-	4+	4+	5-	5+	6-	3-	36-	48	22	32	32	39	56	67	12	308	38	1.4
7	2+	2+	2-	1+	2o	1+	1+	2-	14o	9	9	6	5	7	5	5	6	52	6	0.3
8	1+	1+	1-	1+	2+	3-	3-	1+	14-	5	5	3	5	9	12	12	5	56	7	0.4
9	2+	3o	3-	3+	4o	4-	3+	3+	26-	9	15	12	18	27	22	18	18	139	17	0.9
10	4o	4+	6+	8-	7+	6-	6o	5o	46+	27	32	94	179	154	67	80	48	681	85	1.8
11	4+	3o	3-	3+	2o	2-	1o	2o	20o	32	15	12	18	7	6	4	7	101	13	0.7
12	2+	2+	2+	1+	1o	1o	1+	0+	12o	9	9	9	5	4	4	5	2	47	6	0.3
13	2-	3-	2-	2+	1o	1-	1o	1o	12o	6	12	6	9	4	3	4	4	48	6	0.3
14	2o	2+	2-	1+	2-	2-	0+	1-	12-	7	9	6	5	6	6	2	3	44	6	0.2
15	0+	1-	1o	1+	3-	3-	1+	1+	11+	2	3	4	5	12	12	5	5	48	6	0.3
16	2+	3-	2o	2-	1o	3o	4-	2o	18+	9	12	7	6	4	15	22	7	82	10	0.6
17	3-	3-	2+	3-	3o	3-	4-	4o	24-	12	12	9	12	15	12	22	27	121	15	0.9
18	4o	3o	3+	5-	4+	5o	4o	4+	33-	27	15	18	39	32	48	27	32	238	30	1.3
19	3+	3o	2+	3+	2+	2+	3-	2-	21o	18	15	9	18	9	9	12	6	96	12	0.7
20	3+	4o	4-	3-	3-	4o	3o	3o	26+	18	27	22	12	12	27	15	15	148	18	1.0
21	3o	3-	2-	1+	1+	1-	1+	2o	14o	15	12	6	5	5	3	5	7	58	7	0.4
22	1+	1o	0+	0+	0+	1o	0+	0+	5o	5	4	2	2	2	4	2	2	23	3	0.1
23	1+	1+	2+	2o	2o	1+	1+	1o	13-	5	5	9	7	7	5	5	4	47	6	0.3
24	3-	2-	2-	2-	1o	1o	1o	2o	13-	12	6	6	6	4	4	4	7	49	6	0.3
25	2-	2o	1o	1-	0+	1-	1-	1-	8-	6	7	4	3	2	3	3	3	31	4	0.1
26	1-	1+	2o	1+	2-	2-	3-	2+	14-	3	5	7	5	6	6	12	9	53	7	0.3
27	1o	2o	2o	2+	2-	2o	3+	2o	16+	4	7	7	9	6	7	18	7	65	8	0.4
28	3o	3o	3-	3-	2-	1o	1-	1+	16o	15	15	12	12	6	4	3	5	72	9	0.5
29	1+	2o	1-	1-	0+	0+	0o	0+	6-	5	7	3	3	2	2	0	2	24	3	0.1
30	1-	1-	0o	0o	0+	0+	3o	3o	8o	3	3	0	0	2	2	15	15	40	5	0.2
31	2o	2o	3+	3+	3-	2o	2-	2+	19+	7	7	18	18	12	7	6	9	84	10	0.6

Kp INDICES 1988 (continued)

	Kp								Sum	Nov 1988				ap				Sum	Ap	Cp
1	2-	1+	2-	1+	1-	3-	2+	2+	14o	6	5	6	5	3	12	9	9	55	7	0.3
2	4+	3-	4o	4-	4-	5o	5+	4-	32+	32	12	27	22	22	48	56	22	241	30	1.3
3	4+	4+	4o	4-	5-	3-	4o	3o	31-	32	32	27	22	39	12	27	15	206	26	1.2
4	3-	1+	2o	2+	3-	2+	2+	1+	17o	12	5	7	9	12	9	9	5	68	8	0.5
5	3o	2+	3-	2o	3o	3o	2o	1-	19-	15	9	12	7	15	15	7	3	83	10	0.6
6	1o	4o	3o	3-	2+	2o	3+	3o	21+	4	27	15	12	9	7	18	15	107	13	0.8
7	3+	4o	2+	3-	3o	4-	3+	3+	26-	18	27	9	12	15	22	18	18	139	17	0.9
8	3+	3-	3-	3o	2+	4o	5-	3-	25+	18	12	12	15	9	27	39	12	144	18	1.0
9	3-	1+	2o	3+	3+	3+	2-	3-	20+	12	5	7	18	18	18	6	12	96	12	0.7
10	4-	3+	3o	3o	4-	2+	1o	1-	21-	22	18	15	15	22	9	4	3	108	14	0.8
11	1o	1o	2o	2-	2-	3-	4-	4-	17+	4	4	7	6	6	12	22	22	83	10	0.6
12	3+	2+	2+	3o	3+	4o	3o	4+	26-	18	9	9	15	18	27	15	32	143	18	1.0
13	3+	1+	2-	2+	2o	2o	2+	2o	17o	18	5	6	9	7	7	9	7	68	8	0.5
14	2+	2+	2o	3+	3o	2-	3-	3-	20o	9	9	7	18	15	6	12	12	88	11	0.6
15	3+	4o	2+	3-	3-	2o	3-	2+	22o	18	27	9	12	12	7	12	9	106	13	0.8
16	1o	3+	4+	4-	3-	3o	4-	4-	25+	4	18	32	22	12	15	22	22	147	18	1.0
17	3+	3o	3+	3o	2o	1o	2o	1+	19o	18	15	18	15	7	4	7	5	89	11	0.6
18	1-	2-	2-	2o	3-	2o	3+	2o	16o	3	6	6	7	12	7	18	7	66	8	0.4
19	2-	1-	1o	1o	1o	1-	1o	1+	8+	6	3	4	4	4	3	4	5	33	4	0.1
20	0+	0+	0+	0o	1-	1o	0o	1o	4-	2	2	2	0	3	4	0	4	17	2	0.0
21	2+	2-	2o	1o	0+	1-	2-	2o	12-	9	6	7	4	2	3	6	7	44	6	0.2
22	1+	1o	2o	1o	1o	1-	1-	0+	8o	5	4	7	4	4	3	3	2	32	4	0.1
23	0+	2-	1o	1-	0o	0o	0o	1o	5-	2	6	4	3	0	0	0	4	19	2	0.0
24	2+	2-	1o	0+	0o	1-	1-	1-	7+	9	6	4	2	0	3	3	3	30	4	0.1
25	2o	1o	1o	1-	1+	1o	3o	3o	13o	7	4	4	3	5	4	15	15	57	7	0.4
26	4-	4-	4-	4-	4+	3+	3o	1+	27-	22	22	22	22	32	18	15	5	158	20	1.0
27	3+	2o	3-	3-	3-	3+	3-	2-	21o	18	7	12	12	12	18	12	6	97	12	0.7
28	1o	2o	2o	1+	3+	1+	3o	2+	16+	4	7	7	5	18	5	15	9	70	9	0.5
29	3-	2o	2-	2-	2-	2-	2o	3-	16o	12	7	6	6	6	6	7	12	62	8	0.4
30	2+	3-	5-	6+	5o	5+	4+	1+	32o	9	12	39	94	48	56	32	5	295	37	1.4

	Kp								Sum	Dec 1988				ap				Sum	Ap	Cp
1	1+	1o	1o	2o	3o	0+	1-	0+	10-	5	4	4	7	15	2	3	2	42	5	0.2
2	1o	1o	4-	3-	4o	4o	3-	3-	22-	4	4	22	12	27	27	12	12	120	15	0.8
3	3-	3-	3-	3-	3-	4+	5-	3o	25+	12	12	12	12	12	32	39	15	146	18	1.0
4	3o	4-	3-	2o	2o	3-	1o	1+	18+	15	22	12	7	7	12	4	5	84	10	0.6
5	1-	1+	1-	1o	1-	1o	1-	1+	7+	3	5	3	4	3	4	3	5	30	4	0.1
6	1o	1o	1o	1o	0+	1-	1-	1-	6+	4	4	4	4	2	3	3	3	27	3	0.1
7	0+	1-	0+	1-	1o	1+	0o	1-	5o	2	3	2	3	4	5	0	3	22	3	0.0
8	1o	2o	1-	1o	1o	2o	1o	1+	10o	4	7	3	4	4	7	4	5	38	5	0.2
9	2-	0+	0+	0o	1-	1o	1o	2o	7o	6	2	2	0	3	4	4	7	28	4	0.1
10	2+	2-	1+	3-	3-	3+	1o	0+	15+	9	6	5	12	12	18	4	2	68	8	0.5
11	2-	2+	2+	3o	4o	4-	4o	3+	24+	6	9	9	15	27	22	27	18	133	17	0.9
12	3-	5o	2+	2+	2+	2+	2-	3-	21+	12	48	9	9	9	9	6	12	114	14	0.8
13	2+	4-	3+	3o	4o	3+	4+	3+	27+	9	22	18	15	27	18	32	18	159	20	1.0
14	2o	2o	1+	1-	2+	3o	4+	4o	20-	7	7	5	3	9	15	32	27	105	13	0.8
15	3+	4o	3o	1o	1+	1+	1o	0+	15+	18	27	15	4	5	5	4	2	80	10	0.6
16	4-	3o	2+	3+	4o	5o	4o	4+	30-	22	15	9	18	27	48	27	32	198	25	1.2
17	3-	3-	4o	5-	4-	2-	6+	6-	31+	12	12	27	39	22	6	94	67	279	35	1.4
18	4+	4-	4-	4+	5-	3o	3o	4-	30+	32	22	22	32	39	15	15	22	199	25	1.2
19	4+	4+	4-	3o	3-	4-	4-	2o	27+	32	32	22	15	12	22	22	7	164	20	1.0
20	2+	2+	2o	2-	1o	2-	2o	1+	14+	9	9	7	6	4	6	7	5	53	7	0.3
21	2o	3+	3-	4-	3-	2o	2o	1+	20-	7	18	12	22	12	7	7	5	90	11	0.6
22	3+	3+	4-	2+	1+	3-	3o	2-	21+	18	18	22	9	5	12	15	6	105	13	0.8
23	2-	2-	1-	1o	1-	0+	1+	1o	8+	6	6	3	4	3	2	5	4	33	4	0.1
24	1+	1-	2-	1+	1+	1o	1-	1+	9+	5	3	6	5	5	4	3	5	36	4	0.2
25	2o	2o	3-	4+	4+	4+	4+	3+	27+	7	7	12	32	32	32	32	18	172	22	1.1
26	3+	4-	4-	5o	4o	4o	3o	3+	30o	18	22	22	48	27	27	15	18	197	25	1.2
27	4-	4o	4o	4-	3+	4-	3-	2-	27-	22	27	27	22	18	22	12	6	156	20	1.0
28	2-	2o	2+	3o	4-	3+	4-	2+	22o	6	7	9	15	22	18	22	9	108	14	0.8
29	4o	3o	4o	4-	4-	1+	3+	4-	27-	27	15	27	22	22	5	18	22	158	20	1.0
30	2+	3-	1+	4-	2+	2o	3o	2-	19o	9	12	5	22	9	7	15	6	85	11	0.6
31	1+	2+	3-	2o	3-	3-	3o	3+	20o	5	9	12	7	12	12	15	18	90	11	0.6

FREQUENCIES OF **Kp** INDICES 1988

Kp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0o	4	2	4	1	.	3	.	1	3	4	6	2
0+	22	17	14	7	9	10	11	10	9	19	7	10
1-	19	18	16	15	20	15	16	20	14	22	15	18
1o	26	23	11	11	34	29	19	11	16	19	23	25
1+	22	15	27	23	24	22	21	24	30	28	14	21
2-	24	23	20	28	39	31	32	31	29	23	19	14
2o	29	14	18	28	29	27	33	36	18	22	25	19
2+	21	28	31	26	23	20	26	29	29	22	22	18
3-	15	17	15	32	15	16	27	26	22	26	28	26
3o	12	15	21	16	16	17	22	16	17	15	20	17
3+	15	10	19	8	14	15	17	17	19	15	22	17
4-	11	16	19	10	9	7	10	9	12	5	16	25
4o	5	13	8	3	4	15	5	12	7	8	8	16
4+	5	4	7	7	2	8	4	3	2	8	7	12
5-	3	5	6	6	.	3	2	.	4	2	3	3
5o	6	3	6	6	2	2	2	1	2	3	2	3
5+	2	.	1	3	1		.	1	2	1	2	.
6-	.	1	1	2	.		1	.	2	2	.	1
6o	3	2	2	2	2			1	3	1	.	.
6+	1	2	.	4	.					1	1	1
7-	.	3	1	.	1					.		
7o	1	.	1	.	2					.		
7+	2	1		1	2					1		
8-				.						1		
8o				1								
8+												
9-												
9o												
	248	232	248	240	248	240	248	248	240	248	240	248

LIST OF Kp', 1988

Reduction of Kp to Kp' due to solar flare effects as far as data were available.

Month	Day	Eighth	Kp	Kp'
Jun	24	2	4o	4-
	25	6	5o	5-

MONTHLY AVERAGES OF Ap AND Cp, 1988

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Ap	13	15	14	16	12	11	10	10	12	13	12	13	12.7
Cp	0.59	0.64	0.66	0.67	0.51	0.54	0.54	0.55	0.58	0.54	0.62	0.67	0.59

MONTHLY AND YEARLY **Ap** 1932 - 1988

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1932	11	12	18	17	15	7	7	12	12	10	8	9	11.5
1933	10	11	12	12	12	8	7	9	12	10	9	7	10.1
1934	6	8	11	6	7	5	6	9	10	6	5	8	7.2
1935	9	10	10	8	6	9	7	5	13	12	8	9	8.9
1936	9	11	9	15	10	12	11	5	5	9	10	5	9.1
1937	7	13	12	20	13	12	12	10	9	20	12	10	12.5
1938	28	16	13	18	18	9	13	12	17	16	10	11	15.3
1939	7	15	19	28	21	15	19	19	13	22	9	11	16.5
1940	15	12	36	18	13	16	12	11	14	14	16	15	16.1
1941	14	18	33	15	11	11	19	16	27	11	16	11	16.8
1942	9	12	22	17	8	8	13	13	17	22	15	11	13.8
1943	11	9	13	14	14	12	15	31	25	24	20	14	17.0
1944	13	12	17	15	9	8	6	9	10	11	6	14	10.8
1945	10	10	17	13	9	7	9	7	10	11	8	13	10.4
1946	12	22	33	20	18	16	22	11	34	13	12	9	18.6
1947	12	12	32	18	14	16	16	25	32	23	14	11	18.8
1948	12	13	17	13	19	10	10	20	15	27	16	13	15.4
1949	20	14	19	14	18	14	8	14	13	25	15	9	15.4
1950	12	18	14	18	16	14	14	25	22	28	20	16	18.1
1951	16	22	21	27	20	17	20	22	40	24	18	20	22.3
1952	19	26	33	34	27	18	15	13	23	20	12	15	21.2
1953	15	15	21	16	16	13	16	19	21	16	14	7	15.7
1954	9	16	16	14	7	6	8	10	17	15	9	6	11.0
1955	12	12	14	14	11	9	8	9	13	11	13	8	11.3
1956	18	15	20	27	26	17	13	15	18	14	24	10	18.0
1957	17	17	26	21	11	22	16	14	49	14	18	18	20.1
1958	15	27	26	20	17	24	25	18	20	16	8	15	19.2
1959	14	24	24	17	19	15	32	23	28	19	22	19	21.3
1960	15	14	18	42	24	20	20	20	20	36	32	21	23.6
1961	12	16	14	14	13	14	28	11	13	16	10	12	14.4
1962	7	11	8	14	7	9	12	15	19	20	13	13	12.3
1963	11	9	8	10	11	11	12	13	28	15	12	11	12.6
1964	12	12	13	13	10	9	9	8	11	10	7	5	9.9
1965	6	9	8	8	6	10	8	9	10	7	6	7	7.7
1966	7	8	13	7	9	6	9	11	21	11	9	11	10.2
1967	11	11	7	9	25	12	8	9	16	10	10	14	12.0
1968	11	16	13	13	13	17	10	12	14	16	17	10	13.5
1969	8	15	17	14	17	9	8	8	15	9	10	7	11.3
1970	7	7	18	15	9	10	19	13	11	12	12	9	11.9
1971	12	12	11	15	13	9	8	9	13	12	11	10	11.3
1972	13	10	12	11	10	14	8	24	13	12	14	10	12.6
1973	16	20	25	30	17	17	12	12	14	18	12	11	17.0
1974	15	16	23	21	18	17	24	19	23	26	18	15	19.6
1975	16	18	20	16	13	11	12	10	10	12	18	12	13.9
1976	13	17	23	17	14	10	9	9	13	12	9	10	12.9
1977	10	11	11	16	11	8	14	13	16	13	10	10	11.9
1978	15	16	17	24	25	20	13	17	18	12	15	13	17.0
1979	16	15	19	25	14	12	12	18	14	12	10	9	14.5
1980	10	11	8	11	10	13	11	10	8	14	13	13	11.1
1981	9	14	18	28	20	12	19	15	12	23	15	10	16.3
1982	12	33	18	22	17	22	30	21	36	18	21	21	22.4
1983	16	27	23	24	22	15	12	16	14	17	21	15	18.5
1984	13	17	21	25	17	15	16	16	24	23	21	18	18.8
1985	16	15	11	21	9	11	14	13	13	14	15	13	13.7
1986	14	27	13	8	12	8	8	12	17	11	13	8	12.5
1987	8	10	10	7	8	7	11	14	19	16	13	9	11.0
1988	13	15	14	16	12	11	10	10	12	13	12	13	12.7

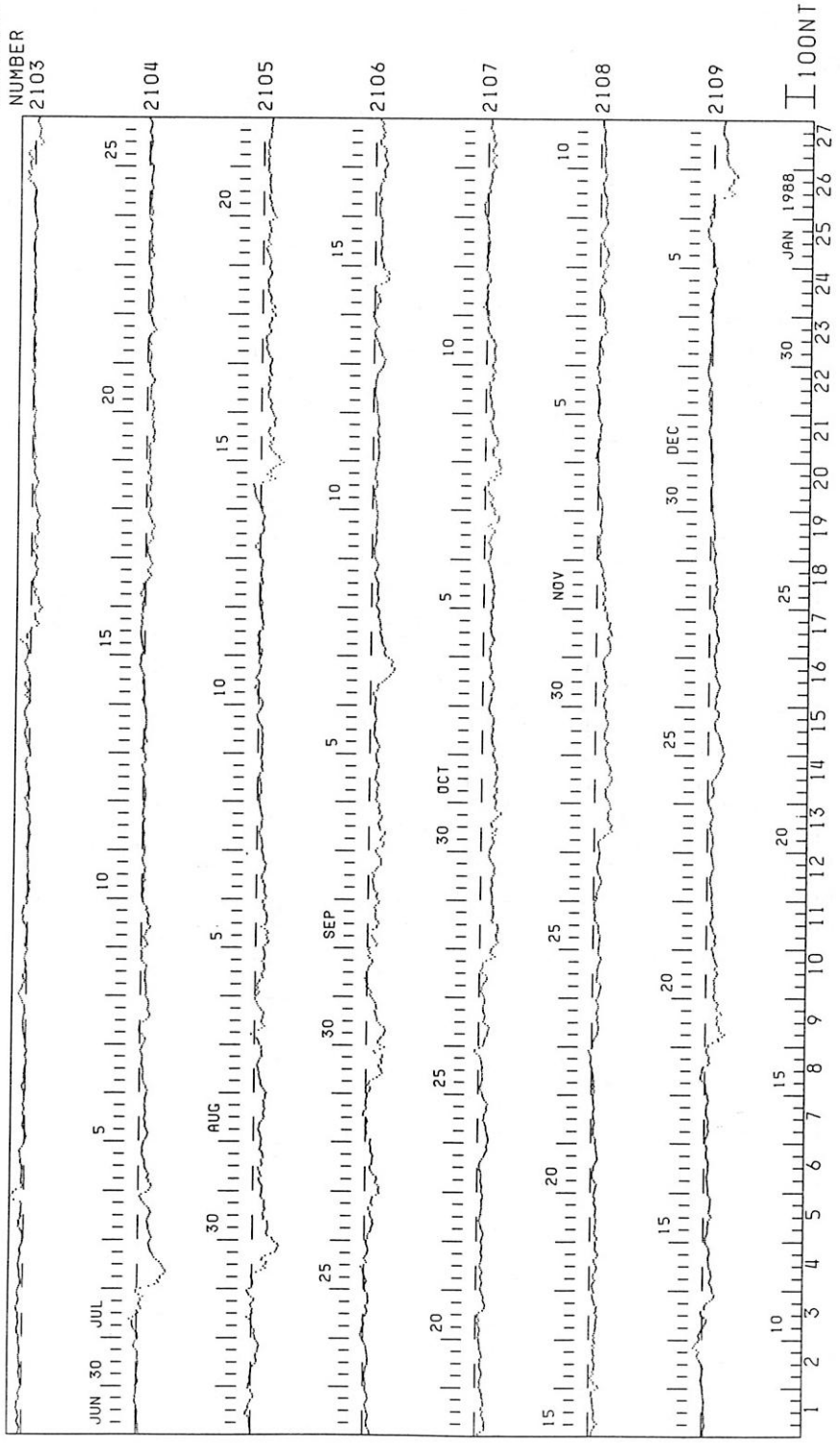
SECTION 3

3.4. Dst INDICES

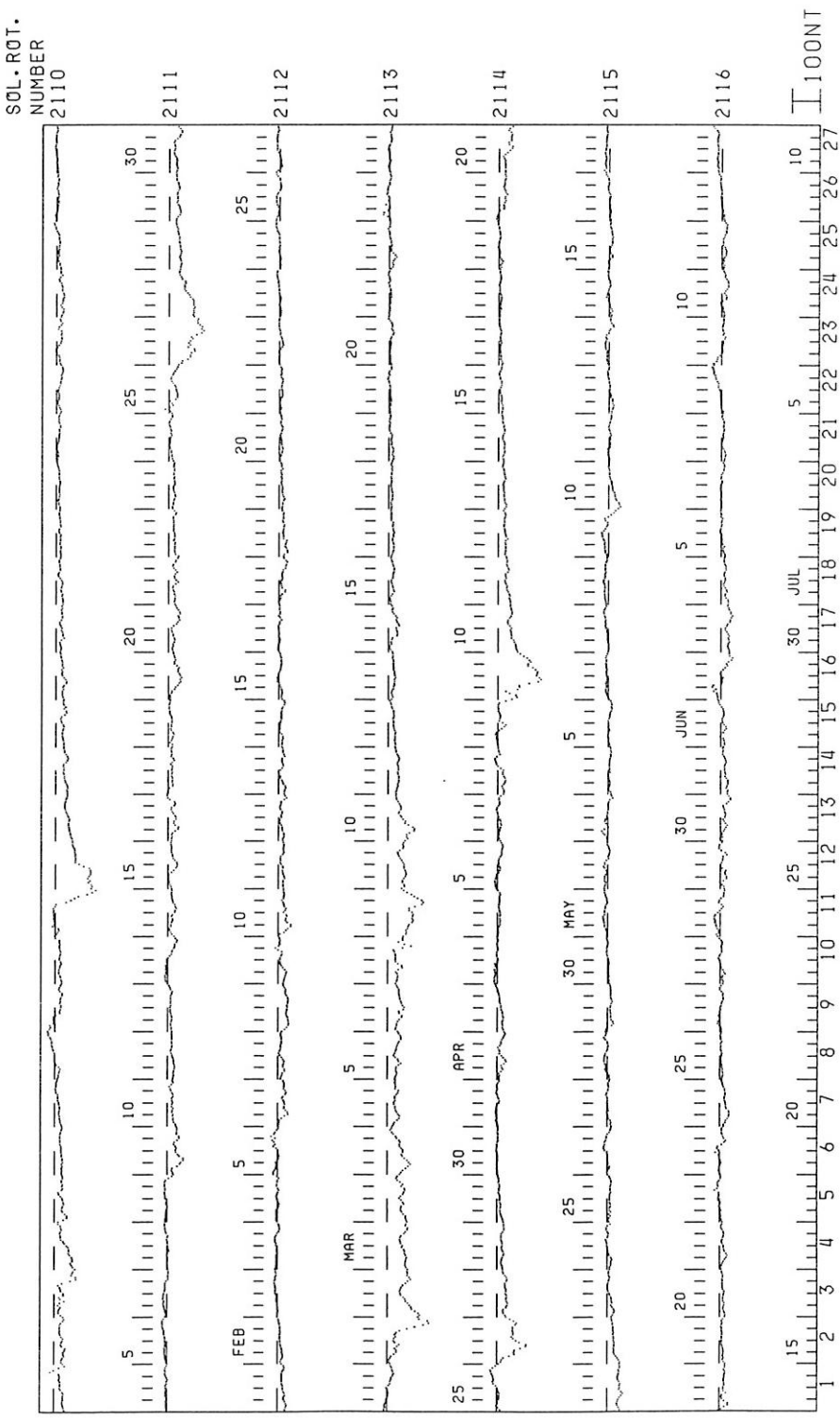
- Hourly values of **Dst** 1988 (graph) 89
- Monthly tables of **Dst** hourly values 92
- Tables of daily means of **Dst** 104
- Monthly and yearly mean values

  1957 - 1988 105

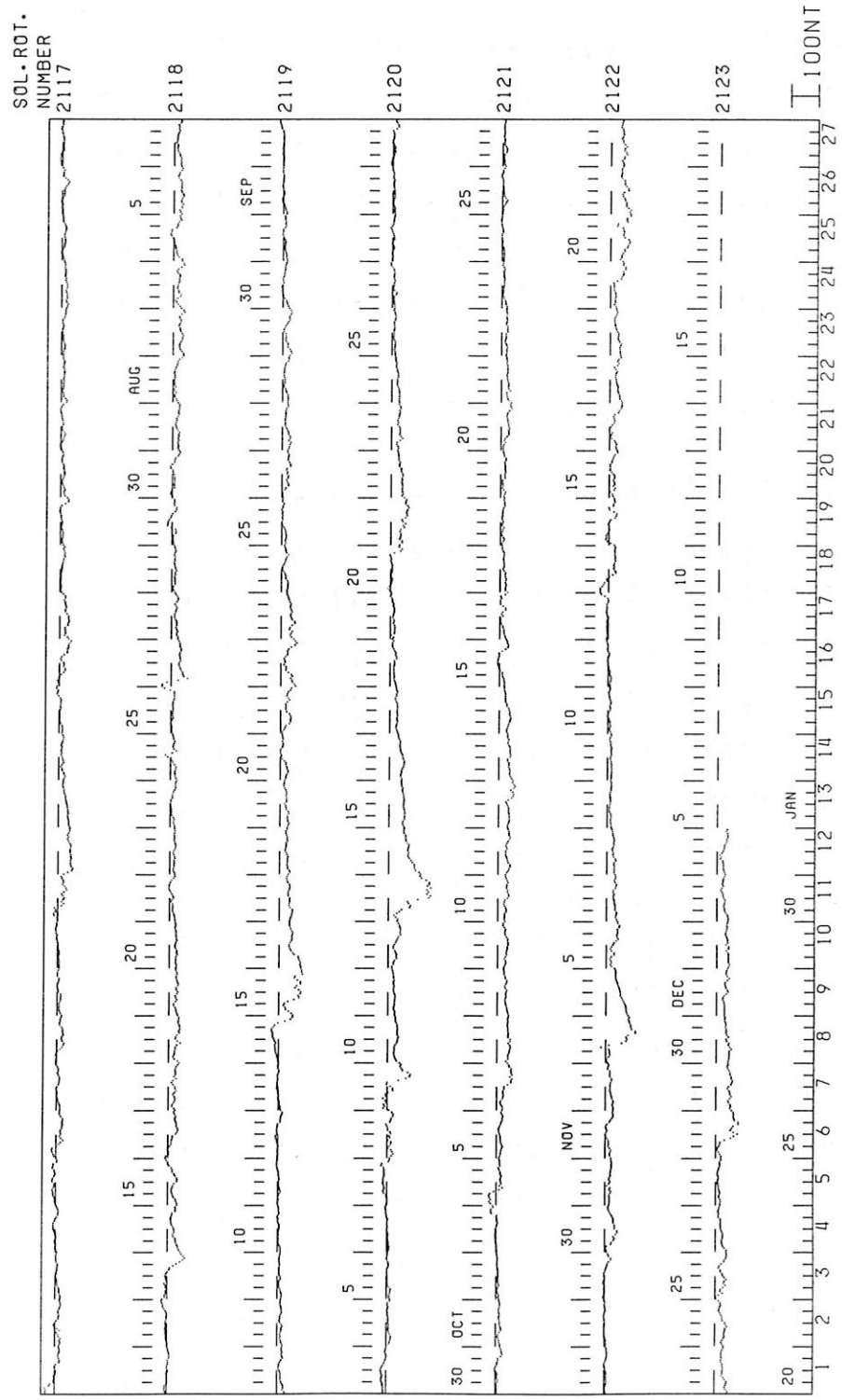
HOURLY VALUES OF **Dst** 1988



HOURLY VALUES OF **Dst** 1988 (continued)



HOURLY VALUES OF **Dst** 1988 (continued)



JANUARY 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-16	-10	-8	-6	-6	-3	-4	-4	-3	-3	-4	-1	-2	6	11	15	13	16	17	16	9	7	5	8
2	10	10	5	-2	3	1	-5	-6	0	-5	-38	-66	-75	-66	-55	-56	-63	-72	-71	-73	-88	-86	-75	-71
3	-66	-58	-52	-52	-50	-46	-46	-45	-50	-46	-49	-48	-49	-48	-46	-41	-37	-35	-34	-34	-36	-36	-38	-40
4	-42	-38	-36	-34	-31	-31	-33	-33	-34	-36	-32	-26	-22	-23	-24	-23	-20	-21	-22	-20	10	-1	-20	-40
5	-33	-28	-28	-32	-38	-35	-35	-40	-41	-30	-26	-28	-32	-33	-27	-24	-21	-21	-21	-21	-21	-26	-33	-38
6	-34	-26	-17	-17	-20	-24	-16	-22	-37	-24	-19	-35	-35	-26	-24	-21	-16	-29	-60	-80	-79	-64	-67	-70
7	-77	-69	-64	-60	-67	-67	-65	-58	-53	-54	-54	-52	-46	-39	-34	-25	-24	-24	-22	-23	-27	-25	-24	-15
8	-15	-35	-47	-47	-40	-32	-28	-29	-32	-36	-34	-31	-30	-24	-18	-16	-28	-32	-30	-31	-28	-28	-31	-31
9	-27	-27	-28	-28	-29	-28	-31	-30	-30	-28	-27	-26	-25	-25	-25	-22	-21	-22	-21	-21	-21	-24	-26	-29
10	-27	-25	-22	-21	-20	-19	-17	-17	-19	-20	-20	-17	-17	-13	-13	-14	-13	-8	-6	-5	-7	-8	-8	-11
11	-12	-15	-16	-17	-19	-21	-16	-7	-3	-2	-2	-2	-2	-2	2	5	6	9	8	8	11	14	21	21
12	22	16	12	15	2	1	3	3	-5	-19	-19	-22	-24	-23	-20	-21	-21	-23	-28	-28	-19	-16	-18	-22
13	-25	-26	-24	-22	-20	-16	-15	-16	-19	-20	-24	-22	-17	-17	-19	-22	-22	-19	-18	-18	-19	-17	-17	-3
14	-2	-8	-11	-16	-13	7	1	-1	1	3	2	2	4	2	4	-2	-5	-41	-59	-72	-86	-117	-134	-147
15	-131	-134	-131	-121	-126	-118	-123	-129	-129	-129	-124	-104	-88	-75	-75	-76	-74	-75	-72	-73	-71	-66	-64	-64
16	-64	-62	-58	-57	-56	-53	-52	-51	-49	-50	-52	-53	-50	-46	-44	-40	-38	-36	-36	-36	-39	-40	-43	-45
17	-45	-45	-43	-46	-45	-41	-38	-36	-34	-33	-32	-30	-32	-31	-30	-31	-40	-45	-48	-45	-40	-35	-34	-31
18	-32	-32	-31	-30	-28	-25	-26	-25	-28	-30	-32	-29	-24	-21	-20	-23	-35	-41	-40	-32	-39	-32	-29	-30
19	-32	-28	-25	-26	-25	-30	-28	-31	-40	-41	-37	-31	-25	-24	-25	-23	-29	-25	-26	-25	-24	-22	-20	-19
20	-18	-19	-21	-19	-17	-15	-22	-32	-27	-27	-26	-22	-24	-20	-15	-16	-21	-26	-26	-24	-23	-21	-25	-23
21	-27	-27	-27	-25	-24	-26	-22	-20	-22	-23	-25	-25	-22	-17	-11	-10	-13	-18	-17	-16	-15	-13	-14	-17
22	-19	-20	-18	-18	-19	-20	-16	-16	-17	-18	-18	-19	-14	-12	-13	-19	-18	-17	-17	-15	-15	-13	-14	-16
23	-16	-15	-12	-11	-10	-12	-13	-15	-14	-13	-13	-13	-15	-17	-15	-13	-13	-13	-14	-13	-11	-9	-7	-6
24	-6	-7	-10	-10	-10	-7	-4	-5	-5	-9	-11	-11	-12	-12	-13	-13	-14	-18	-17	-14	-12	-11	-11	-14
25	-16	-19	-17	-14	-11	-8	-8	-11	-12	-12	-11	-9	-9	-12	-15	-17	-18	-19	-22	-20	-23	-25	-26	-24
26	-19	-16	-14	-14	-13	-11	-4	-1	-1	-6	-12	-17	-20	-22	-21	-19	-21	-19	-9	-11	-19	-23	-18	-15
27	-19	-22	-26	-28	-27	-22	-18	-23	-25	-26	-29	-30	-27	-23	-23	-23	-22	-19	-14	-11	-16	-23	-18	-17
28	-18	-17	-13	-14	-10	-6	-8	-11	-10	-10	-12	-11	-12	-13	-14	-11	-11	-11	-8	-3	0	1	4	7
29	1	-1	0	3	-1	-4	-5	-6	-8	-10	-9	-8	-9	-9	-8	-7	-3	-6	-8	-7	-9	-9	-6	-7
30	-8	-7	-7	-4	-3	-2	-3	-4	-1	0	0	1	2	2	1	-1	-1	1	-1	-1	-2	-5	-5	-4
31	-3	-2	-1	-1	-1	-1	-2	-2	2	2	1	0	1	1	-2	-3	-6	-3	1	3	2	3	2	-2

FEBRUARY 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-4	-1	1	3	4	5	6	5	5	3	3	3	4	4	5	7	8	7	11	13	13	14	14	9
2	4	0	1	3	5	7	9	9	8	11	10	10	8	6	3	4	4	3	0	-6	-7	-7	-8	-8
3	-7	-5	-4	-4	-4	-5	-4	-3	-5	-10	-9	-7	-6	-5	-4	-3	-5	-6	-1	1	3	4	5	5
4	4	3	1	2	2	1	0	-4	-4	-1	-1	-2	3	4	5	5	3	4	6	5	5	2	-9	-20
5	-26	-23	-18	-22	-40	-49	-53	-62	-62	-48	-42	-35	-34	-37	-33	-27	-30	-40	-47	-46	-38	-38	-39	-39
6	-36	-33	-27	-25	-24	-23	-24	-20	-22	-24	-19	-21	-23	-20	-19	-24	-24	-21	-17	-14	-11	-18	-25	-22
7	-23	-25	-26	-25	-26	-28	-30	-28	-26	-26	-25	-22	-20	-17	-15	-17	-19	-20	-19	-18	-19	-19	-18	-18
8	-18	-17	-16	-15	-14	-17	-19	-19	-17	-15	-13	-13	-12	-14	-14	-15	-14	-14	-14	-19	-20	-14	-12	-9
9	-3	3	5	5	6	1	2	3	2	3	-2	0	-1	-4	-11	-17	-19	-20	-26	-29	-29	-36	-38	-32
10	-27	-18	-14	-11	-9	-14	-14	-16	-21	-20	-17	-21	-29	-30	-35	-31	-28	-23	-21	-19	-19	-17	-16	-18
11	-17	-14	-12	-8	-7	-7	-6	-6	-16	-24	-33	-37	-38	-36	-29	-23	-20	-20	-17	-16	-16	-16	-14	-14
12	-16	-17	-18	-16	-21	-30	-40	-42	-30	-24	-26	-33	-33	-29	-23	-18	-14	-16	-26	-30	-27	-11	-3	0
13	0	-2	-4	-8	-20	-21	-18	-18	-19	-16	-17	-18	-17	-18	-18	-13	-18	-26	-22	-14	-17	-16	-15	-15
14	-19	-18	-10	-14	-18	-21	-24	-21	-14	-13	-15	-14	-17	-17	-17	-15	-11	-9	-8	-7	-7	-7	-9	-10
15	-11	-10	-10	-14	-17	-26	-30	-38	-43	-49	-47	-52	-47	-44	-39	-39	-43	-35	-26	-26	-30	-27	-24	-23
16	-21	-18	-17	-20	-20	-24	-27	-24	-21	-21	-16	-14	-15	-23	-33	-38	-44	-42	-40	-46	-45	-40	-34	-31
17	-27	-24	-27	-27	-28	-25	-24	-20	-19	-20	-30	-39	-32	-26	-24	-28	-36	-30	-23	-19	-21	-28	-31	-37
18	-40	-29	-26	-25	-26	-26	-26	-27	-22	-25	-26	-26	-25	-22	-22	-22	-23	-22	-22	-20	-20	-28	-32	-25
19	-18	-17	-20	-21	-23	-24	-29	-27	-25	-22	-20	-21	-26	-26	-24	-23	-25	-23	-23	-24	-24	-22	-23	-24
20	-20	-16	-14	-14	-13	-13	-10	-8	-7	-8	-8	-9	-10	-14	-11	-13	-11	-8	-6	-4	-6	-11	-16	-17
21	-14	-9	9	-7	-19	-14	-7	-28	-35	-35	-35	-32	-30	-29	-25	-18	-14	-10	-12	-16	-21	-26	-32	-36
22	-39	-50	-53	-72	-82	-82	-85	-97	-96	-73	-81	-75	-82	-90	-85	-103	-122	-130	-122	-123	-115	-108	-107	-110
23	-95	-91	-94	-93	-94	-97	-93	-93	-93	-90	-82	-77	-72	-64	-60	-60	-60	-64	-62	-52	-48	-43	-41	-42
24	-44	-46	-47	-49	-47	-45	-41	-44	-47	-48	-45	-44	-43	-42	-41	-41	-42	-39	-37	-35	-36	-33	-30	-29
25	-29	-30	-35	-42	-45	-45	-42	-41	-36	-32	-35	-34	-35	-33	-34	-37	-41	-40	-38	-36	-31	-31	-31	-30
26	-29	-32	-34	-32	-30	-30	-32	-31	-26	-22	-21	-22	-25	-25	-23	-21	-24	-33	-41	-44	-49	-49	-44	-37
27	-31	-29	-32	-35	-32	-29	-25	-24	-29	-28	-24	-22	-22	-21	-18	-18	-18	-18	-18	-18	-20	-25	-27	-25
28	-17	-13	-16	-20	-22	-20	-19	-19	-17	-14	-13	-12	-12	-11	-11	-11	-13	-12	-12	-12	-10	-9	-7	-5
29	-2	-2	-3	-4	-3	-3	-2	-2	1	1	0	2	5	5	4	5	7	8	8	5	5	2	3	4

MARCH 1988

DAY	UNIT=NT 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	5	2	1	1	2	1	2	1	-3	0	0	-1	2	3	6	6	6	2	-1	-7	-10	-10	-9	-6
2	-1	2	2	1	3	3	2	-4	-8	-9	-6	-3	0	1	-2	-4	-7	-4	0	0	-2	-3	-8	-2
3	13	12	8	4	1	3	4	-1	-6	-8	-6	-4	-4	2	12	7	10	16	7	21	11	6	0	-5
4	-6	-7	-8	-9	-16	-28	-40	-38	-31	-25	-26	-28	-26	-23	-18	-22	-30	-33	-30	-24	-25	-26	-25	-22
5	-13	-15	-18	-19	-27	-27	-21	-21	-24	-25	-21	-16	-10	-6	-9	-12	-13	-13	-15	-16	-16	-15	-13	-13
6	-17	-27	-34	-40	-41	-40	-39	-37	-33	-32	-33	-35	-36	-35	-38	-39	-40	-38	-33	-29	-29	-30	-26	-22
7	-21	-23	-25	-27	-29	-32	-33	-27	-20	-14	-11	-10	-10	-10	-14	-17	-16	-3	7	-5	-9	-8	-10	-8
8	-4	-10	-24	-31	-38	-49	-49	-35	-29	-30	-34	-32	-22	-28	-31	-25	-23	-21	-16	-22	-23	-25	-23	-22
9	-22	-20	-20	-20	-21	-26	-24	-20	-19	-18	-20	-19	-13	-10	-11	-11	-12	-19	-23	-21	-21	-22	-23	-21
10	-19	-19	-23	-23	-22	-18	-17	-16	-13	-9	-8	-8	-13	-13	-16	-17	-11	-8	-10	-12	-13	-24	-32	-27
11	-24	-24	-25	-29	-27	-21	-18	-14	-9	-9	-5	-4	-10	-16	-20	-19	-16	-15	-16	-25	-22	-19	-19	-18
12	-14	-15	-16	-16	-19	-18	-14	-8	-6	-7	-7	-8	-9	-11	-13	-12	-13	-12	-14	-14	-18	-23	-25	-23
13	-15	-12	-13	-15	-14	-13	-11	-8	-4	2	1	2	-1	-3	-6	-9	-10	-11	-13	-12	-12	-12	-9	-8
14	-4	0	0	-1	-3	-6	-7	-5	-3	-5	-4	-3	-3	-1	-6	-6	-13	-8	-3	-7	-8	-6	-5	-6
15	-4	-3	-7	-10	-10	-15	-25	-26	-15	-13	-11	-9	-13	-16	-15	-14	-17	-18	-26	-28	-30	-33	-28	-21
16	-19	-22	-34	-33	-30	-25	-26	-29	-31	-19	-19	-19	-17	-18	-20	-21	-22	-18	-16	-19	-19	-18	-20	-15
17	-13	-15	-16	-16	-20	-23	-19	-16	-15	-14	-15	-15	-12	-11	-12	-13	-11	-13	-11	-10	-16	-12	-12	-10
18	-6	-5	-8	-10	-13	-14	-16	-14	-12	-11	-12	-10	-8	-7	-10	-12	-15	-15	-11	-8	-9	-12	-10	-9
19	-7	-6	-9	-9	-7	-6	-6	-7	-11	-14	-14	-14	-12	-11	-12	-13	-16	-15	-10	-9	-11	-10	-12	-8
20	-4	-1	-1	-2	-2	-4	-2	-2	-8	-13	-17	-15	-14	-12	-9	-6	-7	-5	-3	-2	-1	-2	-2	-3
21	-5	-8	-9	-9	-7	-5	-3	-4	-6	-8	-8	-3	-2	-2	-1	0	0	1	1	4	5	6	6	4
22	-5	-5	-7	-5	-4	-7	-6	-3	-1	0	-1	-2	-4	-3	-2	-2	-2	-1	1	5	7	11	10	11
23	10	9	6	2	3	0	-1	3	6	8	8	8	9	7	2	-3	-6	-7	-6	-6	-4	-3	4	9
24	10	4	-5	-10	-7	-6	-7	-6	-4	-2	3	7	6	6	7	7	7	8	6	5	4	1	2	4
25	8	9	6	7	5	1	0	-3	-4	-7	-5	-4	1	-7	-13	-13	-16	-17	-23	-26	-23	-21	-19	-15
26	-13	-9	-9	-13	-17	-27	-35	-36	-30	-38	-45	-30	-25	-27	-33	-30	-35	-48	-75	-103	-135	-154	-150	-119
27	-115	-121	-116	-104	-91	-90	-84	-77	-69	-67	-61	-51	-49	-47	-50	-54	-59	-70	-78	-87	-83	-76	-78	-75
28	-77	-71	-68	-68	-70	-71	-73	-70	-66	-66	-63	-56	-58	-52	-50	-47	-49	-54	-64	-70	-76	-77	-69	-71
29	-75	-72	-70	-70	-62	-56	-52	-52	-54	-64	-59	-53	-46	-51	-60	-63	-68	-65	-54	-59	-49	-40	-35	-39
30	-47	-53	-59	-70	-80	-88	-82	-75	-66	-57	-54	-59	-59	-53	-48	-48	-49	-45	-37	-33	-25	-19	-13	-18
31	-21	-25	-29	-38	-46	-47	-41	-37	-33	-31	-31	-27	-27	-31	-30	-30	-36	-41	-43	-32	-33	-32	-30	-31

APRIL 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-30	-31	-36	-37	-34	-33	-34	-43	-51	-44	-40	-32	-25	-29	-32	-34	-36	-38	-41	-45	-51	-52	-49	-43
2	-39	-31	-33	-36	-36	-40	-46	-53	-55	-46	-43	-59	-64	-57	-54	-51	-48	-46	-45	-43	-43	-43	-39	-36
3	-32	-35	-37	-38	-40	-37	-32	-42	-55	-54	-40	-32	-30	-32	-31	-30	-27	-23	-58	-88	-64	-42	-57	-57
4	-60	-69	-71	-70	-75	-78	-81	-91	-96	-91	-93	-96	-92	-81	-82	-102	-128	-133	-127	-112	-99	-89	-74	-61
5	-53	-63	-62	-56	-56	-62	-67	-70	-69	-66	-62	-61	-62	-58	-53	-48	-44	-40	-38	-46	-57	-60	-58	-60
6	-66	-76	-71	-71	-81	-97	-100	-93	-78	-65	-67	-57	-51	-48	-42	-44	-49	-50	-48	-44	-39	-34	-33	-32
7	-32	-32	-34	-35	-38	-37	-41	-42	-42	-42	-38	-37	-40	-40	-39	-36	-37	-41	-44	-39	-35	-31	-30	-29
8	-27	-29	-27	-26	-27	-28	-28	-29	-26	-23	-22	-21	-22	-21	-20	-23	-23	-22	-22	-17	-15	-13	-11	-8
9	-14	-19	-16	-13	-15	-20	-21	-24	-24	-25	-25	-29	-26	-25	-25	-21	-22	-21	-20	-21	-20	-18	-19	-19
10	-16	-11	-6	-7	-13	-12	-15	-17	-33	-36	-35	-32	-32	-42	-39	-34	-32	-34	-29	-22	-17	-16	-19	-15
11	-11	-11	-8	-7	-12	-17	-23	-21	-19	-17	-15	-12	-13	-18	-19	-19	-22	-23	-23	-20	-18	-16	-14	-11
12	-12	-15	-18	-20	-21	-21	-21	-19	-16	-16	-20	-19	-23	-20	-19	-17	-18	-19	-12	-12	-12	-12	-12	-11
13	-12	-13	-12	-11	-14	-16	-16	-17	-16	-13	-13	-11	-11	-12	-13	-12	-11	-13	-13	-15	-14	-15	-11	-13
14	-16	-20	-20	-15	-17	-19	-19	-15	-12	-13	-11	-11	-13	-14	-9	-5	-4	-4	-4	-7	-4	-6	-8	-8
15	-7	-7	-6	-5	-8	-9	-10	-10	-9	-7	-6	-8	-7	-7	-5	-3	-2	2	0	-4	-2	-4	-11	-11
16	-11	-8	-8	-8	-8	-8	-4	-4	-7	-7	-8	-9	-7	-8	-11	-16	-20	-16	-12	-13	-14	-12	-6	0
17	-1	-3	-2	-4	-5	-4	-3	-7	-7	-6	-10	-10	-8	-8	-7	-3	-3	0	-5	-4	-2	1	0	-3
18	-9	-15	-17	-14	-17	-22	-29	-24	-17	-9	-9	-9	-11	-9	-9	-6	-4	-3	-3	-1	2	-4	-4	-5
19	-6	-4	5	20	18	3	-2	-2	12	-1	1	-1	1	7	5	5	4	3	-3	-3	-4	-7	-8	-5
20	-5	-1	1	2	-1	-4	-6	-2	-1	-1	0	3	2	0	-3	-7	-9	-10	-7	-7	-4	-9	-10	-12
21	-16	-14	-8	-2	-5	-5	-10	-11	-11	-12	-9	-7	-4	0	9	11	8	10	11	15	18	20	11	1
22	-9	-17	-20	-26	-48	-66	-64	-67	-89	-108	-109	-85	-73	-62	-56	-63	-62	-60	-61	-61	-70	-74	-64	-51
23	-37	-33	-27	-24	-27	-36	-41	-42	-38	-36	-38	-39	-34	-37	-36	-33	-33	-33	-38	-40	-38	-33	-26	-24
24	-24	-22	-21	-18	-18	-20	-23	-26	-29	-25	-21	-20	-22	-23	-21	-19	-18	-18	-19	-24	-29	-29	-28	-28
25	-26	-24	-22	-19	-17	-15	-14	-15	-16	-17	-14	-12	-14	-14	-12	-8	-11	-11	-13	-12	-8	-10	-9	-7
26	-5	-5	-5	-3	-4	-3	-3	-6	-5	-5	-5	-2	-1	-2	-3	-3	-4	-7	-6	-6	-7	-5	-6	-7
27	-8	-6	-3	1	-2	-1	0	1	1	0	-1	-4	-10	-12	-9	-6	-5	-1	-2	-5	-3	-3	-6	-11
28	-10	-10	-12	-9	-17	-24	-20	-19	-29	-36	-33	-25	-19	-11	-12	-10	-6	-13	-17	-17	-20	-25	-29	-32
29	-29	-25	-22	-23	-21	-21	-24	-25	-23	-23	-21	-17	-16	-16	-14	-11	-11	-11	-10	-8	-5	-4	-2	2
30	5	8	7	8	5	4	5	7	-1	3	5	-3	-6	-4	-1	0	-1	-5	-5	-3	-2	-3	-5	-3

MAY 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-3	-5	-7	-5	-5	-9	-13	-12	-13	-12	-12	-13	-13	-11	-9	-8	-9	-10	-11	-10	-10	-13	-12	-5
2	1	4	5	6	6	4	1	-1	-7	-11	-13	-11	-8	-7	-7	-9	-13	-18	-19	-19	-20	-22	-21	-17
3	-13	-9	-6	-7	-8	-9	-11	-13	-16	-15	-14	-11	-6	-4	-3	-1	1	-1	-6	-10	-10	-8	-8	-14
4	-24	-26	-25	-22	-19	-25	-30	-32	-30	-26	-21	-21	-24	-14	-4	1	3	6	7	0	-11	-8	-6	-4
5	-4	-3	-1	-1	1	2	5	2	-8	-17	-27	-33	-20	-8	-10	-12	-11	-9	-5	-5	-4	-4	-8	-33
6	-54	-72	-69	-46	-33	-75	-82	-81	-116	-149	-160	-154	-143	-145	-147	-139	-129	-112	-112	-122	-117	-109	-97	-84
7	-75	-72	-69	-69	-67	-63	-60	-53	-53	-52	-51	-49	-52	-47	-41	-39	-41	-47	-51	-54	-55	-53	-50	-49
8	-49	-48	-47	-45	-46	-44	-41	-36	-35	-36	-32	-29	-29	-33	-31	-30	-38	-43	-41	-37	-35	-37	-37	-35
9	-33	-29	-29	-31	-31	-30	-30	-29	-30	-38	-33	-30	-28	-28	-26	-24	-25	-27	-26	-27	-29	-30	-28	-23
10	-27	-33	-32	-29	-27	-27	-24	-24	-27	-23	-23	-22	-21	-22	-26	-30	-28	-26	-25	-24	-22	-18	-20	-23
11	-23	-21	-19	-22	-25	-26	-24	-25	-26	-25	-22	-19	-19	-20	-24	-26	-25	-22	-24	-20	-18	-18	-18	-16
12	-15	-16	-18	-19	-18	-15	-13	-14	-14	-13	-10	-8	-8	-11	-15	-15	-14	-10	-8	-6	-5	-9	-13	-14
13	-15	-17	-15	-11	-12	-11	-10	-9	-8	-8	-9	-13	-11	-9	-9	-10	-12	-12	-9	-7	-6	-5	-5	-5
14	-7	-7	-7	-8	-11	-10	-9	-10	-12	-13	-13	-12	-8	-7	-7	-6	-5	-7	-9	-11	-11	-10	-8	-8
15	-9	-12	-10	-14	-17	-12	-7	-4	-7	-7	-3	-1	-3	-3	-5	-7	-9	-8	-7	-6	-4	-4	-1	-1
16	1	5	3	1	-2	-7	-21	-22	-20	-24	-28	-25	-27	-35	-29	-26	-23	-21	-24	-24	-25	-29	-29	-26
17	-26	-26	-26	-27	-27	-25	-27	-22	-18	-25	-34	-43	-51	-52	-40	-39	-48	-49	-48	-51	-47	-38	-42	-53
18	-50	-47	-43	-39	-38	-40	-42	-47	-54	-59	-54	-46	-48	-47	-49	-45	-41	-39	-42	-44	-45	-43	-48	-48
19	-47	-48	-44	-39	-34	-28	-25	-27	-26	-27	-27	-27	-25	-25	-25	-24	-25	-24	-24	-23	-21	-21	-20	-18
20	-18	-22	-26	-28	-25	-20	-16	-19	-17	-18	-15	-12	-10	-6	-4	-3	-3	-5	-7	-9	-11	-8	-7	-8
21	-11	-11	-15	-15	-16	-19	-16	-9	-7	-6	-4	-4	-1	-1	0	3	-3	-6	-7	-4	0	1	-3	-13
22	-9	-5	-9	-14	-10	-15	-11	-11	-13	-13	-11	-11	-11	-12	-12	-15	-14	-14	-14	-16	-17	-16	-13	-9
23	-4	-2	-4	-9	-11	-6	-5	-4	-4	-3	-4	-1	7	11	10	7	7	3	1	0	-3	-10	-14	-15
24	-18	-14	-15	-13	-7	-6	-3	-1	-8	-6	-3	-3	-2	-4	-3	-1	2	-1	-5	-6	-7	-5	-6	-10
25	-11	-10	-9	-4	2	6	3	2	7	9	9	8	7	4	0	-4	-3	-5	-4	-2	6	10	4	2
26	4	2	-2	-18	-24	-21	-15	-13	-13	-13	-12	-12	-12	-14	-16	-19	-17	-13	-14	-13	-13	-13	-13	-12
27	-10	-8	-7	-6	-7	-6	-5	-5	-5	-5	-7	-7	-5	-3	-2	0	2	1	0	-1	-3	-3	-2	1
28	1	0	0	3	5	8	8	10	12	14	14	9	9	8	7	6	3	-1	0	1	4	6	8	9
29	10	9	7	5	9	8	8	4	-1	3	9	13	8	8	3	-5	-4	-7	-9	-10	-7	-5	-1	-1
30	-1	1	1	9	15	19	10	-3	-2	5	8	6	2	0	-1	-2	-3	-4	-3	-3	-6	-9	-19	-15
31	-13	-11	-6	-6	-8	-10	-10	-7	-6	-3	-4	-10	-8	-7	-8	-7	-8	-8	-10	-12	-12	-14	-12	-12

JUNE 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-10	-7	-6	-4	-4	-2	-2	-3	-7	-5	-4	-4	-3	-2	-6	-8	-8	-9	-13	-16	-14	-15	-14	-12
2	-5	-1	2	4	7	7	4	5	6	4	2	2	5	4	4	3	4	4	6	4	5	7	4	0
3	-2	-3	-3	-4	-3	-2	1	1	1	1	3	3	6	8	7	8	7	9	11	13	14	12	8	5
4	6	7	8	10	10	11	12	11	10	10	12	16	14	10	10	10	7	9	8	9	8	6	3	3
5	3	5	9	10	11	11	12	11	14	17	20	20	22	14	9	5	1	1	9	11	-1	-11	-21	-28
6	-37	-45	-41	-39	-31	-27	-25	-25	-23	-18	-15	-15	-14	-13	-12	-8	-6	-5	-5	-6	-4	-2	-3	-3
7	-4	-5	-2	1	1	0	2	-7	-8	-7	-4	-7	-8	-10	-8	-5	-3	-2	-4	-6	-7	-9	-11	-11
8	-12	-12	-15	-17	-20	-16	-16	-15	-10	-9	-7	-4	-5	-6	-5	-3	-3	-1	0	2	2	3	-1	-3
9	-1	3	5	6	5	5	4	4	8	10	11	11	9	6	9	7	-1	-4	-8	-20	-17	-11	-8	-8
10	-10	-11	-8	-14	-12	-8	-6	-4	0	-1	7	5	2	0	-2	-6	-7	-6	-5	-1	0	1	0	2
11	1	-1	-2	0	0	-5	-14	-13	-7	-3	-3	-7	-12	-13	-13	-14	-16	-14	-12	-11	-9	-7	-6	-7
12	-7	-7	-6	-6	-7	-7	-6	-4	-5	-4	-4	-6	-7	-5	-1	1	2	2	-1	-2	-1	1	4	9
13	10	16	9	10	12	12	10	9	10	12	13	11	10	8	8	8	8	8	7	4	5	7	7	6
14	0	-10	-21	-33	-33	-20	-12	-10	-13	-26	-18	-17	-17	-20	-20	-19	-18	-21	-20	-23	-23	-18	-22	-23
15	-23	-18	-15	-17	-15	-16	-17	-16	-14	-13	-11	-10	-11	-11	-11	-12	-12	-11	-10	-9	-11	-13	-10	-15
16	-21	-22	-21	-18	-15	-16	-18	-19	-15	-14	-14	-17	-18	-18	-14	-12	-13	-13	-13	-13	-14	-15	-12	-10
17	-8	-7	-10	-13	-17	-21	-26	-30	-26	-20	-18	-17	-16	-12	-10	-13	-15	-16	-18	-17	-13	-9	-9	-12
18	-12	-9	-7	-8	-6	-5	-8	-5	-1	-4	-6	1	1	-1	-1	0	14	5	1	4	3	-2	-6	-7
19	-6	-3	-1	-2	-3	-6	-9	-6	-2	-3	0	11	0	5	4	-10	-19	-24	-18	-15	-12	-10	-10	-11
20	-17	-17	-23	-24	-31	-34	-37	-37	-34	-27	-24	-24	-23	-21	-19	-20	-22	-22	-21	-20	-16	-14	-13	-10
21	-11	-12	-15	-14	-13	-13	-11	-10	-8	-8	-7	-6	-9	-10	-8	-7	-7	-7	-7	-10	-7	-6	-5	-7
22	-8	-9	-6	-1	5	4	-2	-2	2	-2	-3	-5	-4	-6	-8	-11	-14	-14	-13	-13	-9	-3	-3	-7
23	-13	-14	-11	-10	-12	-20	-16	-12	-7	-5	-4	-3	0	3	0	-4	-9	-9	-9	-7	-10	-10	-6	-1
24	5	9	2	1	7	10	12	15	15	17	17	13	5	-3	-9	-14	-8	1	-1	-6	-14	-16	-17	-19
25	-17	-16	-10	-2	-14	-25	-25	-20	-19	-23	-11	-5	-4	-8	-11	-12	-13	-26	-20	-6	2	1	0	-9
26	-10	-3	-10	-9	-9	-14	-18	-23	-27	-20	-16	-13	-18	-20	-20	-17	-17	-14	-13	-24	-30	-39	-39	-32
27	-27	-26	-29	-23	-25	-29	-29	-28	-23	-18	-21	-18	-17	-17	-17	-19	-23	-21	-18	-15	-10	-11	-12	-11
28	-13	-16	-16	-15	-12	-2	-4	-13	-17	-23	-21	-15	-11	-8	-8	-12	-14	-14	-13	-11	-6	-1	4	4
29	7	7	9	11	22	15	27	23	-6	-9	-8	-10	-5	-2	-5	-11	-18	-26	-22	-30	-41	-44	-34	-32
30	-33	-33	-29	-27	-29	-32	-31	-29	-32	-28	-24	-19	-19	-24	-27	-35	-37	-40	-45	-39	-38	-33	-30	-26

JULY 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-28	-29	-27	-21	-17	-18	-24	-22	-18	-13	-13	-16	-18	-18	-14	-14	-17	-21	-20	-20	-17	-14	-14	-14
2	-17	-17	-12	-11	-11	-14	-9	-7	-6	-7	-4	-5	0	0	-2	-4	-6	-5	-6	-9	-3	-4	-3	-2
3	-3	-4	-4	-5	-2	-3	-4	-3	-4	-2	-1	-2	-3	-6	-7	-3	-4	-5	-9	-13	-13	-15	-14	-11
4	-13	-14	-16	-18	-17	-14	-11	-7	-5	-5	-6	-9	-10	-9	-11	-12	-13	-11	-11	-12	-12	-8	-5	-6
5	-9	-8	-4	-3	-2	-2	-2	-1	0	0	0	1	3	8	7	7	12	16	17	19	24	24	26	29
6	24	25	15	11	10	3	-4	-7	-7	-5	-6	-9	-8	-14	-17	-9	-12	-9	-7	-7	-8	-10	-10	-10
7	-11	-12	-12	-10	-8	-8	-2	0	-7	-19	-20	-18	-13	-16	-22	-26	-26	-27	-25	-20	-15	-16	-14	-11
8	-9	-10	-12	-8	-10	-9	-12	-18	-19	-19	-16	-14	-8	-9	-8	-9	-12	-15	-19	-18	-20	-21	-22	-17
9	-13	-11	-11	-10	-7	-7	-5	-4	-2	-2	-2	0	-1	-3	-3	-2	-1	0	1	1	1	-1	1	6
10	8	9	7	12	11	10	12	14	12	10	10	9	9	10	12	12	12	11	10	8	9	13	21	26
11	29	32	30	33	18	14	1	1	-1	0	-6	-7	-6	-3	-3	-8	-19	-21	-18	-15	-16	-19	-20	-19
12	-17	-20	-22	-20	-23	-16	-13	-9	-20	-12	-2	2	-4	-8	-15	-16	-18	-15	-14	-18	-21	-24	-22	-20
13	-20	-22	-21	-18	-17	-17	-15	-11	-10	-9	-8	-6	-4	-6	-7	-9	-9	-11	-12	-7	-5	-5	-5	-6
14	-9	-5	-2	-4	-4	-1	0	-4	-5	-3	-1	3	5	5	6	5	0	-2	-7	-12	-12	-13	-12	-8
15	-5	-2	1	0	3	6	7	8	10	6	3	3	10	10	8	3	-1	1	3	9	8	6	-6	-7
16	-4	4	7	11	13	11	-4	-13	-19	-28	-21	-15	-20	-18	-18	-23	-24	-25	-24	-26	-26	-20	-15	-14
17	-15	-16	-15	-14	-12	-8	-7	-4	-4	-5	-4	-2	-5	-10	-12	-13	-14	-13	-9	-6	-9	-9	-6	-1
18	1	0	-1	-2	0	-1	-7	-15	-22	-26	-28	-22	-20	-21	-25	-25	-24	-24	-21	-13	-12	-15	-15	-18
19	-20	-15	-12	-10	-10	-11	-10	-13	-16	-15	-17	-15	-8	-6	-4	-3	-4	-7	-9	-9	-4	-4	-4	-7
20	-10	-9	-9	-10	-9	-8	-7	-9	-9	-9	-6	-5	-5	-4	-2	0	0	-1	2	3	4	2	0	0
21	-2	-2	-1	10	12	5	4	9	-16	-24	-16	-22	-25	-21	-17	-25	-34	-32	-26	-20	-23	-22	-18	-15
22	-24	-38	-51	-55	-50	-47	-47	-47	-50	-48	-48	-46	-46	-46	-48	-48	-44	-40	-37	-40	-37	-40	-44	-44
23	-44	-40	-39	-40	-38	-37	-36	-38	-37	-37	-35	-34	-32	-31	-29	-29	-28	-25	-23	-23	-21	-19	-18	-20
24	-21	-23	-26	-23	-21	-16	-15	-11	-15	-21	-19	-17	-15	-12	-13	-12	-13	-15	-12	-14	-17	-20	-21	-17
25	-13	-15	-15	-15	-14	-9	-6	-4	-6	-5	-5	-4	-7	-9	-7	-9	-9	-10	-7	-1	4	2	0	7
26	5	-2	1	4	-1	-4	-10	-18	-24	-24	-18	-20	-18	-10	-8	-12	-20	-30	-31	-32	-35	-35	-39	-44
27	-36	-31	-21	-24	-23	-22	-22	-32	-33	-36	-36	-34	-34	-29	-23	-23	-26	-25	-23	-22	-19	-23	-23	-16
28	-9	-6	-6	-8	-7	-4	-6	-7	-7	-6	-7	-9	-9	-10	-11	-13	-15	-16	-21	-19	-21	-18	-16	-19
29	-14	-11	-9	-9	-12	-12	-13	-12	-9	-6	-8	-9	-10	-7	-5	-6	-3	-1	-2	-3	-8	-21	-32	-32
30	-27	-19	-16	-16	-18	-15	-13	-9	-8	-10	-13	-16	-17	-17	-15	-14	-15	-12	-8	-8	-8	-11	-13	-10
31	-6	-3	-1	-1	-8	-12	-13	-16	-18	-15	-9	-6	-7	-12	-10	-9	-7	-6	-5	-3	-1	-2	-5	-11

AUGUST 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-22	-24	-19	-12	-12	-10	-6	-10	-12	-12	-12	-13	-12	-13	-14	-14	-15	-14	-11	-13	-14	-15	-10	-10
2	-10	-10	-11	-14	-15	-16	-13	-11	-9	-9	-9	-8	-7	-7	-9	-11	-8	-7	-7	-13	-15	-17	-18	-18
3	-21	-24	-26	-21	-19	-23	-22	-23	-20	-18	-22	-24	-23	-21	-17	-19	-16	-16	-17	-17	-16	-15	-16	-14
4	-12	-11	-8	-5	-3	-3	-7	-11	-12	-14	-15	-14	-13	-12	-13	-16	-17	-18	-16	-13	-8	-7	-7	-6
5	-6	-5	-5	-3	-4	-5	-1	-1	-5	-10	-11	-12	-11	-13	-18	-24	-28	-22	-15	-7	-8	-8	-12	-6
6	-1	2	3	4	5	3	3	-2	-9	-8	-7	-7	-7	-8	-8	-6	-4	-3	-1	0	-1	-5	-4	-5
7	-3	3	6	5	4	-2	-4	-4	-3	-4	-2	-6	-7	-3	-4	-6	-7	-6	-10	-12	-11	-9	-7	-5
8	-4	-5	-3	0	2	1	2	3	3	4	2	2	3	1	-1	-1	-2	-1	2	7	12	12	15	17
9	14	6	6	3	3	-2	3	4	8	-1	1	3	4	1	-4	-9	-12	-24	-35	-48	-58	-65	-60	-53
10	-49	-44	-41	-39	-36	-33	-32	-30	-24	-21	-26	-27	-25	-22	-18	-15	-15	-14	-15	-18	-20	-30	-31	-30
11	-36	-36	-33	-30	-24	-21	-18	-16	-16	-19	-21	-26	-35	-37	-34	-29	-25	-19	-19	-16	-8	-3	-2	3
12	6	4	-5	-5	-1	-3	-9	-14	-13	-15	-18	-19	-30	-34	-38	-37	-32	-33	-31	-27	-27	-30	-26	-23
13	-27	-23	-16	-17	-22	-26	-26	-24	-19	-25	-31	-27	-26	-20	-14	-19	-30	-23	-28	-29	-27	-28	-30	-36
14	-41	-35	-24	-18	-22	-24	-24	-26	-27	-32	-44	-34	-27	-28	-33	-41	-38	-42	-42	-41	-37	-37	-38	-39
15	-34	-32	-29	-28	-25	-20	-20	-26	-32	-27	-25	-31	-34	-29	-29	-34	-37	-33	-31	-29	-28	-32	-31	-27
16	-27	-28	-28	-25	-26	-26	-27	-32	-29	-30	-26	-23	-24	-26	-30	-28	-28	-26	-27	-27	-24	-24	-26	-25
17	-23	-22	-21	-20	-18	-14	-13	-14	-14	-13	-9	-11	-17	-15	-11	-7	-3	0	-1	-2	-5	-10	-17	-22
18	-21	-19	-15	-16	-18	-18	-19	-18	-21	-20	-17	-15	-17	-21	-24	-24	-22	-19	-19	-20	-18	-19	-21	-20
19	-19	-18	-16	-15	-17	-14	-9	-7	-8	-8	-6	-4	-4	-5	-5	-11	-11	-12	-15	-19	-22	-22	-21	-23
20	-26	-23	-20	-20	-18	-20	-22	-23	-17	-12	-10	-5	7	15	-9	-24	-16	-12	-13	-16	-18	-14	-13	-11
21	-10	-7	-6	-7	-6	-3	-4	-8	-12	-10	-9	-10	-11	-11	-9	-10	-11	-14	-15	-16	-15	-15	0	20
22	29	28	12	-28	-62	-49	-45	-44	-39	-36	-33	-31	-32	-37	-35	-34	-33	-34	-38	-39	-35	-34	-34	-31
23	-27	-26	-22	-21	-25	-22	-19	-21	-22	-21	-18	-14	-13	-14	-18	-20	-23	-20	-16	-22	-26	-27	-24	-18
24	-15	-10	-7	-9	-15	-15	-14	-14	-13	-16	-15	-20	-17	-15	-13	-12	-13	-14	-15	-12	-14	-17	-16	-14
25	-11	-8	-8	-7	-7	-8	-16	-17	-15	0	13	12	11	7	2	-1	-5	-14	-18	-20	-12	-10	-12	-12
26	-3	-2	3	1	-2	-11	-11	-10	-12	-12	-11	-11	-9	-5	-5	2	4	-3	-11	-12	-15	-23	-27	-31
27	-27	-23	-24	-23	-21	-25	-23	-25	-25	-28	-21	-18	-16	-13	-15	-18	-17	-22	-26	-24	-25	-28	-28	-29
28	-23	-18	-15	-10	-9	-14	-12	-7	-13	-10	-9	-8	-9	-11	-10	-8	-9	-12	-14	-18	-20	-22	-27	-36
29	-41	-40	-34	-29	-26	-25	-27	-31	-36	-37	-39	-36	-30	-29	-27	-24	-26	-31	-31	-26	-26	-34	-45	-41
30	-32	-27	-20	-15	-11	-18	-29	-31	-23	-21	-17	-18	-20	-23	-25	-24	-27	-26	-20	-16	-21	-32	-42	-41
31	-35	-34	-23	-17	-14	-14	-12	-11	-10	-6	-5	-5	-1	5	8	4	3	-13	-17	-18	-23	-30	-27	-25

SEPTEMBER 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-31	-27	-24	-33	-31	-37	-30	-30	-34	-39	-37	-32	-29	-31	-30	-31	-32	-27	-21	-19	-22	-24	-31	-34
2	-30	-28	-29	-28	-29	-25	-23	-20	-16	-14	-16	-16	-11	-14	-14	-15	-16	-19	-22	-20	-21	-19	-27	-29
3	-33	-30	-23	-26	-25	-22	-18	-15	-16	-15	-16	-14	-11	-8	-9	-10	-14	-18	-24	-22	-20	-22	-20	-20
4	-22	-21	-17	-16	-13	-14	-13	-16	-19	-18	-22	-20	-13	-11	-13	-13	-16	-20	-20	-18	-17	-15	-14	-15
5	-16	-18	-19	-17	-14	-13	-10	-9	-8	-10	-14	-15	-11	-9	-9	-9	-9	-12	-12	-10	-9	-10	-12	-13
6	-13	-13	-13	-12	-8	-7	-6	-7	-6	-6	-6	-7	-9	-9	-9	-5	-4	-5	-2	-5	-9	-7	-7	-6
7	-4	-3	-4	-5	-4	-6	-10	-13	-10	-9	-6	-6	-6	-8	-7	-6	-5	-5	-3	0	1	1	1	-1
8	0	0	-2	-1	-1	-2	-4	-1	1	3	6	6	1	1	2	1	0	-1	-11	-11	-12	-13	-17	-18
9	-12	-10	-10	-7	-7	-6	-2	-4	-4	-2	0	3	2	1	1	0	-1	0	0	-4	-6	-2	-1	-2
10	-3	-1	0	3	4	7	9	9	10	11	8	12	15	19	20	20	23	24	17	12	0	-26	-46	-53
11	-54	-48	-38	-28	-26	-20	-24	-36	-58	-76	-73	-81	-83	-75	-62	-68	-82	-82	-71	-59	-62	-88	-86	-85
12	-83	-82	-79	-81	-77	-74	-72	-58	-52	-46	-42	-39	-39	-43	-48	-50	-49	-50	-52	-49	-45	-42	-40	-40
13	-40	-42	-45	-48	-49	-50	-50	-42	-38	-39	-41	-40	-41	-35	-35	-35	-38	-41	-41	-39	-33	-31	-29	-31
14	-35	-41	-38	-33	-32	-30	-31	-31	-32	-33	-30	-28	-23	-24	-26	-27	-27	-31	-30	-30	-28	-25	-25	-29
15	-30	-33	-36	-32	-31	-30	-31	-35	-33	-27	-25	-24	-20	-27	-27	-28	-25	-27	-27	-24	-20	-17	-17	-19
16	-20	-23	-24	-27	-31	-32	-28	-27	-24	-24	-18	-11	-7	-7	-4	-3	-5	-11	-13	-13	-11	-13	-12	-10
17	-10	-11	-16	-20	-23	-35	-39	-39	-41	-39	-35	-25	-22	-22	-22	-21	-28	-35	-31	-25	-27	-31	-38	-42
18	-57	-52	-45	-43	-38	-45	-41	-30	-21	-22	-22	-14	-18	-17	-15	-20	-26	-28	-27	-31	-41	-54	-61	-55
19	-49	-41	-36	-39	-43	-33	-35	-43	-53	-52	-43	-40	-37	-38	-42	-39	-36	-37	-38	-35	-32	-30	-28	-24
20	-24	-23	-26	-26	-27	-27	-25	-19	-19	-17	-14	-10	-6	-7	-11	-15	-18	-20	-23	-29	-22	-19	-18	-15
21	-14	-18	-16	-18	-20	-20	-18	-17	-15	-12	-7	-3	-4	-7	-5	-7	-5	-6	-3	-7	-8	-12	-6	-6
22	-8	-6	-5	-4	-14	-17	-27	-26	-23	-20	-25	-26	-21	-23	-20	-21	-34	-33	-30	-25	-26	-27	-28	-24
23	-23	-27	-29	-32	-34	-27	-32	-32	-26	-25	-23	-19	-15	-13	-14	-13	-14	-15	-16	-16	-16	-18	-24	-24
24	-22	-23	-24	-23	-23	-18	-16	-13	-8	-8	-12	-12	-12	-9	-8	-8	-9	-10	-12	-13	-16	-24	-26	-25
25	-29	-36	-33	-29	-22	-21	-22	-16	-13	-15	-15	-14	-8	-7	-11	-14	-20	-24	-29	-28	-28	-33	-36	-32
26	-27	-23	-20	-17	-16	-10	-4	-3	-1	-1	-2	1	-2	-6	-4	-3	-6	-8	-9	-10	-12	-12	-13	-16
27	-18	-17	-15	-15	-14	-12	-9	-9	-10	-11	-12	-9	-6	-2	-1	-3	-3	-9	-13	-12	-13	-10	-10	-9
28	-15	-16	-12	-11	-9	-5	0	1	1	-3	-7	-6	-3	-1	0	0	-2	-3	-3	-4	-4	-1	0	-1
29	-2	-1	-1	-1	-2	-3	1	1	0	1	-1	-2	-2	-3	-3	-3	-3	-2	0	4	6	8	11	11
30	10	8	9	9	10	10	14	16	14	12	15	16	17	14	10	5	3	0	-2	-4	-2	1	0	-2

OCTOBER 1988

DAY	UNIT=NT 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-4	-13	-14	-17	-19	-19	-15	-12	-10	-11	-11	-12	-9	-9	-9	-8	-7	-7	-5	-7	-9	-6	-7	-15
2	-14	-12	-12	-15	-16	-17	-12	-7	-5	-5	-5	-5	-5	-4	-4	-4	-7	-10	-9	-8	-4	-3	-5	-5
3	-7	-10	-11	-11	-9	-9	-7	-6	-7	-8	-7	-4	-4	-5	-4	-4	-5	-6	-2	-2	0	0	1	2
4	0	-3	-4	-4	-3	0	8	11	8	7	9	12	11	11	10	7	7	8	8	9	18	16	-8	-12
5	-12	-19	-25	-21	-17	-7	-12	-16	-17	-5	-13	-11	-16	-14	-5	-5	-2	1	-13	-16	-18	-24	-25	-20
6	-9	12	7	10	1	4	13	3	4	-5	-23	-22	-13	0	-2	-43	-71	-83	-87	-77	-58	-54	-49	-53
7	-46	-36	-32	-28	-26	-25	-27	-27	-27	-30	-36	-38	-39	-42	-38	-37	-37	-38	-37	-37	-34	-31	-31	-31
8	-28	-28	-28	-23	-24	-26	-26	-27	-28	-29	-29	-27	-24	-23	-24	-25	-23	-22	-26	-24	-23	-22	-21	-19
9	-16	-16	-22	-22	-26	-33	-32	-33	-30	-27	-21	-21	-25	-30	-33	-37	-40	-48	-46	-47	-47	-45	-44	-40
10	-35	-37	-30	-24	-33	-43	-51	-80	-84	-77	-73	-110	-149	-155	-143	-148	-142	-156	-145	-151	-151	-140	-123	-117
11	-119	-114	-102	-98	-97	-96	-90	-84	-79	-74	-74	-76	-73	-74	-76	-77	-71	-66	-65	-65	-64	-58	-57	-59
12	-58	-54	-52	-54	-59	-59	-60	-60	-60	-58	-56	-55	-56	-57	-58	-56	-56	-54	-52	-51	-53	-49	-48	-47
13	-48	-48	-44	-45	-47	-47	-50	-54	-56	-58	-57	-54	-52	-50	-46	-44	-42	-41	-41	-42	-42	-39	-36	-35
14	-33	-31	-28	-25	-27	-29	-31	-29	-29	-31	-30	-29	-30	-31	-31	-30	-27	-24	-23	-27	-28	-31	-28	-26
15	-25	-24	-21	-18	-17	-18	-17	-17	-16	-16	-16	-19	-19	-18	-27	-26	-23	-24	-20	-16	-12	-11	-12	-16
16	-11	-15	-6	-17	-19	-18	-20	-18	-13	-16	-16	-12	-13	-15	-17	-17	-17	-14	-15	-11	-10	-8	-3	-6
17	-5	0	6	0	-4	-7	-9	-10	-6	-4	-7	-9	-9	-8	-9	-6	-4	-5	-4	0	-16	-39	-44	-33
18	-35	-44	-44	-35	-38	-39	-39	-36	-39	-52	-48	-56	-46	-43	-56	-62	-61	-61	-64	-69	-64	-57	-58	-60
19	-52	-43	-46	-45	-43	-44	-45	-43	-41	-44	-42	-46	-45	-40	-40	-40	-33	-33	-35	-31	-30	-30	-29	-28
20	-26	-29	-27	-22	-23	-34	-43	-37	-33	-34	-34	-34	-31	-25	-28	-25	-28	-31	-32	-34	-33	-37	-36	-29
21	-31	-30	-31	-31	-31	-31	-30	-29	-26	-23	-23	-24	-24	-27	-27	-26	-24	-23	-19	-20	-21	-18	-17	-17
22	-15	-14	-13	-12	-13	-14	-15	-14	-11	-9	-10	-11	-10	-11	-12	-12	-11	-10	-15	-16	-17	-15	-13	-10
23	-12	-12	-11	-10	-10	-9	-10	-17	-20	-11	-8	-9	-10	-10	-13	-11	-9	-10	-12	-10	-9	-4	1	2
24	-3	-3	-4	-4	-2	-4	-8	-10	-6	-3	-5	-10	-9	-8	-6	-3	0	3	-3	-6	-7	-8	-9	-11
25	-12	-11	-10	-11	-9	-5	-5	-8	-10	-11	-11	-9	-9	-8	-7	-6	-7	-9	-6	-5	-7	-6	-3	-2
26	0	2	4	1	0	-5	-7	-11	-10	-10	-10	-6	0	-2	-5	-6	-7	-5	-3	-15	-23	-21	-17	-13
27	-11	-7	-6	-7	-7	-6	-11	-12	-9	-8	-10	-6	-1	-1	-4	-8	-9	-12	-12	-22	-28	-25	-24	-21
28	-18	-19	-15	-15	-12	-10	-12	-16	-21	-22	-20	-16	-17	-16	-14	-14	-16	-15	-13	-14	-16	-17	-17	-15
29	-13	-11	-13	-10	-7	-7	-10	-14	-12	-10	-9	-10	-11	-10	-10	-9	-8	-7	-7	-7	-8	-8	-7	-6
30	-5	-6	-5	-4	-4	-2	-2	-1	1	1	0	-1	-1	-4	-6	-8	-6	-6	-4	-5	14	17	16	8
31	9	18	23	18	22	24	20	6	-13	-25	-15	-21	-19	-17	-19	-21	-17	-17	-13	-11	-16	-15	-15	-14

NOVEMBER 1988

DAY	UNIT=NT 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-12	-15	-17	-18	-20	-22	-25	-21	-18	-17	-17	-16	-14	-12	-11	-11	-14	-18	-20	-24	-23	-26	-23	-19
2	-23	-24	-23	-19	-15	-18	-24	-27	-27	-25	-26	-30	-30	-43	-55	-55	-59	-51	-59	-56	-55	-56	-49	-47
3	-42	-36	-44	-43	-43	-47	-48	-50	-52	-49	-44	-50	-51	-43	-43	-44	-42	-43	-42	-40	-41	-43	-41	-43
4	-45	-42	-40	-38	-37	-35	-33	-32	-31	-33	-35	-33	-35	-37	-32	-29	-33	-37	-37	-32	-31	-27	-27	-26
5	-25	-27	-31	-33	-32	-28	-32	-36	-34	-36	-38	-38	-41	-41	-39	-40	-35	-31	-29	-30	-32	-27	-22	-23
6	-29	-27	-27	-28	-28	-33	-34	-32	-27	-24	-27	-29	-37	-43	-42	-38	-39	-34	-35	-36	-40	-37	-33	-31
7	-30	-35	-40	-43	-46	-47	-40	-37	-36	-33	-30	-31	-30	-36	-33	-31	-35	-39	-44	-46	-43	-42	-42	-39
8	-36	-36	-39	-41	-43	-42	-42	-41	-40	-40	-40	-37	-33	-30	-38	-50	-56	-58	-54	-48	-58	-63	-60	-54
9	-55	-50	-46	-42	-43	-44	-42	-39	-40	-40	-35	-35	-44	-46	-44	-44	-44	-44	-40	-36	-37	-40	-35	-35
10	-35	-31	-30	-33	-36	-38	-41	-43	-46	-44	-41	-42	-40	-37	-31	-31	-27	-26	-25	-25	-26	-24	-22	-21
11	-21	-21	-21	-20	-19	-15	-13	-13	-4	-1	0	3	4	3	2	0	-2	-1	-12	-25	-33	-36	-32	-31
12	-27	-23	-22	-19	-18	-18	-15	-13	-8	-4	-7	-6	-14	-9	-13	-24	-24	-15	-5	-5	-4	-9	-6	-23
13	-31	-23	-22	-24	-25	-22	-24	-25	-22	-21	-23	-17	-13	-17	-18	-17	-16	-15	-16	-17	-18	-14	-11	-10
14	-9	-10	-14	-17	-14	-9	-7	-11	-12	-16	-10	-9	-13	-10	-8	-11	-11	-12	-12	-15	-20	-18	-18	-16
15	-17	-15	-19	-21	-14	-10	-12	-11	-10	-10	-19	-19	-18	-21	-20	-20	-20	-18	-18	-22	-22	-16	-15	-13
16	-12	-11	-12	-14	-20	-15	-18	-25	-31	-32	-31	-34	-31	-30	-28	-27	-26	-24	-25	-28	-34	-44	-39	-37
17	-40	-31	-27	-24	-23	-23	-36	-30	-28	-30	-29	-26	-25	-24	-23	-25	-26	-26	-26	-25	-23	-24	-23	-22
18	-20	-21	-22	-22	-24	-22	-19	-16	-17	-20	-20	-19	-25	-24	-25	-24	-20	-22	-24	-22	-21	-24	-22	-21
19	-22	-22	-19	-17	-16	-12	-9	-7	-8	-9	-10	-10	-12	-12	-12	-13	-11	-11	-11	-11	-14	-11	-6	-8
20	-9	-10	-10	-11	-11	-11	-10	-8	-3	-3	-4	-3	-3	-2	-3	-7	-6	-4	-2	-1	0	0	-2	-2
21	-3	-5	-7	-5	-9	-13	-17	-21	-15	-11	-9	-8	-7	-6	-5	-5	-6	-5	-3	0	-1	-5	-5	-11
22	-15	-11	-9	-9	-8	-8	-10	-16	-18	-18	-14	-10	-10	-10	-10	-7	-9	-9	-9	-8	-8	-8	-11	-12
23	-9	-7	-4	-4	-8	-9	-11	-10	-9	-10	-10	-9	-7	-5	-3	-3	-5	-8	-10	-12	-12	-12	-11	-11
24	-7	-10	-7	-8	-6	-2	-2	-2	-2	-2	-2	-3	-4	-3	-2	0	-2	-3	-6	-5	-4	-3	-5	-3
25	1	2	1	-2	-3	-1	-2	-2	2	2	-2	-3	-1	0	-4	-6	-8	-11	-12	-17	-24	-25	-17	-15
26	-10	-9	-5	-10	-24	-27	-34	-38	-33	-42	-48	-48	-37	-38	-37	-33	-33	-33	-30	-27	-22	-18	-15	-14
27	-17	-18	-19	-19	-19	-17	-21	-24	-18	-21	-11	-17	-21	-17	-18	-22	-21	-23	-23	-26	-25	-27	-26	-24
28	-24	-20	-19	-21	-24	-19	-13	-15	-15	-14	-10	-5	-3	-7	-9	-6	-4	-9	-17	-21	-27	-31	-31	-29
29	-31	-32	-29	-28	-31	-31	-27	-25	-23	-22	-19	-20	-20	-20	-21	-25	-25	-20	-18	-20	-19	-11	-12	-15
30	-11	-7	-6	-13	-18	-17	-16	-14	14	-14	-61	-77	-80	-77	-84	-111	-110	-97	-94	-93	-90	-88	-85	-88

DECEMBER 1988

UNIT=NT

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	U.T. 24
1	-83	-79	-77	-76	-75	-74	-70	-67	-63	-59	-55	-55	-54	-53	-50	-47	-45	-43	-40	-38	-37	-37	-38	-37
2	-33	-23	-18	-21	-19	-16	-21	-32	-31	-22	-18	-22	-27	-31	-39	-46	-42	-41	-44	-44	-43	-49	-51	-45
3	-43	-40	-36	-37	-40	-39	-34	-34	-34	-32	-31	-30	-28	-28	-30	-27	-28	-35	-37	-39	-34	-31	-35	-36
4	-33	-29	-31	-30	-31	-29	-29	-36	-34	-28	-25	-26	-24	-22	-26	-29	-28	-29	-30	-28	-25	-24	-23	-21
5	-18	-18	-16	-15	-15	-16	-17	-15	-11	-11	-11	-12	-13	-15	-15	-14	-13	-12	-14	-17	-17	-18	-18	-18
6	-15	-16	-17	-17	-18	-18	-19	-18	-18	-16	-16	-12	-14	-17	-16	-16	-17	-17	-14	-15	-13	-10	-12	-16
7	-16	-12	-9	-10	-12	-11	-11	-8	-5	-2	-4	-7	-11	-12	-10	-12	-14	-12	-9	-8	-7	-6	-10	-11
8	-10	-10	-11	-12	-14	-12	-9	-9	-9	-5	-5	-2	-3	-1	-2	-3	-7	-7	-2	-1	-2	-2	0	2
9	4	3	0	1	2	3	3	2	1	2	1	0	1	3	4	4	2	3	2	-2	-3	0	10	23
10	28	28	28	21	16	12	4	4	-5	-17	-29	-27	-21	-23	-22	-24	-28	-27	-27	-25	-26	-25	-26	-27
11	-23	-11	4	9	6	7	3	-2	-5	-3	-3	0	-5	-9	-25	-30	-32	-21	-5	-3	-19	-20	-25	-23
12	-22	-17	-14	-7	-21	-25	-18	-23	-22	-18	-22	-23	-19	-12	-6	-7	-6	-6	-12	-14	-17	-20	-24	-33
13	-32	-28	-26	-29	-25	-21	-11	-6	-10	-13	-3	-3	-8	-13	-20	-22	-20	-17	-22	-35	-38	-44	-47	-48
14	-48	-45	-40	-39	-37	-34	-32	-32	-33	-30	-28	-26	-25	-23	-24	-25	-29	-24	-19	-30	-36	-31	-35	-43
15	-41	-40	-39	-39	-38	-41	-44	-37	-33	-32	-33	-34	-30	-26	-24	-22	-21	-20	-19	-20	-23	-27	-29	-27
16	-25	-24	-17	-21	-21	-21	-23	-23	-21	-18	-16	-16	-16	-15	-28	-41	-45	-49	-52	-50	-58	-58	-50	-51
17	-47	-38	-43	-44	-48	-54	-54	-64	-67	-71	-73	-69	-54	-50	-50	-52	-50	-48	-28	-30	-65	-62	-62	-76
18	-76	-73	-77	-67	-60	-60	-60	-55	-53	-47	-45	-51	-68	-66	-59	-54	-54	-53	-44	-40	-41	-43	-42	-43
19	-48	-49	-46	-43	-50	-52	-61	-58	-50	-53	-60	-53	-47	-46	-41	-45	-49	-47	-47	-45	-40	-42	-43	-46
20	-48	-50	-44	-40	-43	-46	-47	-40	-35	-28	-30	-31	-31	-32	-31	-30	-26	-25	-28	-26	-27	-26	-29	-34
21	-34	-29	-25	-29	-35	-37	-36	-37	-40	-40	-47	-42	-39	-30	-28	-28	-25	-20	-16	-17	-20	-23	-21	-15
22	-4	-5	-14	-29	-20	-21	-31	-40	-32	-36	-43	-36	-30	-28	-22	-20	-14	-17	-24	-34	-36	-41	-44	-44
23	-42	-43	-36	-30	-27	-25	-25	-28	-29	-29	-28	-24	-21	-21	-20	-20	-21	-20	-13	-13	-14	-12	-14	-16
24	-19	-19	-21	-19	-14	-15	-18	-17	-14	-13	-12	-11	-10	-11	-13	-11	-9	-10	-12	-15	-18	-17	-16	-22
25	-22	-22	-17	-13	-8	-9	-14	-17	-19	-35	-58	-69	-82	-68	-57	-62	-67	-85	-85	-72	-69	-67	-69	-67
26	-61	-54	-57	-56	-49	-48	-54	-60	-55	-54	-51	-45	-49	-58	-62	-64	-59	-60	-55	-55	-51	-47	-44	-48
27	-47	-48	-50	-50	-51	-50	-52	-59	-53	-48	-49	-41	-40	-48	-42	-39	-40	-40	-36	-38	-37	-34	-33	-35
28	-32	-32	-32	-32	-32	-32	-31	-29	-25	-26	-31	-39	-45	-42	-37	-35	-33	-34	-43	-49	-42	-38	-38	-40
29	-44	-47	-51	-46	-45	-46	-45	-46	-44	-38	-46	-47	-37	-43	-43	-41	-39	-35	-35	-37	-40	-41	-39	-41
30	-43	-45	-44	-42	-37	-32	-31	-29	-28	-30	-32	-32	-28	-25	-24	-21	-16	-20	-26	-23	-24	-25	-27	-31
31	-33	-31	-28	-26	-26	-26	-24	-23	-14	-18	-14	-20	-24	-28	-29	-30	-36	-38	-38	-42	-42	-41	-36	-40

DAILY MEANS OF EQUATORIAL DST FOR 1988

DAY	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	2	6	0	-38	-10	-7	-19	-13	-30	-11	-18	-56
2	-39	3	-2	-45	-8	4	-7	-11	-21	-8	-37	-32
3	-45	-3	4	-42	-8	4	-6	-20	-19	-5	-44	-34
4	-26	1	-24	-90	-15	9	-11	-11	-17	5	-34	-28
5	-30	-39	-17	-57	-9	6	7	-10	-12	-14	-33	-15
6	-36	-22	-33	-60	-106	-18	-3	-3	-8	-25	-33	-16
7	-45	-22	-16	-37	-55	-5	-15	-4	-5	-34	-38	-10
8	-31	-15	-27	-22	-38	-7	-14	3	-3	-25	-45	-6
9	-26	-10	-19	-21	-29	1	-3	-13	-3	-33	-42	3
10	-15	-20	-16	-24	-25	-4	12	-27	4	-100	-33	-10
11	-1	-19	-18	-16	-22	-8	-1	-22	-61	-80	-13	-10
12	-11	-23	-14	-17	-13	-3	-15	-19	-56	-55	-14	-17
13	-19	-15	-9	-13	-10	9	-11	-25	-40	-47	-19	-23
14	-29	-14	-5	-11	-9	-19	-3	-33	-30	-29	-13	-32
15	-99	-31	-17	-6	-7	-13	4	-29	-27	-19	-17	-31
16	-48	-28	-22	-9	-19	-16	-13	-27	-17	-14	-26	-32
17	-38	-27	-14	-4	-37	-16	-9	-13	-28	-10	-27	-54
18	-30	-25	-11	-10	-46	-2	-15	-19	-34	-50	-22	-55
19	-28	-23	-10	2	-28	-6	-10	-13	-38	-40	-12	-48
20	-22	-11	-6	-4	-13	-23	-4	-14	-19	-31	-5	-34
21	-20	-21	-2	0	-7	-9	-13	-8	-11	-25	-8	-30
22	-17	-91	-1	-61	-12	-6	-44	-30	-21	-13	-11	-28
23	-13	-73	2	-34	-2	-8	-31	-21	-22	-10	-8	-24
24	-11	-41	2	-23	-6	1	-17	-14	-16	-5	-4	-15
25	-16	-36	-7	-14	1	-12	-7	-7	-22	-8	-6	-48
26	-14	-32	-52	-5	-13	-19	-18	-9	-9	-7	-28	-54
27	-22	-25	-77	-4	-4	-20	-27	-23	-10	-11	-21	-44
28	-9	-14	-65	-19	6	-11	-11	-14	-4	-16	-16	-35
29	-6	2	-57	-16	2	-8	-11	-32	1	-9	-23	-42
30	-2	0	-52	1	0	-31	-14	-24	8	-1	-56	-30
31	0	0	-33	0	-9	0	-8	-13	0	-5	0	-29
MEAN	-24	-23	-20	-23	-18	-8	-11	-17	-19	-24	-24	-30

ANNUAL MEAN -20

MONTHLY AND YEARLY **Dst** 1957 - 1988

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual mean
1957	-19.8	-24.1	-41.3	-27.8	-5.2	-10.0	-11.7	-3.5	-64.0	-14.4	-20.7	-18.5	-21.6
1958	-18.3	-28.1	-32.3	-19.6	-10.8	-22.8	-27.5	-13.8	-24.9	-17.7	-1.1	-18.9	-19.6
1959	-10.5	-31.5	-25.1	-22.6	-14.3	-6.5	-35.6	-32.0	-39.2	-25.3	-35.1	-30.1	-25.6
1960	-17.7	-11.8	-11.5	-58.3	-28.6	-18.2	-20.7	-21.9	-30.8	-53.9	-54.5	-42.3	-30.9
1961	-17.2	-21.5	-13.6	-11.8	-7.0	-6.5	-28.3	-7.2	-8.8	-28.3	-17.5	-10.9	-14.9
1962	-3.1	-5.4	0.5	-7.6	2.1	0.2	1.1	-7.4	-19.6	-17.9	-11.6	-12.3	-6.7
1963	-6.1	-2.2	1.8	2.0	1.1	0.0	1.9	-4.2	-29.5	-23.3	-15.4	-7.9	-6.8
1964	-8.8	-9.2	-9.8	-10.1	-4.0	-0.2	1.9	2.3	-0.3	-6.2	-0.2	5.9	-3.2
1965	5.7	-1.0	0.8	-3.4	5.7	0.3	1.5	2.5	-2.2	5.3	4.6	2.4	1.9
1966	4.2	0.1	-8.2	-1.6	-3.4	0.2	-3.2	-2.1	-25.2	-10.7	-8.1	-13.9	-6.0
1967	-18.6	-19.3	-2.7	-6.1	-32.6	-25.7	-9.7	-5.0	-20.6	-14.1	-11.8	-18.1	-15.3
1968	-20.4	-26.8	-20.8	-13.9	-12.6	-13.0	-5.4	-6.2	-11.8	-16.6	-32.5	-13.7	-16.1
1969	-7.2	-21.6	-29.1	-19.8	-16.3	-2.5	3.6	-0.3	-8.3	-10.8	-4.1	2.3	-9.4
1970	-3.0	0.0	-28.5	-25.8	-10.2	-12.1	-20.4	-21.4	-13.2	-20.1	-21.5	-17.3	-16.2
1971	-15.0	-17.9	-15.0	-26.6	-17.2	-8.7	-3.5	-9.4	-16.8	-15.6	-14.9	-24.2	-15.4
1972	-19.8	-17.9	-16.9	-15.1	-8.2	-16.4	-10.1	-36.4	-22.7	-22.2	-24.2	-9.9	-18.3
1973	-12.8	-20.4	-23.9	-46.3	-17.0	-10.1	-1.2	-2.9	-10.8	-13.7	-7.3	-0.2	-13.8
1974	-4.2	-5.6	-16.3	-13.7	-8.4	-5.7	-26.6	-13.3	-20.8	-23.0	-17.1	-12.0	-13.9
1975	-10.4	-13.4	-18.2	-10.4	-6.3	0.5	-7.0	-9.0	-4.2	-9.9	-21.4	-9.5	-9.9
1976	-12.3	-11.3	-24.1	-24.6	-13.2	-4.4	-5.7	-7.5	-12.2	-16.2	-14.9	-16.1	-13.5
1977	-13.6	-14.6	-10.9	-23.3	-13.7	-3.6	-13.7	-19.3	-23.5	-25.4	-19.4	-22.4	-17.0
1978	-19.4	-26.1	-28.1	-30.8	-34.5	-14.9	-9.2	-12.1	-27.1	-22.7	-27.4	-13.9	-22.1
1979	-28.8	-26.2	-30.4	-33.4	-12.7	-4.3	1.8	-10.8	-19.3	-18.9	-11.6	-2.5	-16.3
1980	-13.1	-18.5	-3.1	-9.4	-6.6	-11.7	-6.6	-4.3	-4.8	-22.2	-18.1	-19.9	-11.5
1981	-8.5	-21.6	-35.0	-43.5	-29.9	-2.9	-21.6	-26.6	-19.9	-42.5	-27.5	-12.5	-24.4
1982	-4.0	-50.0	-18.8	-25.0	-2.7	-12.4	-31.2	-23.5	-47.8	-23.9	-26.0	-20.0	-23.5
1983	-21.2	-38.0	-35.6	-23.2	-18.5	-10.0	-1.8	-9.9	-4.8	-15.7	-17.5	-10.5	-17.1
1984	-7.5	-18.5	-26.0	-24.8	-17.6	-10.7	-9.5	-12.2	-22.6	-22.2	-20.6	-16.4	-17.4
1985	-18.5	-19.6	-9.6	-22.8	-7.7	-6.2	-11.1	-12.0	-14.2	-21.2	-18.5	-28.1	-15.8
1986	-15.5	-44.9	-26.0	-11.4	-12.4	-2.7	-1.7	-10.9	-23.1	-13.5	-18.7	-8.9	-15.6
1987	-4.5	-8.0	-9.0	-4.0	-2.0	-3.6	-5.3	-15.7	-22.3	-27.9	-22.8	-15.8	-11.8
1988	-24.0	-23.1	-19.9	-23.4	-17.7	-7.8	-10.8	-16.7	-19.0	-23.6	-23.4	-29.6	-19.9

Unit : nT

SECTION 3

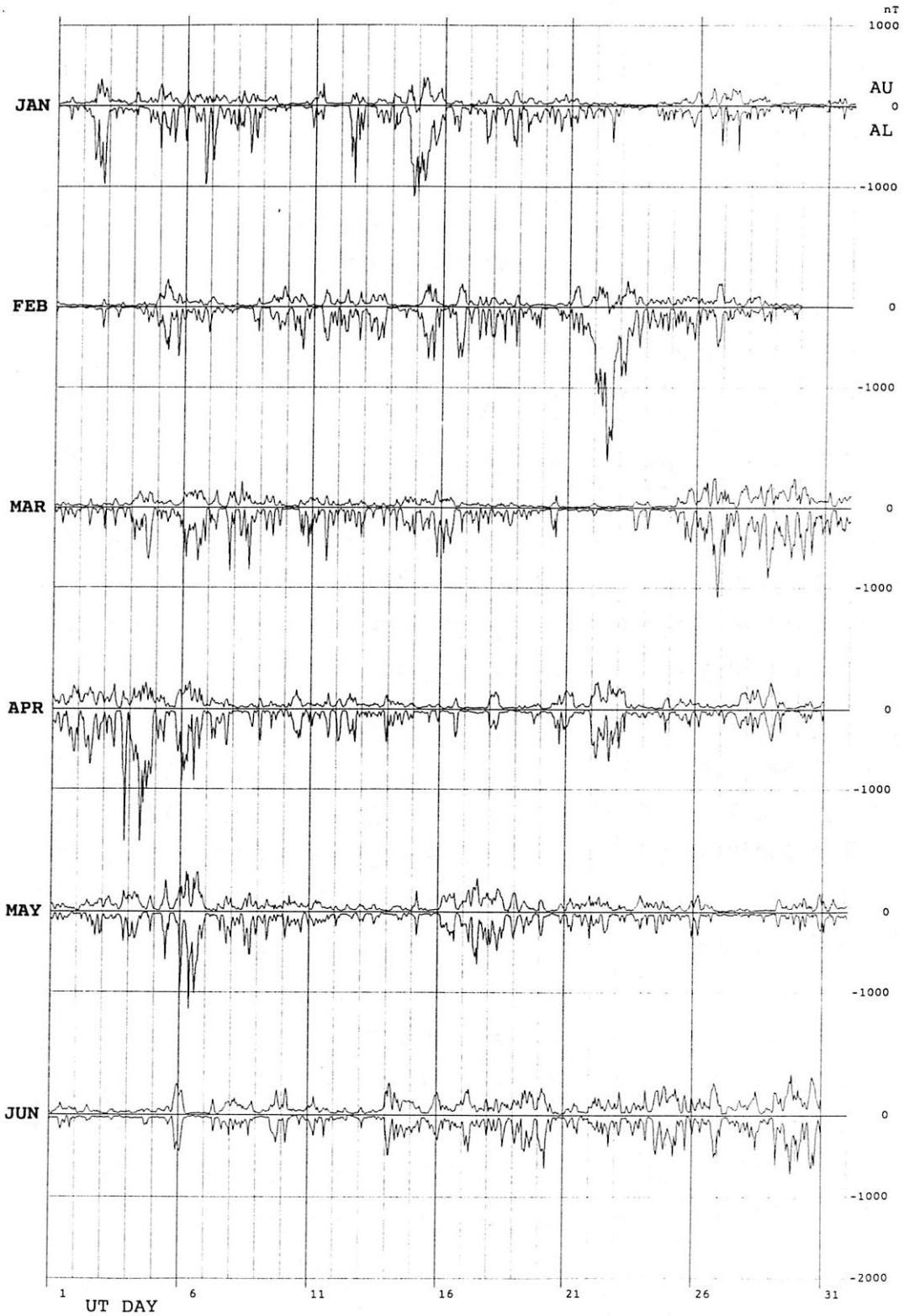
3.5. AU, AL, AE INDICES

- Hourly values of **AU** and **AL** 1988 109
  Jan - Jun 1988 (graph)

- Monthly tables of hourly values of
  AU, AL and **AE** indices 110

- Monthly and yearly mean values of **AE**
  Jan 1957 - Jun 1988 122

HOURLY VALUES OF **AU** AND **AL** 1988



HOURLY VALUES (nT) OF AU, AL AND AE INDICES JANUARY 1988

DAY\UT		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	AU	26	26	23	31	28	37	36	54	31	41	46	98	101	61	33	38	19	34	34	29	24	27	25	29	39
	AL	-7	-11	-8	-1	-2	-1	-7	-15	-2	-27	-25	-180	-133	-5	0	-21	-20	-65	-11	6	2	-1	-12	-48	-25
	AE	34	38	32	33	30	38	44	70	33	69	73	279	235	67	32	59	40	100	45	22	20	28	37	77	64
2		31	43	37	27	44	40	64	41	38	88	24	163	282	144	166	334	254	176	101	164	228	189	52	42	116
		-32	-81	-78	-42	-38	-99	-147	-132	-134	-223	-680	-647	-490	-174	-465	-774	-685	-457	-878	-972	-632	-288	-98	-58	-346
		64	125	115	69	83	140	212	174	173	313	704	811	773	319	632	1109	939	633	981	1137	861	478	151	100	462
3		51	76	53	57	47	60	47	81	35	61	39	46	62	44	31	33	5	17	21	18	35	50	44	62	45
		-55	-70	-34	-47	-37	-165	-78	-22	-24	-27	-33	-111	-71	-39	-33	-43	-61	-55	-45	-36	-68	-88	-55	-62	-57
		106	147	88	104	85	226	126	104	60	89	74	157	134	84	65	77	66	74	66	55	104	139	99	125	102
4		123	171	150	50	53	44	53	59	43	37	40	59	72	104	50	35	50	84	57	35	75	189	230	264	89
		-53	-127	-13	-4	-21	-22	-23	-34	-33	-32	-42	-46	-70	-222	-130	-51	-148	-166	-173	-71	-129	-232	-234	-530	-109
		176	299	163	55	75	66	77	93	77	71	83	106	143	326	180	87	200	252	231	106	205	422	465	795	198
5		227	122	64	122	97	139	140	172	103	57	45	71	91	88	58	36	30	18	16	18	38	56	105	160	86
		-148	-73	-73	-159	-268	-281	-267	-377	-252	-56	-36	-107	-462	-299	-82	-17	-26	-20	-18	-18	-20	-122	-444	-274	-162
		376	196	138	282	366	421	409	551	356	114	83	180	554	388	141	54	57	39	35	37	59	179	550	434	250
6		196	137	86	75	69	38	51	122	125	93	125	141	98	90	67	28	67	113	25	95	116	76	34	94	90
		-161	-33	4	-18	-33	-15	-18	-123	-218	-91	-125	-174	-202	-130	-38	-29	-210	-973	-924	-565	-133	-19	-95	-370	-196
		358	170	80	94	102	53	70	247	344	185	252	316	301	222	105	58	277	1088	950	661	250	96	130	465	286
7		55	57	135	97	103	52	61	87	93	132	108	104	70	48	24	27	36	52	58	62	47	76	91	115	74
		-628	-679	-303	-267	-136	-22	-17	-34	-82	-147	-171	-99	-40	-54	-31	-95	-243	-183	-83	-56	-225	-232	-322	-47	-175
		684	737	439	365	240	74	79	121	176	280	280	205	112	102	55	123	281	236	142	119	272	309	413	163	250
8		62	50	16	101	187	123	83	45	36	30	52	118	141	135	51	45	127	89	58	71	49	70	52	52	77
		-86	-227	-261	-198	-272	-49	-31	-7	-25	-43	-119	-596	-536	-184	-30	-61	-366	-408	-79	-159	-105	-38	-30	-21	-164
		149	279	278	300	460	173	115	53	62	74	172	715	678	319	81	106	494	498	138	231	154	109	82	74	241
9		58	52	72	76	103	96	87	58	91	131	66	34	13	12	8	21	9	4	6	8	10	11	18	25	45
		-32	-23	-39	-60	-49	-71	-43	-48	-34	-84	-19	-14	-14	-18	-22	-33	-25	-23	-16	-73	-39	-30	-29	-17	-36
		91	76	112	137	153	168	131	107	126	216	87	49	29	31	32	55	35	28	23	82	50	42	47	42	81
10		22	22	26	20	17	13	15	18	18	18	23	25	25	26	49	41	15	15	22	18	57	60	100	78	31
		-3	-4	-5	-9	-7	-7	-6	-7	-8	-6	-8	-9	-31	-24	-47	-29	-28	-22	-28	-17	-120	-283	-125	-42	-36
		26	26	32	31	25	22	22	27	28	25	33	36	57	51	98	71	44	39	51	36	178	344	226	120	69
11		83	88	150	176	109	94	277	90	40	23	24	24	24	26	22	23	19	19	17	20	20	21	26	22	60
		-52	-123	-107	-81	-57	-179	-169	-3	-5	-7	-6	-7	-7	-11	-12	-13	-16	-14	-10	-11	-7	0	4	2	-37
		135	211	258	258	167	274	447	94	46	31	31	32	31	38	34	36	35	34	28	31	28	21	21	19	97
12		26	23	21	30	22	24	23	24	39	139	119	67	158	124	68	16	42	43	101	84	46	31	23	18	55
		0	-3	-6	-4	-6	-6	-40	-131	-196	-645	-392	-465	-958	-230	-31	-204	-428	-90	-248	-311	-132	-11	-8	-8	-190
		24	27	28	35	29	31	64	156	236	784	512	533	1117	355	100	220	471	134	350	397	179	42	32	27	245
13		18	17	18	20	13	11	27	35	33	82	67	70	47	59	69	57	31	21	18	36	27	20	22	78	37
		-9	-13	-18	-22	-18	-9	-31	-23	-120	-158	-96	-80	-55	-169	-230	-115	-65	-69	-143	-223	-165	-31	-7	-21	-79
		28	31	36	43	31	21	59	60	154	242	164	152	103	229	300	172	96	91	161	261	193	52	29	101	117
14		140	121	103	110	92	104	42	28	32	28	22	26	71	198	170	154	255	60	108	4	-97	-77	-34	-59	67
		-303	-286	-94	-250	-226	-221	-93	-89	-31	-30	-32	-16	-24	-133	-126	-151	-700	-727	-737	-1124	-1070	-693	-634	-1019	-367
		444	409	198	362	319	327	136	119	64	58	55	43	96	331	296	305	956	787	846	1128	973	615	600	960	434
15		72	81	180	349	215	269	349	337	271	106	107	124	46	46	56	85	104	160	160	174	223	93	56	61	155
		-767	-839	-581	-804	-667	-935	-894	-741	-561	-577	-475	-256	-274	-177	-409	-507	-444	-409	-337	-260	-170	-109	-185	-175	-481
		840	922	763	1154	884	1205	1245	1080	833	684	583	380	321	224	466	593	550	570	498	435	394	202	242	237	638

16	30	22	19	21	12	16	34	26	56	55	54	50	33	46	59	21	9	3	4	2	2	9	9	19	25
	-44	-28	-22	-19	-17	-20	-36	-94	-244	-139	-128	-134	-329	-306	-60	-19	-30	-27	-20	-46	-43	-43	-117	-63	-84
	75	51	41	41	29	36	71	121	301	195	183	185	363	353	120	41	39	31	24	48	45	52	127	83	111
17	21	15	11	14	12	14	47	66	21	21	22	38	41	28	17	76	87	151	149	121	37	42	41	41	47
	-18	-14	-17	-39	-38	-41	-115	-46	-40	-44	-62	-78	-115	-40	-93	-479	-383	-390	-340	-177	-58	-63	-140	-210	-127
	39	30	28	54	51	56	163	113	62	66	84	117	157	70	110	556	472	542	490	299	96	105	181	252	175
18	45	43	29	25	25	36	35	51	82	85	55	41	16	14	22	34	137	167	185	188	143	82	45	60	68
	-24	-20	-46	-52	-23	-20	-40	-121	-243	-169	-78	-49	-53	-43	-59	-181	-441	-371	-440	-515	-206	-19	-182	-102	-146
	70	64	76	77	50	58	76	173	326	255	134	91	70	59	82	216	579	540	626	704	350	101	227	162	215
19	31	22	69	29	50	60	91	95	99	94	90	46	28	31	23	55	65	51	53	28	22	23	25	23	50
	-47	-12	-47	-50	-51	-105	-332	-191	-236	-165	-143	-101	-113	-134	-71	-162	-183	-207	-153	-128	-68	-52	-29	-67	-119
	79	35	117	80	102	166	425	287	336	260	234	148	142	166	95	219	250	259	207	157	90	75	54	90	170
20	23	33	36	34	28	50	53	94	100	59	57	37	67	70	76	66	74	153	116	66	32	59	78	63	64
	-53	-63	-147	-33	-6	-30	-140	-229	-116	-50	-35	-78	-109	-326	-284	-141	-142	-149	-94	-42	-35	-115	-264	-120	-117
	77	97	184	67	35	81	194	325	217	111	93	117	178	397	362	209	218	303	211	109	67	176	342	183	181
21	65	60	81	81	94	73	23	25	25	17	29	33	38	28	21	13	13	9	19	42	27	33	21	27	37
	-128	-148	-158	-113	-217	-176	-17	-17	-52	-57	-58	-70	-163	-115	-18	-18	-22	-29	-75	-157	-148	-78	-60	-47	-89
	194	209	240	195	312	250	41	43	78	75	88	105	202	145	39	31	35	39	95	201	176	112	81	75	127
22	15	20	35	29	25	33	28	17	20	25	22	32	18	13	26	52	36	18	15	16	14	13	12	15	23
	-32	-33	-74	-35	-49	-148	-27	-7	-18	-30	-46	-81	-99	-132	-455	-239	-38	-48	-132	-130	-67	-20	-12	-11	-82
	47	53	109	65	75	181	56	25	39	56	69	115	118	146	482	293	75	67	148	147	82	34	24	27	106
23	21	17	11	15	21	15	13	11	12	8	9	8	13	8	11	15	14	11	7	5	9	12	14	13	12
	-12	-18	-12	-10	-8	-6	-22	-29	-18	-25	-18	-14	-16	-23	-61	-32	-32	-19	-18	-18	-16	-11	-7	-4	-19
	33	35	24	26	30	21	37	41	30	35	28	23	30	32	73	47	47	31	26	24	26	24	22	18	32
24	12	12	11	12	11	12	16	20	37	50	41	33	22	52	29	21	12	26	15	17	15	34	41	28	24
	-5	-3	-6	-17	-7	-8	-17	-47	-127	-126	-83	-28	-48	-195	-83	-64	-148	-185	-90	-53	-54	-60	-177	-36	-69
	17	16	17	29	18	21	35	68	165	176	126	62	71	249	113	86	161	212	107	72	70	94	219	65	95
25	28	37	34	25	32	49	78	79	70	102	79	48	36	55	32	25	38	57	78	108	162	181	165	121	72
	-68	-74	-63	-58	-27	-48	-168	-80	-87	-61	-70	-42	-52	-93	-156	-134	-204	-275	-203	-175	-103	-74	-82	-54	-102
	97	111	98	84	60	97	247	160	159	164	150	92	89	149	189	161	244	334	282	285	265	256	248	175	175
26	49	22	17	12	13	15	24	40	61	105	96	217	210	143	69	39	16	22	42	114	120	168	147	78	77
	0	-4	-7	-11	-9	-7	-5	-5	-49	-98	-167	-129	-113	-130	-79	-71	-22	-21	-22	-223	-502	-153	-17	-26	-78
	50	26	24	24	23	22	30	46	111	205	264	348	325	275	148	110	38	43	64	338	623	321	165	105	155
27	103	104	78	68	100	211	205	178	188	143	151	203	155	70	30	26	21	22	36	23	49	86	71	44	99
	-70	-193	-113	-113	-116	-178	-174	-136	-103	-44	-90	-565	-133	-93	-77	-71	-79	-72	-172	-76	-90	-177	-15	-16	-123
	173	298	192	182	217	390	380	315	293	188	242	769	290	163	107	99	101	96	210	101	140	264	87	60	223
28	53	61	70	71	73	94	90	86	62	87	85	125	52	46	62	72	35	20	18	14	17	20	14	15	56
	-19	-2	-26	-33	-177	-74	-40	-49	-41	-38	-142	-100	-42	-36	-54	-73	-14	-10	-7	0	0	-3	-6	-1	-41
	72	63	97	105	251	170	131	136	105	127	229	226	96	83	117	147	49	30	26	16	18	23	21	17	98
29	15	17	19	31	38	36	31	22	28	25	39	35	34	35	59	41	15	23	27	19	16	24	17	24	28
	-4	-6	-50	-93	-35	-11	-3	-11	-21	-22	-109	-41	-58	-76	-35	-38	-191	-37	-32	-5	-10	-73	-23	-17	-42
	20	23	70	125	74	48	35	35	51	49	149	78	94	111	95	80	207	61	60	25	26	98	41	42	71
30	22	22	22	19	21	21	16	15	22	20	19	16	17	15	18	21	20	21	8	13	17	36	77	35	22
	-7	-5	-9	-2	-4	-2	-1	-4	-4	-5	-10	-11	-12	-11	-10	-7	-10	-21	-39	-49	-68	-77	-75	-9	-19
	31	29	32	22	26	24	18	21	27	27	31	29	30	28	29	29	31	43	48	63	87	114	153	45	42
31	21	31	40	43	58	46	38	35	60	101	46	32	40	86	104	40	28	14	17	20	32	22	21	39	42
	-7	-4	-7	-8	-20	-8	-5	-15	-26	-19	-1	-6	-42	-171	-84	-12	-6	-9	-30	-38	-45	-8	-8	-14	-25
	29	36	49	53	79	55	43	51	87	121	48	39	84	258	190	52	35	24	48	60	78	30	30	54	68

HOURLY VALUES (nT) OF AU, AL AND AE INDICES FEBRUARY 1988

DAY\UT		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	AU	56	60	39	29	30	31	29	23	19	18	19	18	15	21	25	25	25	19	13	14	21	21	16	16	25
	AL	-62	-15	-1	-2	-5	-3	-3	-1	0	-5	-6	-10	-17	-12	-12	-11	-10	-10	-7	-7	-4	-2	-4	-6	-9
	AE	118	76	41	32	37	36	33	26	20	24	26	29	34	34	38	38	36	30	22	22	26	25	21	23	35
2		18	17	18	16	15	14	15	18	9	10	9	10	14	9	9	11	11	9	18	92	82	33	18	22	21
		-8	-5	-23	-17	-15	-7	-6	-8	-10	-9	-9	-23	-34	-41	-29	-27	-26	-23	-41	-264	-190	-58	-25	-27	-39
		27	23	43	34	31	22	22	27	20	20	19	35	50	51	39	40	38	32	61	358	273	92	44	49	60
3		22	18	10	16	13	10	11	20	18	31	19	11	21	51	29	10	10	6	9	9	9	11	8	7	16
		-23	-20	-6	-6	-5	-3	-20	-39	-50	-143	-87	-32	-11	-15	-15	-11	-13	-11	-10	-9	-8	-8	-7	-11	-23
		46	38	18	23	19	15	33	60	68	174	106	44	33	66	45	22	23	17	19	19	17	20	16	20	40
4		7	10	18	21	31	28	16	23	28	55	17	13	20	29	39	22	20	28	30	11	15	71	86	156	33
		-11	-16	-25	-30	-13	-19	-47	-60	-100	-84	-8	-15	-54	-201	-126	-61	-122	-130	-24	-4	-10	-91	-255	-217	-72
		20	27	43	52	46	49	64	83	128	139	26	28	76	232	167	85	143	159	55	16	26	163	342	375	106
5		164	116	132	90	144	257	299	344	228	255	183	185	79	82	81	42	49	160	149	124	34	41	66	53	140
		-164	-211	-101	-202	-256	-381	-479	-384	-535	-344	-70	-80	-167	-162	-124	-37	-147	-614	-547	-147	-28	-35	-149	-167	-230
		329	329	234	293	401	638	779	729	764	600	254	267	248	246	206	80	198	776	697	272	63	76	215	221	371
6		105	70	54	46	48	60	60	60	65	63	60	50	37	90	61	52	15	24	32	17	23	62	68	70	54
		-147	-37	-43	-71	-67	-83	-37	-21	-40	-121	-173	-38	-47	-154	-164	-200	-177	-68	-14	-23	-45	-124	-323	-225	-102
		253	108	98	117	117	144	98	81	106	184	234	89	86	246	226	253	194	93	47	40	69	186	392	296	156
7		95	124	115	80	75	48	33	35	34	35	42	30	9	11	3	12	4	1	6	21	12	13	21	33	37
		-125	-81	-49	-79	-47	-11	-27	-16	-44	-67	-87	-40	-17	-14	-18	-28	-34	-60	-33	-84	-56	-34	-39	-24	-46
		220	206	165	161	124	61	61	52	78	103	131	71	26	27	23	42	40	62	41	106	69	48	60	57	85
8		41	24	14	12	16	16	11	4	12	9	6	16	12	6	6	16	24	18	19	65	107	51	34	37	24
		-21	-32	-11	-9	-12	-11	-13	-17	-25	-16	-16	-31	-24	-20	-17	-66	-184	-186	-163	-148	-307	-75	-16	-13	-60
		63	57	26	23	28	29	25	23	38	25	23	48	38	27	24	84	209	205	183	214	415	126	51	52	85
9		28	32	38	42	48	43	56	60	74	121	144	93	73	118	47	117	104	89	124	210	263	209	119	152	100
		-14	-12	-20	-18	-14	-16	-13	-111	-135	-164	-142	-84	-62	-71	-104	-287	-286	-177	-190	-196	-239	-179	-74	-91	-113
		43	45	58	61	63	61	69	172	210	285	287	178	136	190	153	406	392	268	315	408	503	389	194	243	214
10		96	54	41	44	99	114	122	98	84	62	53	154	149	93	106	65	45	20	6	19	7	17	29	25	67
		-39	-17	-17	-26	-70	-215	-305	-113	-135	-213	-110	-368	-285	-533	-475	-72	-38	-24	-74	-162	-88	-26	-16	-13	-143
		136	73	59	71	169	330	429	212	219	276	165	523	436	627	582	138	84	45	81	182	97	44	45	39	211
11		14	15	14	7	6	7	12	20	52	62	138	217	157	167	124	42	33	31	25	30	69	92	47	44	59
		-14	-21	-17	-9	-7	-5	-5	-29	-157	-329	-263	-410	-429	-413	-227	-93	-66	-204	-104	-57	-196	-246	-16	-27	-139
		29	38	33	16	14	14	18	51	209	393	402	628	588	581	352	136	99	236	130	88	266	339	64	71	200
12		28	55	38	58	58	116	184	216	81	37	62	55	29	16	15	27	25	53	122	184	59	77	31	48	70
		-48	-241	-158	-103	-155	-320	-303	-312	-73	-30	-116	-142	-117	-53	-26	-111	-50	-145	-424	-304	-63	-64	-51	-38	-144
		76	297	197	162	214	436	489	530	155	68	179	198	147	70	42	140	77	200	547	490	123	141	83	87	214
13		26	44	36	39	72	113	159	105	72	65	68	134	143	137	93	71	161	132	76	33	28	19	18	21	78
		-29	-82	-99	-86	-278	-326	-221	-140	-198	-125	-164	-422	-407	-348	-264	-188	-392	-254	-162	-10	-15	-17	-20	-25	-178
		56	126	135	125	350	440	381	245	270	191	233	557	550	487	358	261	554	387	240	44	44	36	39	47	256
14		13	19	24	16	10	6	2	9	17	20	11	19	15	19	17	12	12	7	6	7	10	7	16	16	13
		-19	-19	-18	-16	-16	-19	-45	-60	-49	-51	-38	-42	-30	-147	-77	-35	-25	-19	-49	-57	-33	-64	-71	-39	-43
		33	39	43	33	27	26	48	71	66	71	50	62	47	167	95	48	38	27	56	65	44	71	88	56	57
15		17	25	35	33	66	91	155	201	175	279	152	285	138	68	62	194	226	70	46	63	36	28	35	13	104
		-75	-136	-160	-74	-124	-220	-382	-366	-325	-464	-653	-483	-322	-290	-219	-677	-400	-60	-19	-152	-261	-26	-44	-46	-249
		93	161	195	108	190	312	539	569	501	745	806	769	462	359	281	872	627	131	66	216	297	55	79	59	354

16	14	12	13	7	4	13	17	28	10	32	18	17	36	77	146	243	243	288	211	177	206	63	40	25	81
	-45	-22	-38	-20	-12	-26	-142	-74	-18	-93	-96	-59	-122	-445	-642	-532	-443	-624	-561	-412	-236	-13	-24	-33	-197
	59	34	53	29	16	40	160	102	29	126	115	77	160	524	789	776	688	912	773	590	442	77	65	59	279
17	44	81	61	47	30	30	23	20	17	51	133	98	29	19	39	66	127	33	19	23	50	111	109	111	57
	-40	-102	-210	-137	-56	-11	-10	-10	-18	-43	-414	-340	-51	-23	-57	-156	-357	-156	-26	-26	-43	-273	-375	-346	-137
	86	184	273	185	88	43	34	31	36	95	548	439	81	42	97	224	485	191	45	50	94	384	484	458	195
18	114	99	64	47	32	23	59	49	37	101	89	68	40	33	42	41	25	7	11	19	72	136	156	63	59
	-379	-312	-80	-123	-53	-27	-85	-156	-80	-239	-454	-77	-34	-18	-19	-93	-234	-90	-37	-37	-117	-493	-175	-31	-143
	494	412	145	171	86	51	145	206	119	341	544	145	74	53	62	136	260	98	50	58	189	630	332	95	204
19	41	32	24	23	20	39	51	30	21	13	14	21	21	22	32	27	28	38	32	31	23	47	27	25	28
	-24	-22	-49	-133	-44	-74	-75	-25	-16	-23	-29	-142	-161	-94	-63	-132	-232	-96	-92	-269	-59	-13	-13	-18	-79
	67	56	74	157	66	114	127	56	37	36	44	164	183	118	96	160	262	135	124	301	82	61	41	43	109
20	22	27	27	31	27	22	20	17	18	19	20	31	44	36	50	42	40	39	11	26	17	30	66	50	30
	-23	-20	-18	-9	-6	-10	-9	-11	-9	-12	-16	-22	-33	-81	-105	-39	-178	-34	-81	-91	-148	-127	-87	-118	-54
	46	48	46	41	35	33	30	30	27	31	37	54	77	117	156	82	220	74	93	118	165	158	154	169	85
21	29	47	86	94	212	177	257	261	260	142	54	28	14	15	7	15	14	19	32	47	79	126	134	83	93
	-61	-18	-141	-282	-187	-64	-92	-220	-323	-82	-75	-88	-352	-218	-251	-283	-194	-192	-260	-351	-374	-382	-449	-468	-225
	90	65	229	377	400	241	350	482	584	225	131	117	367	234	260	300	210	212	293	399	454	508	584	552	319
22	81	88	156	266	227	153	250	158	114	182	193	21	-85	-28	3	35	-20	39	66	32	95	158	40	28	94
	-952	-820	-970	-1081	-753	-858	-1123	-1230	-818	-808	-1170	-1803	-1916	-1471	-1618	-1519	-1657	-661	-669	-576	-547	-348	-380	-440	-1008
	1034	909	1127	1348	980	1012	1374	1389	933	992	1364	1826	1830	1442	1622	1555	1637	700	736	608	642	506	420	468	1102
23	130	115	152	138	196	328	256	168	197	190	155	232	122	58	28	52	128	127	118	62	50	31	22	22	128
	-856	-769	-663	-709	-850	-511	-266	-251	-286	-341	-368	-239	-149	-36	-43	-96	-313	-508	-291	-241	-83	-30	-22	-27	-331
	988	884	815	848	1047	840	523	421	484	532	524	472	272	95	73	149	443	636	410	304	134	62	45	50	460
24	39	59	66	108	81	48	56	67	92	82	68	65	35	89	86	62	42	45	87	128	83	58	40	22	67
	-50	-185	-267	-187	-37	-21	-100	-179	-161	-256	-223	-164	-52	-137	-279	-84	-105	-95	-64	-301	-262	-24	-21	-21	-136
	89	245	334	296	119	70	156	247	254	338	292	229	88	227	367	147	149	141	152	430	346	83	62	45	204
25	24	46	35	92	98	78	58	36	55	105	114	72	103	141	134	73	77	111	126	105	113	116	82	38	85
	-23	-43	-247	-181	-78	-206	-83	-32	-185	-123	-76	-49	-153	-349	-187	-105	-201	-209	-190	-297	-415	-219	-65	-40	-157
	47	90	283	274	177	286	142	68	241	229	191	122	257	491	322	179	280	321	318	404	529	336	147	78	242
26	55	83	112	56	53	40	56	66	76	42	84	78	42	45	86	77	81	212	291	287	269	300	164	100	115
	-79	-220	-38	-16	-25	-36	-34	-167	-111	-23	-76	-65	-21	-38	-123	-83	-211	-454	-497	-391	-423	-275	-78	-67	-148
	135	304	151	73	78	77	91	234	187	65	161	144	64	83	211	161	293	668	790	679	692	576	242	167	264
27	49	57	69	60	65	61	95	114	129	69	50	30	24	46	40	11	13	14	16	36	54	96	94	115	59
	-49	-67	-71	-172	-141	-24	-146	-140	-115	-40	-33	-17	-26	-61	-87	-21	-24	-65	-74	-115	-93	-53	-132	-96	-78
	99	125	142	233	206	86	241	255	245	110	84	47	50	108	127	32	38	81	92	152	148	150	227	211	137
28	53	60	82	122	96	115	132	127	130	43	15	25	47	86	54	49	25	18	30	43	16	20	22	47	61
	-39	-32	-54	-50	-58	-64	-72	-73	-39	-19	-21	-19	-114	-178	-125	-100	-116	-60	-49	-212	-35	-9	-14	-32	-66
	92	92	137	173	155	179	205	201	169	63	36	45	162	265	180	150	142	79	80	256	52	29	37	79	127
29	44	27	15	14	20	31	35	39	45	30	19	11	16	26	32	30	10	21	20	46	35	16	18	14	26
	-15	-13	-12	-12	-8	-16	-15	-64	-43	-18	-25	-23	-20	-20	-20	-34	-100	-97	-50	-170	-56	-43	-15	-21	-38
	59	40	29	26	28	48	51	104	89	49	45	35	37	48	53	65	111	120	72	217	92	60	33	35	64

HOURLY VALUES (nT) OF AU, AL AND AE INDICES — MARCH 1988

DAY\UT		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	AU	22	35	47	28	28	18	41	65	55	36	28	42	51	26	25	21	16	21	30	38	24	40	39	42	34
	AL	-7	-61	-44	-10	-12	-12	-71	-205	-115	-10	-11	-50	-97	-19	-18	-19	-83	-77	-130	-103	-42	-26	-23	-51	-54
	AE	29	97	92	38	41	31	114	272	172	48	40	93	148	46	44	41	100	99	162	142	67	67	63	94	89
2		29	27	22	16	16	17	29	34	85	111	34	24	22	20	17	35	18	18	16	16	16	49	53	38	32
		-11	-5	-7	-6	-4	-2	-1	-71	-232	-159	-31	-13	-14	-23	-16	-70	-72	-29	-19	-16	-5	-29	-264	-49	-48
		40	32	29	23	20	20	32	106	318	272	67	38	37	43	34	105	91	48	36	34	23	78	317	88	80
3		37	41	40	49	33	22	36	85	116	91	61	22	21	23	28	17	39	59	40	42	29	30	37	58	44
		-25	-27	-17	-37	-46	-9	-9	-138	-235	-94	-29	-11	-11	-13	-12	-9	-57	-130	-41	-9	-8	-9	-81	-195	-52
		63	68	58	86	80	33	47	224	351	185	91	33	33	36	40	27	97	189	82	53	39	40	119	254	97
4		81	76	114	118	106	150	189	209	162	139	68	63	125	107	66	174	207	170	179	82	55	44	77	88	119
		-121	-203	-412	-150	-188	-247	-289	-284	-130	-245	-107	-84	-111	-351	-612	-652	-552	-394	-179	-139	-18	-10	-28	-101	-234
		202	280	527	269	295	398	479	495	293	385	176	149	237	459	679	827	760	565	358	221	74	55	105	189	353
5		60	53	60	78	55	37	51	57	56	74	79	98	68	40	38	21	27	27	28	37	52	53	77	107	55
		-51	-32	-40	-149	-35	-49	-67	-42	-109	-184	-118	-127	-21	-17	-24	-81	-97	-115	-48	-111	-93	-250	-152	-260	-95
		112	86	101	227	91	88	119	101	166	259	199	226	90	58	63	103	125	143	77	149	146	304	230	368	151
6		195	169	129	165	182	195	162	204	137	177	226	174	98	183	217	189	221	177	97	130	101	70	35	31	153
		-560	-272	-621	-413	-314	-213	-288	-271	-239	-292	-188	-273	-413	-671	-477	-380	-487	-319	-136	-211	-430	-32	-12	-19	-314
		756	442	752	579	498	410	451	475	377	470	416	448	512	856	695	570	708	497	234	342	532	103	48	50	467
7		38	49	45	82	76	122	201	225	65	36	47	19	15	12	9	14	21	58	113	199	150	121	208	158	87
		-38	-197	-83	-155	-149	-171	-278	-203	-37	-17	-12	-16	-17	-13	-11	-9	-102	-134	-368	-797	-293	-60	-216	-146	-147
		77	247	128	237	226	294	479	429	104	54	60	36	32	26	21	23	123	193	481	997	443	182	425	305	234
8		133	69	36	28	72	144	335	133	83	121	207	130	99	162	88	55	57	42	84	56	42	41	58	57	97
		-43	-25	-29	-24	-80	-354	-361	-203	-23	-71	-431	-250	-199	-781	-440	-105	-110	-185	-187	-124	-23	-40	-65	-70	-176
		176	95	65	53	154	499	697	337	106	193	639	381	299	944	530	161	168	228	272	182	66	83	123	128	274
9		47	43	42	53	111	161	99	75	62	80	141	148	52	30	21	35	46	89	50	24	35	35	18	18	63
		-87	-24	-23	-31	-148	-293	-172	-72	-34	-69	-177	-360	-74	-17	-20	-15	-55	-233	-197	-20	-11	-26	-17	-19	-91
		135	67	66	84	260	455	271	148	97	150	319	509	127	48	42	50	101	323	248	44	47	62	36	38	155
10		16	18	23	18	15	15	25	36	21	16	19	33	97	87	45	50	29	46	77	67	84	116	136	93	49
		-16	-16	-17	-11	-10	-12	-17	-25	-18	-26	-11	-16	-187	-318	-86	-361	-223	-39	-86	-129	-492	-202	-335	-153	-117
		33	34	41	29	25	28	43	62	39	43	31	50	286	406	132	412	253	86	164	197	576	319	472	247	167
11		127	91	84	117	127	60	70	44	39	39	26	61	115	155	102	41	33	37	28	87	53	35	25	40	68
		-239	-129	-74	-194	-146	-15	-96	-45	-21	-27	-35	-57	-333	-679	-334	-81	-29	-72	-63	-233	-178	-33	-28	-99	-135
		367	222	159	313	274	75	168	91	61	66	62	120	449	835	437	123	63	110	92	321	232	69	55	140	204
12		35	28	21	43	36	31	55	54	51	55	114	68	24	29	49	25	48	51	28	44	64	94	47	64	48
		-56	-22	-15	-27	-41	-27	-199	-65	-32	-54	-173	-164	-21	-27	-38	-86	-235	-240	-53	-57	-65	-381	-184	-193	-102
		92	51	37	71	78	59	255	120	84	109	288	234	46	58	88	111	284	291	82	103	130	475	231	258	151
13		59	38	24	15	18	25	23	28	34	62	31	19	23	18	15	16	22	56	44	23	18	22	15	32	28
		-151	-37	-33	-9	-15	-12	-24	-43	-136	-58	-26	-13	-18	-14	-12	-10	-18	-85	-234	-45	-6	-13	-13	-35	-44
		211	75	58	24	34	37	48	73	171	121	58	33	42	33	28	27	41	141	280	69	25	35	29	68	74
14		32	27	20	19	30	44	109	58	59	16	22	48	75	94	145	73	107	58	134	142	100	72	108	122	71
		-99	-71	-22	-21	-16	-104	-290	-51	-14	-16	-14	-56	-157	-229	-214	-161	-198	-191	-304	-243	-224	-76	-328	-334	-143
		131	100	42	40	47	148	400	111	74	32	37	106	233	324	360	235	306	251	439	385	325	149	436	457	215
15		48	47	34	43	26	114	103	74	111	116	61	69	88	73	43	41	39	80	156	222	232	128	74	95	88
		-69	-50	-52	-64	-22	-125	-272	-292	-191	-179	-138	-126	-269	-134	-52	-42	-57	-108	-317	-409	-621	-276	-153	-198	-176
		117	97	87	108	48	240	375	367	303	296	201	196	359	208	95	83	97	188	474	632	853	404	227	295	265

16	70	112	90	118	81	127	95	93	142	121	92	80	32	16	21	25	15	31	58	75	52	51	46	46	70
	-259	-313	-571	-270	-136	-150	-343	-361	-465	-336	-271	-160	-36	-13	-9	-35	-27	-30	-91	-314	-89	-101	-54	-51	-187
	330	427	662	389	219	278	439	455	607	459	364	242	69	30	31	61	43	61	149	390	142	153	101	98	258
17	35	43	35	36	38	54	37	55	49	38	73	50	34	26	44	28	30	22	27	49	53	32	28	19	39
	-37	-63	-83	-24	-62	-197	-148	-155	-73	-31	-138	-313	-14	-9	-70	-130	-102	-30	-69	-82	-204	-81	-16	-19	-90
	73	107	118	61	101	252	187	211	124	71	212	363	49	36	115	159	133	53	97	132	258	114	44	39	130
18	24	26	19	27	29	46	41	34	68	38	47	21	20	29	37	24	44	69	65	47	37	42	35	27	37
	-17	-51	-105	-83	-45	-41	-51	-60	-103	-65	-179	-113	-46	-18	-38	-154	-217	-222	-191	-84	-35	-71	-67	-31	-87
	43	78	125	111	75	88	93	94	173	104	227	135	67	49	76	178	262	292	257	132	72	113	102	59	125
19	21	18	17	39	21	49	29	36	20	15	23	33	32	25	17	13	14	8	15	34	15	27	28	28	24
	-21	-21	-46	-100	-102	-24	-19	-77	-144	-84	-37	-36	-97	-21	-27	-28	-28	-24	-23	-65	-53	-25	-24	-30	-48
	43	40	63	139	125	74	48	114	165	100	61	70	130	46	45	42	43	34	39	100	70	52	53	60	73
20	19	20	17	15	14	17	19	28	41	64	64	65	171	83	38	27	12	17	23	24	18	17	14	16	35
	-31	-23	-19	-12	-11	-14	-14	-3	-183	-242	-275	-128	-371	-92	-15	-18	-27	-20	-15	-14	-10	-9	-14	-21	-66
	51	44	36	29	26	31	34	31	225	307	340	194	543	176	54	46	40	38	40	39	29	28	30	38	102
21	14	15	11	14	12	14	15	16	17	16	12	13	20	18	19	16	11	20	22	19	17	30	42	55	19
	-23	-22	-18	-18	-17	-20	-19	-10	-13	-37	-44	-35	-26	-25	-20	-23	-24	-24	-37	-20	-20	-20	-17	-63	-25
	37	38	30	32	30	35	35	27	31	54	56	50	46	43	39	39	36	44	60	40	38	50	60	119	45
22	60	62	43	31	28	20	17	17	17	17	18	17	18	26	28	20	16	13	15	17	25	27	26	28	25
	-92	-79	-50	-20	-10	-18	-12	-11	-9	-15	-19	-21	-21	-25	-32	-28	-28	-25	-16	-14	-27	-29	-21	-24	-27
	153	142	94	52	39	38	29	29	27	34	38	39	40	51	61	49	44	39	32	32	53	57	47	52	53
23	24	28	28	25	25	24	20	26	25	20	24	21	27	53	72	87	85	53	61	51	48	41	46	48	40
	-20	-17	-12	-10	-10	-14	-22	-10	-22	-25	-21	-21	-25	-44	-280	-264	-271	-135	-75	-38	-40	-20	-18	-17	-60
	45	46	41	36	36	39	44	37	49	46	47	43	52	98	353	352	356	189	136	90	90	62	65	66	101
24	48	71	89	59	39	20	17	17	19	21	20	23	24	25	25	22	22	24	17	22	24	26	42	29	31
	-25	-44	-264	-175	-36	-14	-17	-14	-10	-17	-20	-15	-15	-19	-18	-29	-32	-28	-20	-6	-8	-15	-40	-23	-38
	73	116	354	234	76	34	34	31	30	39	41	39	40	44	43	52	55	53	38	30	33	42	83	54	69
25	25	21	21	25	31	56	147	111	81	67	96	51	73	63	82	158	245	214	265	239	220	98	64	46	104
	-24	-22	-20	-20	-44	-102	-194	-78	-43	-58	-49	-35	-68	-401	-150	-227	-347	-365	-435	-247	-174	-38	-35	-36	-134
	49	43	42	46	75	160	343	191	125	126	146	87	143	465	233	387	593	579	701	487	394	138	100	83	239
26	98	84	90	112	144	207	276	267	211	344	183	53	27	83	189	372	371	383	122	47	85	130	215	205	179
	-195	-242	-122	-112	-243	-281	-225	-422	-246	-327	-172	-33	-44	-154	-236	-600	-442	-544	-779	-1097	-1112	-751	-439	-407	-384
	294	327	213	224	388	489	502	691	458	671	356	86	72	238	426	972	814	927	902	1144	1198	882	655	613	564
27	140	122	245	90	152	192	68	69	72	64	75	34	12	20	36	97	183	228	198	250	234	306	266	174	139
	-258	-358	-606	-166	-58	-331	-205	-59	-63	-106	-229	-162	-26	-29	-74	-226	-408	-346	-621	-531	-517	-446	-265	-176	-261
	399	482	853	257	211	525	274	128	136	171	306	197	39	51	112	325	591	575	820	782	753	754	532	352	401
28	134	103	69	93	135	130	158	141	120	171	177	301	162	114	40	27	101	238	210	241	298	311	141	48	153
	-216	-153	-118	-87	-233	-295	-285	-188	-158	-253	-524	-401	-202	-156	-62	-73	-107	-557	-880	-755	-742	-532	-481	-525	-333
	350	256	188	181	370	426	443	329	279	424	702	703	366	271	104	101	209	796	1090	998	1042	844	623	573	486
29	94	176	131	122	217	205	198	223	236	205	159	143	92	112	127	268	295	265	380	365	187	100	124	183	192
	-276	-198	-151	-232	-293	-207	-345	-340	-344	-457	-477	-69	-100	-308	-362	-445	-649	-507	-455	-468	-156	-43	-54	-142	-295
	371	374	282	356	511	413	544	563	581	662	637	213	193	421	490	714	945	773	836	834	343	144	178	325	488
30	56	132	259	248	283	259	165	187	105	40	146	130	125	98	86	79	67	97	86	100	98	86	83	100	130
	-375	-303	-500	-573	-661	-323	-251	-287	-55	-29	-65	-594	-452	-163	-227	-96	-122	-104	-84	-124	-74	-337	-247	-225	-261
	432	436	759	822	946	583	417	475	161	70	212	725	578	263	314	176	190	201	171	225	172	424	330	326	392
31	91	82	91	156	218	127	37	35	34	25	45	85	128	140	80	79	94	137	152	120	100	122	136	162	103
	-182	-139	-138	-272	-340	-137	-36	-16	-24	-24	-34	-230	-142	-200	-95	-154	-277	-247	-289	-244	-99	-154	-192	-162	-159
	274	221	230	430	560	266	75	53	59	50	81	316	271	342	177	235	372	385	442	366	200	277	328	324	264

HOURLY VALUES (nT) OF AU, AL AND AE INDICES APRIL 1988

DAY\UT		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	AU	173	134	86	102	110	61	92	149	182	169	118	49	44	89	70	159	153	131	223	300	257	212	180	241	145
	AL	-149	-151	-185	-143	-42	-55	-202	-290	-262	-103	-68	-102	-26	-94	-235	-356	-226	-242	-421	-528	-539	-288	-234	-338	-220
	AE	324	287	272	247	152	118	294	440	445	274	187	153	72	183	305	515	379	373	645	829	797	501	415	581	366
2		167	82	99	82	132	181	190	184	159	209	274	231	192	210	124	81	43	73	161	210	210	198	168	99	157
		-96	-21	-57	-136	-109	-294	-475	-491	-348	-335	-692	-681	-482	-351	-209	-99	-56	-154	-364	-397	-211	-176	-169	-120	-272
		264	105	157	220	242	477	666	675	508	544	966	912	675	562	334	181	100	229	526	608	422	375	339	220	429
3		81	124	140	138	87	110	153	184	232	314	119	50	29	16	15	20	106	226	137	119	124	115	63	42	114
		-45	-116	-316	-139	-81	-125	-126	-309	-401	-485	-75	-25	-36	-31	-24	-37	-191	-731	-870	-1644	-517	-67	-42	-248	-278
		127	241	457	278	170	236	280	494	634	799	195	76	66	48	40	58	298	957	1007	1764	642	182	107	292	394
4		75	89	164	260	135	146	149	191	231	91	195	299	178	266	332	235	112	182	262	130	227	115	74	82	176
		-389	-396	-500	-656	-564	-446	-633	-557	-765	-1642	-1403	-777	-1175	-826	-647	-990	-908	-646	-707	-827	-708	-95	-12	-19	-679
		465	486	665	917	700	593	783	750	996	1734	1599	1077	1354	1093	980	1226	1021	828	970	958	936	211	86	102	855
5		120	141	90	94	176	137	122	147	67	28	68	69	28	32	31	30	21	23	85	160	194	228	245	160	104
		-109	-312	-380	-154	-132	-254	-288	-422	-172	-34	-57	-33	-94	-23	-28	-34	-37	-37	-97	-392	-539	-493	-288	-594	-208
		231	454	471	250	310	392	411	571	240	64	126	103	123	56	59	65	59	61	182	554	734	722	534	755	314
6		186	191	209	304	230	248	322	349	124	102	144	255	234	117	82	126	257	102	181	93	40	43	35	62	168
		-896	-550	-776	-661	-572	-663	-204	-228	-287	-71	-433	-896	-343	-127	-101	-239	-502	-284	-236	-106	-21	-21	-44	-64	-347
		1084	742	987	966	803	912	528	578	411	173	577	1151	578	245	184	366	759	387	418	201	63	66	80	127	516
7		50	40	43	109	145	100	108	69	76	80	67	59	76	77	63	21	102	122	123	68	35	59	51	28	74
		-29	-51	-51	-89	-378	-227	-265	-366	-118	-103	-150	-185	-167	-94	-55	-61	-195	-445	-451	-182	-32	-54	-64	-23	-160
		80	92	94	200	524	329	374	436	195	184	219	244	244	171	118	83	297	569	576	251	69	115	117	52	235
8		46	33	21	15	14	21	27	39	35	32	22	21	27	23	30	49	57	69	46	24	44	21	18	42	32
		-28	-28	-28	-21	-13	-34	-24	-32	-51	-34	-27	-30	-37	-39	-41	-91	-144	-222	-222	-26	-29	-52	-11	-30	-54
		75	62	50	37	29	57	53	72	87	67	51	53	66	63	71	140	202	292	269	52	74	74	30	73	87
9		132	130	75	33	20	34	34	43	35	43	88	100	42	54	60	61	24	39	39	26	32	57	56	32	54
		-300	-400	-70	-25	-18	-54	-26	-28	-23	-44	-41	-246	-35	-32	-60	-136	-98	-32	-44	-9	-15	-22	-92	-62	-80
		433	531	146	59	38	89	61	72	60	89	131	346	78	87	121	198	122	73	84	37	48	80	150	95	135
10		27	21	26	81	35	35	101	149	151	165	245	163	143	106	132	58	26	42	44	46	67	80	69	54	86
		-6	-8	-21	-99	-89	-34	-121	-149	-247	-278	-307	-259	-369	-254	-357	-159	-37	-91	-52	-5	-34	-49	-174	-43	-135
		34	30	48	182	125	71	223	300	400	445	553	423	512	361	490	218	64	134	97	52	103	130	245	98	222
11		74	53	34	54	35	77	66	52	43	56	24	37	41	99	61	75	205	116	48	39	30	32	47	44	60
		-66	-215	-122	-69	-31	-48	-75	-65	-129	-55	-27	-32	-35	-87	-125	-191	-362	-289	-60	-18	-11	-22	-33	-47	-92
		141	269	158	124	67	127	142	119	173	112	53	71	77	187	187	266	567	406	108	59	43	55	81	92	153
12		90	98	125	127	77	39	22	40	52	99	129	126	199	112	144	84	126	145	72	39	67	54	58	57	91
		-192	-407	-388	-280	-87	-24	-22	-22	-24	-35	-104	-232	-318	-254	-274	-123	-315	-415	-100	-14	-60	-104	-61	-37	-162
		283	506	514	408	165	63	46	63	77	136	233	359	517	367	418	208	441	560	174	55	129	159	120	96	254
13		63	68	58	39	51	45	27	55	44	58	52	80	63	58	68	32	23	33	46	38	81	146	179	88	62
		-47	-37	-83	-30	-106	-44	-21	-54	-105	-48	-42	-58	-75	-76	-99	-31	-43	-90	-29	-15	-40	-282	-417	-79	-81
		111	106	142	70	158	90	50	110	150	107	95	140	138	135	168	64	67	124	76	54	122	429	598	168	145
14		110	113	51	101	101	74	63	54	81	93	55	65	80	59	63	28	24	42	43	46	70	63	85	45	67
		-140	-210	-70	-150	-215	-155	-50	-21	-76	-139	-57	-52	-176	-198	-94	-43	-18	-21	-75	-135	-101	-56	-119	-88	-102
		252	324	122	252	317	231	114	76	159	234	112	118	256	257	157	71	42	64	119	181	173	121	205	135	171
15		49	38	27	18	14	22	16	24	31	29	29	38	31	53	56	57	27	35	31	30	34	54	66	65	36
		-23	-33	-32	-26	-36	-38	-41	-30	-28	-42	-48	-48	-39	-41	-166	-59	-18	-15	-22	-20	-13	-94	-156	-120	-50
		73	72	60	46	51	60	57	55	61	72	79	88	71	96	222	117	46	51	54	51	49	149	224	186	87

16	40	37	20	15	11	10	28	31	41	23	33	23	37	67	115	145	102	29	36	23	20	16	15	22	39
	-32	-22	-17	-19	-18	-28	-24	-23	-33	-47	-45	-48	-42	-50	-325	-345	-271	-48	-27	-14	-15	-20	-25	-26	-65
	73	60	38	35	30	39	52	55	76	72	79	72	80	118	440	491	374	77	63	38	35	37	41	48	105
17	21	26	31	24	21	21	25	18	19	22	19	22	23	25	22	25	25	26	17	21	24	26	65	140	29
	-27	-25	-16	-20	-24	-27	-26	-36	-35	-34	-40	-46	-48	-42	-36	-40	-39	-32	-20	-16	-19	-35	-24	-181	-37
	48	51	48	45	46	49	52	56	56	57	61	70	72	69	60	66	65	59	37	38	44	63	91	322	68
18	157	187	174	160	221	226	182	172	62	47	34	22	17	20	25	21	28	28	26	26	32	31	21	19	81
	-231	-208	-189	-127	-200	-250	-195	-142	-39	-31	-35	-36	-34	-32	-24	-29	-24	-11	-5	-5	-10	-8	-13	-19	-79
	390	397	363	289	422	477	378	314	102	80	71	59	53	53	51	51	53	39	31	32	43	39	35	39	161
19	23	20	29	51	38	21	20	22	54	36	28	24	29	34	39	47	46	70	53	48	81	82	52	48	42
	-20	-21	-15	-13	-24	-34	-32	-27	-19	-43	-32	-41	-33	-25	-29	-33	-95	-183	-118	-77	-44	-79	-49	-24	-46
	44	42	45	66	63	55	53	50	75	81	61	67	64	60	69	81	141	254	172	126	127	163	103	73	89
20	33	17	14	14	12	19	23	25	27	42	83	91	62	90	77	68	121	191	103	66	102	137	200	237	77
	-24	-24	-17	-18	-23	-32	-40	-32	-27	-34	-44	-89	-92	-202	-236	-153	-116	-431	-111	-19	-111	-252	-205	-248	-107
	58	41	32	33	37	52	65	59	55	78	129	182	154	292	313	222	238	623	215	87	214	391	406	487	186
21	239	218	203	168	173	225	170	42	42	23	32	62	43	65	73	82	69	44	40	39	39	41	77	178	99
	-209	-197	-143	-92	-77	-93	-64	-21	-31	-28	-30	-38	-34	-28	-30	-55	-43	-8	-3	-4	-3	-10	-37	-221	-62
	449	416	347	261	251	320	235	65	73	52	64	101	78	93	103	137	112	52	43	44	43	52	115	401	163
22	153	176	197	328	311	351	272	225	102	118	161	135	124	91	126	321	377	232	195	272	201	210	158	218	211
	-430	-443	-394	-593	-607	-433	-211	-244	-330	-281	-374	-369	-162	-57	-137	-580	-646	-298	-257	-433	-340	-293	-239	-139	-345
	584	620	593	923	919	786	485	470	433	400	535	505	287	148	263	902	1023	532	453	706	542	504	398	359	557
23	217	266	268	204	211	238	221	88	37	35	38	27	75	56	23	26	17	37	48	68	63	48	46	43	100
	-155	-482	-317	-113	-78	-32	-270	-35	-14	-31	-46	-38	-51	-70	-35	-38	-29	-39	-52	-94	-80	-100	-45	-41	-95
	373	750	587	318	291	271	493	124	52	68	85	66	127	127	59	66	46	77	101	164	144	150	93	86	197
24	37	37	31	31	19	25	26	42	28	28	19	17	17	20	27	24	23	23	30	98	123	136	159	112	47
	-45	-96	-96	-48	-29	-31	-29	-45	-60	-44	-24	-23	-23	-20	-38	-86	-97	-43	-26	-90	-292	-117	-128	-114	-69
	84	135	128	80	49	57	57	88	90	73	45	41	41	42	66	110	120	67	57	189	416	253	289	228	117
25	52	25	12	16	24	39	68	70	77	96	148	89	103	94	75	44	54	76	86	139	99	73	69	75	71
	-49	-29	-25	-21	-32	-15	-64	-61	-48	-95	-111	-119	-139	-66	-51	-42	-118	-184	-116	-217	-86	-26	-26	-20	-73
	103	55	38	38	56	56	132	132	126	191	260	208	243	161	126	87	173	260	202	357	187	100	95	96	145
26	70	78	91	85	45	47	39	31	40	41	53	85	45	30	47	39	33	24	26	40	46	54	58	42	50
	-45	-72	-111	-217	-143	-35	-13	-21	-21	-25	-27	-63	-55	-22	-68	-67	-56	-18	-1	-12	-24	-38	-72	-20	-52
	116	151	204	303	189	83	53	54	63	67	82	149	101	53	116	106	90	43	28	53	72	94	132	63	103
27	37	52	56	60	66	77	47	34	37	50	48	77	54	68	52	63	64	116	183	207	207	205	229	195	95
	-14	-15	-45	-178	-82	-82	-31	-31	-20	-21	-22	-40	-45	-50	-94	-131	-178	-214	-232	-129	-123	-144	-83	-82	-87
	52	67	102	239	149	160	79	66	58	73	71	117	99	118	146	194	243	330	416	338	331	351	313	278	183
28	148	143	97	87	203	255	134	142	162	263	253	192	148	87	39	29	49	68	160	170	181	283	346	295	164
	-170	-190	-76	-25	-73	-298	-125	-90	-105	-204	-227	-136	-60	-34	-52	-19	-16	-64	-158	-185	-229	-296	-361	-386	-149
	319	334	174	113	278	554	260	234	268	469	481	328	208	122	92	50	66	133	319	357	411	580	708	682	314
29	251	198	167	98	46	26	107	87	77	111	70	46	26	18	24	25	24	21	21	24	27	25	31	34	66
	-333	-192	-141	-60	-20	-17	-59	-286	-103	-34	-70	-18	-13	-10	-12	-15	-10	-1	-1	-6	-13	-14	-20	-14	-61
	585	391	310	159	66	44	167	374	181	147	141	65	40	30	38	41	35	22	23	31	41	40	52	48	128
30	37	47	52	52	44	50	38	93	61	59	102	117	85	43	27	23	29	34	35	44	41	77	111	102	58
	-13	-17	-65	-50	-101	-61	-33	-169	-137	-56	-52	-113	-89	-18	-9	-4	-12	-11	-6	-5	-4	-32	-140	-69	-53
	51	65	118	103	146	112	73	264	199	116	155	230	174	63	37	28	42	45	43	50	46	111	253	173	112

HOURLY VALUES (nT) OF AU, AL AND AE INDICES MAY 1988

DAY\UT		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	AU	100	97	71	32	30	77	77	79	45	56	96	88	69	50	55	50	33	48	43	34	39	46	24	22	57
	AL	-82	-99	-65	-23	-21	-72	-116	-58	-18	-38	-82	-109	-65	-71	-79	-77	-47	-53	-25	-8	-15	-37	-31	-29	-55
	AE	183	197	137	55	52	150	195	139	64	96	180	198	135	123	136	127	81	102	69	42	54	84	57	52	113
2		18	14	28	68	85	74	76	77	103	147	99	107	64	68	82	61	84	104	93	94	146	160	151	155	90
		-27	-28	-28	-26	-99	-39	-22	-25	-26	-69	-136	-84	-41	-85	-195	-115	-179	-304	-152	-36	-55	-284	-261	-144	-102
		46	42	57	96	185	114	100	103	130	218	236	192	107	155	277	176	263	409	245	131	203	445	413	299	194
3		61	51	109	143	151	189	182	116	77	84	65	90	96	79	30	24	38	68	133	258	191	154	150	200	114
		-58	-32	-75	-96	-82	-92	-82	-58	-45	-80	-97	-66	-82	-41	-38	-38	-54	-80	-186	-369	-179	-76	-105	-208	-97
		120	84	185	240	234	282	265	175	123	165	163	156	179	121	68	63	93	149	320	628	372	232	255	409	212
4		199	200	181	149	198	249	218	169	213	152	116	102	69	47	61	35	22	38	108	154	197	122	65	33	129
		-310	-318	-296	-124	-221	-334	-318	-247	-185	-90	-56	-99	-48	-18	-14	-15	-13	-6	-77	-53	-252	-108	-30	-25	-136
		509	518	479	275	420	584	537	417	398	243	174	202	118	66	76	51	37	45	186	208	451	231	96	59	266
5		37	28	20	19	18	28	77	78	140	181	392	331	143	93	30	34	42	28	54	95	156	132	220	299	111
		-36	-31	-25	-24	-24	-23	-25	-56	-235	-246	-597	-339	-147	-225	-30	-20	-22	-19	-26	-70	-146	-118	-161	-431	-128
		74	59	46	44	42	52	103	135	376	428	990	671	292	318	60	55	65	49	81	165	302	252	381	730	240
6		191	316	167	163	194	492	379	458	129	87	58	140	415	276	402	480	484	225	241	168	214	118	90	40	247
		-939	-634	-207	-111	-108	-187	-364	-489	-1204	-604	-517	-383	-749	-1016	-729	-638	-611	-239	-168	-228	-345	-193	-144	-78	-454
		1131	951	375	275	303	680	743	949	1334	693	577	523	1166	1293	1133	1119	1096	466	410	397	559	312	235	118	702
7		52	29	25	33	22	9	23	40	25	14	16	98	89	60	50	44	31	85	173	191	122	86	117	167	67
		-27	-26	-30	-41	-68	-36	-53	-34	-43	-48	-47	-96	-108	-246	-51	-44	-54	-126	-318	-399	-185	-192	-253	-310	-118
		80	57	55	75	92	47	78	76	70	62	64	195	199	307	103	90	85	212	492	591	308	279	371	477	186
8		82	52	67	55	28	36	54	26	36	23	57	103	147	167	57	122	235	221	104	71	66	90	135	89	89
		-152	-63	-100	-177	-127	-75	-100	-163	-25	-30	-44	-177	-441	-320	-204	-215	-535	-536	-194	-101	-53	-125	-293	-202	-185
		235	115	169	233	156	112	155	190	62	54	102	280	589	489	262	339	770	757	299	173	120	216	429	292	275
9		47	30	46	66	73	67	35	60	155	139	81	81	64	62	80	30	87	47	42	69	60	83	53	41	67
		-74	-49	-67	-86	-130	-148	-52	-35	-355	-291	-143	-66	-57	-107	-116	-35	-63	-120	-35	-60	-46	-57	-64	-23	-95
		122	80	113	153	205	217	89	96	512	431	226	149	121	170	198	67	150	168	79	130	107	141	118	66	163
10		130	128	105	98	75	201	86	108	119	104	136	100	94	65	67	57	107	102	72	67	65	53	76	93	96
		-113	-327	-239	-114	-43	-180	-171	-100	-127	-114	-89	-161	-137	-87	-109	-199	-261	-112	-50	-12	-16	-22	-111	-158	-127
		244	457	345	213	119	383	259	210	247	219	226	262	232	154	178	257	369	215	123	80	82	76	188	252	225
11		39	33	26	49	110	114	147	94	132	106	121	84	51	54	64	51	45	42	50	50	67	37	23	32	68
		-37	-65	-96	-102	-180	-158	-86	-95	-149	-101	-93	-139	-127	-88	-126	-117	-76	-32	-92	-75	-41	-46	-31	-34	-91
		76	98	123	152	291	273	235	191	283	208	215	223	180	144	191	169	123	75	143	126	109	85	55	67	160
12		61	76	38	27	32	22	16	27	29	28	38	96	80	62	38	34	37	27	29	32	37	60	64	95	45
		-51	-177	-96	-54	-75	-35	-26	-33	-22	-28	-25	-33	-37	-50	-51	-71	-90	-46	-25	-14	-16	-43	-77	-120	-54
		113	254	135	82	109	58	43	61	53	58	64	129	119	114	90	106	127	73	55	48	55	104	143	216	100
13		86	63	78	47	35	24	23	39	47	38	39	85	85	89	39	23	37	45	36	26	23	21	21	22	45
		-97	-88	-125	-63	-28	-31	-21	-22	-28	-26	-27	-64	-151	-117	-81	-53	-47	-76	-34	-11	-12	-22	-24	-25	-53
		183	152	204	111	65	57	45	62	76	65	67	150	237	207	121	76	84	122	71	39	37	45	47	48	99
14		25	12	16	19	29	41	61	71	59	75	74	68	60	67	35	23	26	38	48	32	25	24	16	23	40
		-24	-26	-27	-29	-29	-31	-40	-44	-30	-32	-48	-101	-67	-84	-101	-64	-19	-18	-54	-61	-20	-15	-24	-25	-42
		49	39	44	48	59	74	102	117	91	109	122	170	128	151	137	88	46	57	104	94	46	40	41	48	84
15		47	73	67	118	261	114	32	28	49	42	30	32	48	23	19	21	27	31	27	28	37	29	38	29	52
		-36	-44	-52	-94	-292	-163	-44	-24	-32	-32	-28	-23	-25	-19	-24	-26	-20	-48	-40	-24	-21	-16	-19	-15	-48
		84	117	120	214	555	278	77	52	82	75	59	56	74	43	45	48	48	80	68	53	58	47	58	45	102

16	35	38	60	106	193	201	202	136	126	163	209	230	180	184	179	245	102	45	45	28	63	87	102	144	129
	-19	-27	-34	-185	-197	-147	-193	-149	-129	-234	-229	-291	-235	-264	-225	-368	-93	-14	-9	-18	-40	-60	-182	-139	-145
	55	65	95	292	391	350	396	286	256	398	439	523	416	450	406	614	197	60	56	47	104	148	284	283	275
17	133	134	130	175	268	278	144	69	147	301	306	270	349	423	253	106	93	75	168	184	175	178	248	192	200
	-161	-143	-145	-167	-283	-375	-142	-61	-64	-403	-493	-563	-444	-655	-262	-90	-147	-120	-220	-348	-230	-190	-361	-410	-270
	295	277	276	343	552	654	287	131	212	705	801	834	794	1080	517	196	240	195	388	534	406	369	609	602	471
18	167	156	169	96	181	173	143	236	299	280	256	199	189	150	91	23	31	31	10	59	59	127	201	237	148
	-214	-406	-357	-100	-136	-245	-272	-417	-485	-319	-213	-179	-329	-214	-224	-75	-33	-32	-27	-61	-42	-99	-255	-323	-211
	381	563	527	197	319	419	416	653	785	601	471	379	519	365	317	99	65	65	39	121	103	226	456	561	360
19	245	220	136	50	15	15	40	84	118	143	120	98	67	71	41	61	40	50	55	37	32	16	24	31	75
	-256	-187	-141	-62	-43	-36	-41	-90	-166	-266	-139	-76	-48	-153	-158	-102	-129	-90	-33	-32	-12	-21	-31	-42	-98
	502	408	278	113	59	51	83	175	286	410	261	175	115	225	201	164	170	141	90	70	45	39	56	73	174
20	125	161	144	115	55	46	19	15	14	10	18	24	35	21	26	29	29	35	50	89	108	102	63	55	58
	-146	-290	-276	-151	-47	-57	-48	-44	-33	-40	-23	-20	-12	-17	-25	-29	-36	-39	-34	-66	-141	-93	-33	-33	-72
	271	453	422	266	102	104	69	61	48	51	43	46	48	40	52	59	65	75	85	156	250	196	97	89	131
21	29	27	101	110	118	184	133	116	48	55	85	112	83	106	33	66	120	98	98	74	105	131	142	207	99
	-30	-27	-50	-183	-159	-153	-235	-137	-27	-18	-21	-53	-39	-66	-24	-38	-173	-145	-82	-23	-27	-95	-136	-320	-94
	60	54	152	293	279	338	370	255	77	73	107	167	123	173	59	106	295	244	180	98	133	227	279	527	195
22	133	79	143	86	125	131	93	181	193	89	74	85	111	119	85	108	139	63	48	68	46	23	31	30	95
	-169	-24	-128	-167	-147	-124	-76	-135	-125	-51	-20	-39	-129	-254	-246	-224	-208	-86	-30	-52	-22	-21	-24	-27	-105
	303	104	273	254	274	256	171	317	320	141	95	126	241	374	333	333	349	150	79	121	69	45	57	58	202
23	39	37	47	99	40	64	65	73	68	39	27	29	40	26	28	25	34	52	63	81	105	142	220	179	68
	-28	-35	-34	-77	-109	-41	-35	-54	-124	-50	-25	-29	-26	-19	-16	-26	-30	-57	-110	-100	-77	-100	-212	-172	-66
	68	72	81	177	151	107	102	128	194	91	53	60	67	46	46	53	66	109	174	182	184	244	433	352	135
24	142	120	90	54	99	135	66	118	109	99	68	63	105	135	108	50	36	48	77	143	124	63	63	62	91
	-75	-81	-57	-30	-38	-165	-41	-33	-33	-40	-27	-40	-84	-257	-252	-78	-32	-21	-54	-149	-136	-28	-24	-40	-76
	218	202	148	85	138	302	109	153	144	141	97	104	191	394	361	129	69	70	131	294	261	93	88	102	168
25	80	69	41	30	26	27	29	48	49	63	71	91	60	40	28	15	26	23	40	48	69	130	158	81	56
	-86	-89	-107	-23	-30	-33	-24	-53	-15	-24	-27	-75	-91	-39	-38	-52	-45	-25	-39	-30	-58	-198	-323	-139	-69
	166	159	149	53	57	61	55	102	65	89	98	167	153	80	67	67	71	49	79	78	127	328	482	220	126
26	67	113	155	199	225	161	46	30	50	51	106	107	93	83	62	48	81	82	41	31	32	25	22	22	81
	-59	-82	-120	-231	-287	-103	-22	-25	-34	-36	-38	-40	-42	-20	-22	-52	-125	-44	-11	-10	-5	-14	-25	-31	-61
	127	196	276	431	514	265	69	57	86	88	145	148	137	103	85	102	207	127	53	43	38	40	48	54	143
27	13	10	22	17	27	15	17	13	16	31	24	31	32	24	15	19	29	38	45	56	47	36	28	23	26
	-32	-36	-32	-26	-21	-20	-20	-30	-32	-31	-37	-36	-39	-27	-18	-26	-31	-15	-6	-29	-45	-35	-29	-23	-28
	46	46	54	44	49	35	39	45	50	64	63	68	73	51	34	46	62	55	52	86	94	72	58	48	56
28	33	51	40	31	22	18	17	24	25	30	27	26	29	30	28	31	34	32	33	40	36	32	31	33	31
	-26	-26	-26	-60	-18	-17	-20	-19	-20	-25	-32	-36	-30	-25	-26	-35	-60	-117	-40	-32	-32	-32	-31	-26	-34
	60	77	66	92	40	36	38	44	46	57	61	62	60	56	56	68	95	150	74	73	69	65	64	61	65
29	32	32	40	26	36	84	161	169	164	115	62	69	64	66	97	50	48	44	50	48	67	114	103	72	76
	-15	-13	-16	-13	-14	-76	-163	-166	-99	-29	-28	-37	-28	-27	-72	-56	-72	-30	-2	-9	-27	-151	-76	-27	-52
	48	46	56	39	50	161	326	337	264	144	91	108	94	94	170	107	121	75	53	59	95	266	180	100	128
30	62	86	99	130	115	70	177	178	129	57	60	96	49	85	58	15	30	40	62	91	201	239	168	97	100
	-28	-43	-47	-227	-102	-32	-42	-155	-175	-24	-14	-32	-50	-44	-23	-57	-17	-20	-27	-51	-182	-216	-234	-119	-82
	90	130	147	358	218	103	220	334	306	82	75	129	100	130	82	73	49	61	90	143	384	456	403	217	182
31	133	148	62	78	26	23	28	54	115	102	179	125	96	81	56	52	66	60	65	64	57	61	76	78	79
	-134	-259	-85	-74	-57	-58	-32	-12	-50	-37	-53	-156	-118	-65	-39	-35	-54	-56	-54	-47	-64	-36	-40	-81	-71
	267	408	147	152	85	82	61	67	166	141	233	283	216	147	96	89	121	118	120	112	123	99	117	159	150

HOURLY VALUES (nT) OF AU, AL AND AE INDICES JUNE 1988

DAY\UT		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	MEAN
1	AU	43	22	11	32	39	43	54	76	84	90	147	108	64	61	67	65	59	68	96	99	64	83	47	69	66
	AL	-53	-30	-42	-44	-33	-46	-35	-42	-44	-123	-186	-139	-70	-72	-109	-68	-17	-32	-103	-170	-48	-63	-36	-38	-68
	AE	98	53	55	77	73	90	91	119	129	213	333	248	135	134	177	135	77	101	199	271	113	148	84	109	136
2		80	39	13	18	31	34	23	26	34	60	96	121	82	59	41	31	31	37	48	34	28	49	24	29	45
		-54	-34	-31	-33	-17	-27	-33	-34	-35	-41	-43	-83	-71	-59	-64	-41	-26	-23	-36	-24	-29	-39	-30	-29	-39
		135	74	45	53	50	63	58	62	71	102	139	205	154	119	106	72	58	61	85	59	58	89	54	58	85
3		22	17	16	16	13	10	11	33	43	58	57	62	30	32	33	19	18	26	32	38	36	29	32	31	30
		-29	-30	-38	-34	-33	-36	-32	-28	-42	-51	-71	-49	-29	-25	-24	-27	-30	-17	-21	-28	-34	-43	-37	-33	-34
		51	48	54	51	47	47	44	62	87	110	129	112	61	57	58	47	50	44	54	68	71	73	70	64	65
4		35	41	44	29	18	17	20	26	24	28	45	42	41	59	60	59	31	50	62	69	60	54	32	28	41
		-30	-34	-35	-38	-45	-43	-41	-41	-36	-42	-43	-38	-42	-45	-30	-55	-124	-122	-101	-123	-53	-38	-39	-34	-53
		66	76	80	68	65	62	62	68	62	72	89	82	84	105	91	115	156	173	164	193	114	92	71	63	95
5		30	34	33	24	49	67	70	70	52	47	48	39	72	97	92	88	38	32	53	171	252	348	385	339	105
		-37	-32	-36	-39	-27	-31	-39	-44	-35	-41	-39	-36	-54	-77	-130	-95	-65	-25	-23	-122	-322	-435	-329	-365	-103
		67	67	71	64	78	99	110	115	89	89	89	77	128	175	222	184	104	58	77	294	575	783	716	704	210
6		227	262	297	291	165	69	28	9	12	13	14	17	22	20	17	17	23	19	26	25	20	17	16	20	69
		-432	-444	-296	-207	-80	-35	-39	-38	-21	-18	-22	-20	-15	-10	-14	-26	-29	-24	-14	-19	-25	-31	-38	-40	-81
		661	708	595	500	246	105	68	47	35	33	38	38	38	30	32	44	52	44	41	46	47	49	55	60	150
7		23	21	18	13	13	9	48	106	195	101	37	14	11	8	30	47	45	53	83	95	146	145	168	156	66
		-29	-21	-25	-30	-37	-40	-38	-37	-209	-145	-45	-44	-34	-39	-54	-122	-187	-96	-83	-87	-97	-137	-147	-252	-85
		52	43	44	45	51	50	87	144	404	247	82	60	47	49	84	169	233	150	167	184	244	282	316	409	152
8		106	118	185	158	206	138	149	98	134	103	124	68	108	76	71	64	71	89	120	119	172	111	41	33	111
		-60	-54	-87	-194	-123	-54	-120	-126	-94	-93	-173	-72	-110	-96	-54	-67	-115	-269	-122	-54	-59	-82	-42	-47	-99
		168	173	274	354	330	193	270	226	228	197	298	141	219	174	126	132	186	359	243	173	232	194	84	80	211
9		32	28	20	26	20	32	42	65	50	38	45	55	53	95	123	94	116	120	262	309	180	104	62	82	86
		-33	-28	-29	-24	-23	-19	-25	-25	-29	-35	-33	-31	-34	-122	-206	-219	-231	-251	-344	-286	-193	-57	-63	-72	-100
		66	57	49	50	44	53	68	91	80	75	79	86	89	218	330	313	347	371	607	596	373	161	126	156	187
10		128	84	180	331	274	85	62	60	75	44	73	66	56	46	50	58	57	63	55	51	38	60	62	94	90
		-72	-41	-156	-340	-196	-89	-42	-48	-29	-21	-11	-15	-6	-6	-18	-52	-131	-66	-30	-15	-22	-44	-68	-61	-66
		201	126	337	673	472	176	105	110	106	66	84	81	62	52	69	111	189	130	86	66	61	105	132	157	157
11		88	114	83	112	118	233	155	91	59	97	54	26	43	49	76	91	73	55	85	63	43	29	24	31	79
		-57	-70	-91	-148	-172	-257	-224	-41	-68	-106	-49	-23	-38	-29	-103	-276	-117	-49	-51	-47	-81	-21	-23	-37	-91
		146	186	175	261	292	492	380	133	128	203	104	51	82	79	180	369	191	105	136	111	125	51	48	69	171
12		23	21	26	24	57	34	48	32	35	34	82	83	55	34	34	24	23	22	14	22	25	27	23	33	35
		-61	-57	-53	-45	-34	-43	-46	-32	-31	-30	-50	-66	-63	-5	-4	-6	-12	-16	-16	-20	-28	-31	-41	-47	-35
		85	79	79	69	93	78	95	65	68	65	132	149	119	40	39	31	35	39	31	42	53	59	65	80	70
13		48	90	93	41	37	15	18	26	36	34	41	28	55	64	50	34	38	37	53	59	56	68	75	138	51
		-53	-71	-169	-80	-42	-28	-43	-36	-29	-27	-25	-28	-25	-14	-23	-26	-58	-33	-20	-34	-62	-53	-26	-38	-43
		102	162	262	121	80	44	62	63	66	62	67	57	80	79	74	60	97	71	75	93	118	122	102	176	96
14		241	303	229	385	393	257	124	64	249	283	182	147	197	84	42	86	159	176	178	170	161	177	169	173	193
		-167	-316	-489	-490	-319	-191	-116	-43	-228	-312	-144	-112	-272	-219	-142	-113	-160	-220	-283	-213	-153	-188	-146	-146	-216
		409	621	719	877	714	450	242	108	479	597	327	261	470	303	185	200	319	397	462	383	315	367	317	320	410
15		155	155	170	111	99	76	94	87	115	52	32	29	23	40	21	27	31	43	80	90	122	140	247	238	95
		-183	-225	-170	-139	-159	-133	-73	-66	-219	-133	-37	-34	-29	-33	-53	-90	-61	-107	-172	-115	-126	-146	-244	-217	-123
		339	381	340	251	259	211	168	153	334	186	70	64	53	73	75	118	93	150	253	207	249	287	493	456	219

16	289	266	184	185	57	103	124	95	70	116	98	58	70	84	48	52	54	58	89	137	129	124	135	181	117
	-273	-309	-228	-150	-85	-61	-173	-51	-38	-80	-60	-65	-61	-191	-88	-75	-100	-139	-88	-152	-142	-134	-153	-155	-127
	563	576	414	336	144	165	298	148	109	197	159	124	131	276	136	127	154	198	177	289	272	259	290	338	245
17	141	129	201	255	300	269	326	197	138	126	90	108	126	87	41	55	70	93	72	88	71	54	168	205	142
	-87	-83	-306	-375	-242	-345	-449	-314	-102	-103	-65	-126	-131	-133	-50	-103	-134	-149	-92	-76	-51	-47	-98	-246	-163
	229	213	509	632	544	615	776	512	241	231	156	235	258	220	92	158	205	243	165	165	123	103	267	453	306
18	142	51	106	78	101	88	49	121	201	193	71	31	58	133	161	150	117	142	88	141	92	77	67	104	107
	-171	-35	-57	-116	-194	-158	-41	-174	-194	-152	-50	-32	-50	-118	-386	-282	-185	-139	-75	-70	-32	-40	-54	-65	-120
	315	87	164	195	296	248	91	296	395	346	121	64	108	251	548	433	303	282	163	212	125	118	123	171	227
19	126	197	180	147	123	189	145	91	94	288	204	317	291	153	156	256	301	222	269	213	84	74	73	89	178
	-148	-311	-348	-241	-101	-90	-217	-121	-32	-410	-410	-447	-365	-178	-272	-295	-398	-264	-308	-224	-68	-41	-42	-69	-225
	275	510	529	389	224	280	364	214	127	699	615	765	656	332	428	552	699	486	578	438	154	116	116	160	404
20	222	195	246	341	285	268	262	158	145	67	51	153	100	64	34	25	48	38	25	32	23	11	20	27	118
	-266	-298	-375	-442	-410	-412	-642	-317	-186	-84	-41	-108	-201	-86	-26	-29	-21	-61	-26	-22	-20	-24	-31	-35	-173
	489	494	622	784	697	681	905	476	332	153	93	261	302	151	60	54	70	99	52	55	45	36	51	63	293
21	24	27	55	82	74	94	52	38	57	88	158	117	124	114	42	52	43	43	42	37	47	28	39	44	63
	-26	-31	-45	-69	-150	-100	-79	-40	-28	-28	-162	-130	-160	-228	-82	-41	-15	-9	-14	-63	-34	-46	-44	-32	-69
	52	59	101	151	225	195	133	79	87	117	321	247	285	344	125	93	59	54	56	101	81	76	84	77	133
22	107	103	100	99	184	142	228	121	117	213	192	118	78	116	77	53	87	138	202	166	118	94	80	107	127
	-99	-76	-100	-84	-141	-133	-186	-152	-49	-173	-210	-142	-78	-236	-124	-89	-132	-155	-384	-192	-110	-64	-60	-91	-136
	208	180	200	185	326	277	416	274	167	387	403	261	156	352	202	142	220	294	586	359	228	159	142	199	263
23	152	85	93	143	298	199	46	31	43	34	45	125	81	36	40	37	68	128	164	112	69	111	135	115	100
	-148	-80	-79	-214	-246	-181	-29	-42	-28	-34	-26	-42	-97	-58	-76	-110	-180	-248	-176	-87	-64	-119	-166	-60	-108
	302	166	172	358	546	382	77	75	73	69	72	168	179	94	117	148	249	376	341	200	134	231	302	176	209
24	70	73	118	82	314	182	98	55	50	55	54	90	126	224	301	300	319	156	112	181	246	344	367	314	176
	-36	-59	-82	-93	-287	-307	-48	-15	-22	-25	-34	-47	-98	-416	-474	-403	-246	-143	-64	-152	-347	-417	-302	-263	-183
	107	133	201	176	602	491	147	72	74	81	90	139	225	641	775	704	566	299	177	333	593	762	670	578	360
25	181	157	207	225	231	246	268	235	343	239	173	227	113	50	30	56	215	257	142	67	49	42	42	222	167
	-246	-142	-210	-235	-301	-341	-500	-246	-369	-357	-60	-83	-136	-64	-53	-77	-168	-419	-120	-10	-8	-23	-43	-174	-183
	429	299	418	461	533	588	770	483	714	597	235	311	250	116	84	134	384	677	262	78	58	66	85	398	351
26	171	133	76	66	117	165	147	222	140	90	96	177	130	124	101	112	78	190	321	326	404	374	290	275	180
	-221	-123	-42	-33	-59	-83	-82	-211	-141	-32	-52	-101	-85	-112	-78	-47	-72	-81	-263	-297	-514	-457	-480	-303	-165
	394	257	120	100	178	249	230	434	282	123	148	278	216	237	180	160	150	271	585	623	919	831	770	579	346
27	196	121	135	127	22	27	30	30	29	99	119	107	97	106	72	79	62	80	94	168	190	122	114	108	97
	-202	-160	-264	-118	-40	-35	-23	-21	-26	-24	-67	-104	-75	-81	-60	-88	-134	-50	-79	-83	-210	-199	-106	-87	-97
	399	283	401	246	63	63	54	53	56	123	187	212	172	188	133	168	197	131	173	252	401	322	221	196	196
28	113	138	111	70	114	141	157	188	212	203	306	233	148	113	47	40	26	28	49	43	75	103	81	86	118
	-89	-183	-155	-65	-172	-274	-158	-126	-231	-268	-420	-210	-191	-198	-136	-58	-66	-85	-46	-38	-68	-86	-110	-71	-146
	204	322	267	136	288	417	316	316	443	473	727	443	339	312	185	99	92	113	97	82	144	189	192	159	265
29	80	66	40	62	297	277	278	201	148	153	220	139	60	72	184	239	247	298	423	398	511	271	188	263	213
	-35	-24	-21	-43	-246	-600	-310	-140	-145	-184	-216	-132	-87	-113	-271	-426	-338	-365	-523	-708	-502	-284	-235	-281	-260
	117	91	63	106	545	878	590	343	293	338	437	271	148	186	456	666	585	664	946	1106	1013	556	425	545	474
30	221	198	324	224	209	216	147	110	161	164	90	86	167	242	394	478	436	384	337	218	183	115	86	197	225
	-359	-289	-554	-455	-343	-314	-157	-75	-295	-274	-106	-77	-215	-539	-632	-648	-449	-612	-397	-235	-128	-44	-103	-206	-313
	581	489	880	681	553	532	304	186	456	438	197	164	382	782	1026	1126	886	997	735	453	312	160	190	404	538

MONTHLY AND YEARLY **AE** 1957 - 1988

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual mean
1957							158	145	310	155	167	216	
1958	192	255	301	263	231	272	270	200	185	174	131	182	221.7
1959	184	256	205	193	208	205	280	225	270	216	246	235	227.0
1960	170	162	183	322	206	235	225	211	211	324	277	254	232.0
1961	156	168	141	165	154	162	252	145	149	142	128	148	159.7
1962	89	95	100	159	110	130	139	171	197	220	151	155	143.8
1963	132	94	94	108	123	141	137	156	228	153	129	114	134.8
1964	116	122	133	148	123	94	99	88	101	110	88	62	107.3
1965	83	121	112	93	93	177	131	130	142	89	86	100	113.4
1966	107	129	152	145	161	150	182	176	222	151	148	156	157.2
1967	134	139	121	168	278	205	176	171	204	123	161	195	173.5
1968	187	227	256	231	267	302	213	202	205	183	198	163	219.7
1969	132	168	227	254	268	224	171	174	198	161	152	110	187.0
1970	117	104	210	233	199	242	275	221	202	194	191	134	194.6
1971	187	177	194	244	240	229	189	194	213	188	155	92	198.2
1972	192	160	203	202	193	238	176	259	195	201	179	132	194.9
1973	220	261	315	336	241	273	231	223	224	260	192	182	246.9
1974	200	226	323	308	297	278	322	307	305	325	247	244	282.8
1975	198	246	283	227	238	542	240	220	188	197	244	180	250.3
1976													
1977													
1978	191	237	244	292	310	308	214	239	246	192	214	177	238.9
1979	213	196	248	297	253	255	223	255	217	188	152	158	221.8
1980	149	164	122	182	184	262	203	180	165	195	199	151	180.1
1981	148	195	238	324	319	219	279	280	206	253	218	159	237.3
1982	178	387	221	305	290	367	372	319	347	275	255	277	299.0
1983	218	321	318	382	292	283	261	264	230	263	283	237	279.3
1984	214	253	300	330	315	284	279	260	311	302	246	255	279.6
1985	225	235	176	270	183	219	265	223	201	203	199	186	215.7
1986	187	273	208	138	202	188	172	232	217	161	187	138	191.6
1987	122	154	164	114	166	160	195	255	270	253	201	146	184.1
1988	180	215	218	233	196	234							

Unit : nT

SECTION 4

CLASSIFICATION OF DAYS

CLASSIFICATION OF DAYS

Erratum : JUNE 1988 data are erroneous in page 125 of Bulletin n°32s

This page 125bis replaces page 125

QUIET DAYS 1988

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	C .	C C *	C C *	. .	C C	C K	. .	. .	. .	. .	. .	C .
2	. .	C C *	K K	. .	. K	C C *	. .	C . *	. .	C K *	. .	. .
3	. .	C C *	. .	. .	. .	C C *	C C	. C	. .	C C *	. .	. .
4	. .	. .	. .	. .	. .	C C *	C C *	C C *	. .	. .	. .	. .
5	. .	. .	. .	. .	. .	. .	C K *	. .	C C *	. .	. .	C C *
6	. .	. .	. .	. .	. .	K .	. .	K .	C C *	. .	. .	C C *
7	. .	C K	. .	. .	. .	. .	. .	C C *	C C *	C .	. .	C C *
8	. .	K K	. .	K .	. .	. C	. .	C C *	C C	. .	. .	C C
9	K .	. .	. .	. .	. .	. .	C K *	. .	C C *	. .	. .	C K *
10	C K	. .	. .	. .	. .	. .	C .	. .	. .	. .	. .	. .
11	. .	. .	. .	. .	C .	. .	. .	. .	. .	. .	. .	. .
12	. .	. .	. .	. .	C C *	C K *	. .	. .	. .	. .	. .	. .
13	. .	. .	C . *	. .	C C *	C .	C . *	. .	. .	C C	. .	. .
14	. .	K .	. .	. .	C C *	. .	. .	. .	. .	C C	. .	. .
15	. .	. .	. .	C K *	K K	. .	. .	. .	. .	. .	. .	. .
16	C .	. .	. .	K K *	. .	C .	. .	. .	C .	. .	. .	. .
17	. K	. .	. .	C . *	. .	. .	. .	C K *	. .	. .	. .	. .
18	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
19	. .	. .	C C *	. .	C .	. .	. .	. .	. .	. .	C K *	. .
20	. .	C .	K K	. .	C C	. .	C . *	. .	. .	. .	C C *	. .
21	. .	. .	C C *	. .	. .	C K *	. .	. .	. .	C .	C C	. .
22	. K	. .	C C *	. .	. .	. .	. .	. .	. .	C C *	C C *	. .
23	C K *	. .	K C	. .	C C	. .	. .	. .	. .	C C	C C *	C K *
24	C C *	. .	C K	C K	. .	. .	. C	. .	. .	. C	C C *	C .
25	. C	. .	. .	K K *	K .	. .	C .	. .	. .	C C *	. .	. .
26	. .	. .	. .	C K *	K K	. .	. .	. .	. .	. .	. .	. .
27	. .	C K	. .	C .	C C *	. .	. .	. .	C K	. .	. .	. .
28	C C	C C *	. .	. .	C C *	. .	. .	. .	C C	. .	. .	. .
29	C C *	C C *	. .	C .	. .	. .	. .	. .	C C *	C C *	. .	. .
30	C C *		. .	. C	. .	. .	C .	. .	. .	. .	. .	. .
31	C C *		. .		. .		. .	. .		. .		. .

C: indicates very quiet period
K: indicates quiet period
This characterization is deduced from aa values - see text p.13.
The first column is relative to the U.T.day,
the second column to the 48 hour interval centered on U.T.day.

An asterisk in the third column indicates that the U.T. day is one of the five quietest days of the month - according to Kp, see text p.22

CLASSIFICATION OF DAYS

QUIET DAYS 1988

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	C .	C C *	C C *	. .	C C	C C	. .	. .	. .	. .	. .	C .
2	. .	C C *	K K	. .	. K	. K	. .	C . *	. .	C K *	. .	. .
3	. .	C C *	. .	. .	. .	. .	C C	. C	. .	C C *	. .	. .
4	. .	. .	. .	. .	. .	. .	C C *	C C *	. .	. .	. .	. .
5	. .	. .	. .	. .	. .	. .	C K *	. .	C C *	. .	. .	C C *
6	. .	. .	. .	. .	. .	. .	. .	K .	C C *	. .	. .	C C *
7	. .	C K	. .	. .	. .	. .	. .	C C *	C C *	C .	. .	C C *
8	. .	K K	. .	K .	. .	. .	. .	C C *	C C	. .	. .	C C
9	K .	. .	. .	. .	. .	. .	C K *	. .	C C *	. .	. .	C K *
10	C K	. .	. .	. .	. .	. .	C .	. .	. .	. .	. .	. .
11	. .	. .	. .	. .	C .	C .	. .	. .	. .	. .	. .	. .
12	. .	. .	. .	. .	C C *	C C *	. .	. .	. .	. .	. .	. .
13	. .	. .	C . *	. .	C C *	C C *	C . *	. .	. .	C C	. .	. .
14	. .	K .	. .	. .	C C *	C C *	. .	. .	. .	C C	. .	. .
15	. .	. .	. .	C K *	K K	K K	. .	. .	. .	. .	. .	. .
16	C .	. .	. .	K K *	. .	. .	. .	. .	C .	. .	. .	. .
17	. K	. .	. .	C . *	. .	. .	. .	C K *	. .	. .	. .	. .
18	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
19	. .	. .	C C *	. .	C .	C .	. .	. .	. .	. .	C K *	. .
20	. .	C .	K K	. .	C C	C C	C . *	. .	. .	. .	C C *	. .
21	. .	. .	C C *	. .	. .	. .	. .	. .	. .	C .	C C	. .
22	. K	. .	C C *	. .	. .	. .	. .	. .	. .	C C *	C C *	. .
23	C K *	. .	K C	. .	C C	C C	. .	. .	. .	C C	C C *	C K *
24	C C *	. .	C K	C K	. .	. .	. C	. .	. .	. C	C C *	C .
25	. C	. .	. .	K K *	K .	K .	C .	. .	. .	C C *	. .	. .
26	. .	. .	. .	C K *	K K	K K	. .	. .	. .	. .	. .	. .
27	. .	C K	. .	C .	C C *	C C *	. .	. .	C K	. .	. .	. .
28	C C	C C *	. .	. .	C C *	C C *	. .	. .	C C	. .	. .	. .
29	C C *	C C *	. .	C .	. .	. .	. .	. .	C C *	C C *	. .	. .
30	C C *		. .	. C	. .	. .	C .	. .	. .	. .	. .	. .
31	C C *		. .		. .		. .	. .		. .		. .

C: indicates very quiet period
K: indicates quiet period
This characterization is deduced from aa values - see text p.13.
The first column is relative to the U.T.day,
the second column to the 48 hour interval centered on U.T.day.

An asterisk in the third column indicates that the U.T. day is one of
the five quietest days of the month - according to Kp, see text p.22

CLASSIFICATION OF DAYS 1988

JANUARY

Five international quietest days (from Kp)		:	23 24 29 30 31
24-hours quiet intervals (from aa)	C - very quiet	:	1 10 16 23 24 28 29 30 31
	K - quiet	:	9
48-hours quiet intervals (from aa)	C - very quiet	:	24 25 28 29 30 31
	K - quiet	:	10 17 22 23

FEBRUARY

Five international quietest days (from Kp)		:	1 2 3 28 29
24-hours quiet intervals (from aa)	C - very quiet	:	1 2 3 7 20 27 28 29
	K - quiet	:	8 14
48-hours quiet intervals (from aa)	C - very quiet	:	1 2 3 28 29
	K - quiet	:	7 8 27

MARCH

Five international quietest days (from Kp)		:	1 13 19 21 22
24-hours quiet intervals (from aa)	C - very quiet	:	1 13 19 21 22 24
	K - quiet	:	2 20 23
48-hours quiet intervals (from aa)	C - very quiet	:	1 19 21 22 23
	K - quiet	:	2 20 24

APRIL

Five international quietest days (from Kp)		:	15 16 17 25 26
24-hours quiet intervals (from aa)	C - very quiet	:	15 17 24 26 27 29
	K - quiet	:	8 16 25
48-hours quiet intervals (from aa)	C - very quiet	:	30
	K - quiet	:	15 16 24 25 26

MAY

Five international quietest days (from Kp)		:	12 13 14 27 28
24-hours quiet intervals (from aa)	C - very quiet	:	1 11 12 13 14 19 20 23 27 28
	K - quiet	:	15 25 26
48-hours quiet intervals (from aa)	C - very quiet	:	1 12 13 14 20 23 27 28
	K - quiet	:	2 15 26

JUNE

Five international quietest days (from Kp)		:	2 3 4 12 21
24-hours quiet intervals (from aa)	C - very quiet	:	1 2 3 4 12 13 16 21
	K - quiet	:	6
48-hours quiet intervals (from aa)	C - very quiet	:	2 3 4 8
	K - quiet	:	1 12 21

CLASSIFICATION OF DAYS 1988 (continued)

JULY

Five international quietest days (from Kp)		:	4 5 9 13 20
24-hours quiet intervals (from aa)	C - very quiet	:	3 4 5 9 10 13 20 25 30
	K - quiet	:	NONE
48-hours quiet intervals (from aa)	C - very quiet	:	3 4 24
	K - quiet	:	5 9

AUGUST

Five international quietest days (from Kp)		:	2 4 7 8 17
24-hours quiet intervals (from aa)	C - very quiet	:	2 4 7 8 17
	K - quiet	:	6
48-hours quiet intervals (from aa)	C - very quiet	:	3 4 7 8
	K - quiet	:	17

SEPTEMBER

Five international quietest days (from Kp)		:	5 6 7 9 29
24-hours quiet intervals (from aa)	C - very quiet	:	5 6 7 8 9 16 27 28 29
	K - quiet	:	NONE
48-hours quiet intervals (from aa)	C - very quiet	:	5 6 7 8 9 28 29
	K - quiet	:	27

OCTOBER

Five international quietest days (from Kp)		:	2 3 22 25 29
24-hours quiet intervals (from aa)	C - very quiet	:	2 3 7 13 14 21 22 23 25 29
	K - quiet	:	NONE
48-hours quiet intervals (from aa)	C - very quiet	:	3 13 14 22 23 24 25 29
	K - quiet	:	2

NOVEMBER

Five international quietest days (from Kp)		:	19 20 22 23 24
24-hours quiet intervals (from aa)	C - very quiet	:	19 20 21 22 23 24
	K - quiet	:	NONE
48-hours quiet intervals (from aa)	C - very quiet	:	20 21 22 23 24
	K - quiet	:	19

DECEMBER

Five international quietest days (from Kp)		:	5 6 7 9 23
24-hours quiet intervals (from aa)	C - very quiet	:	1 5 6 7 8 9 23 24
	K - quiet	:	NONE
48-hours quiet intervals (from aa)	C - very quiet	:	5 6 7 8
	K - quiet	:	9 23

CLASSIFICATION OF DAYS 1988 (continued)

INTERNATIONAL QUIET AND DISTURBED DAYS 1988

Month	Quietest Days 1-5					Quietest Days 6-10					Most Disturbed Days 1-5				
Jan	23	31	30	29	24	10	1	16	25	28K	15	14	6	2	7
Feb	1	29	3	2	28	20	8K	7	4A	14A	22	23	5	21	15*
Mar	21	22	19	1	13	24	23	18A	20K	2K	26	29	30	27	28
Apr	17	26	16	25	15	29K	27K	18A	20A	24A	4	6	3	22	5
May	27	28	14	13	12	1	23K	15K	20	19	6	17	18*	5	8*
Jun	3	4	12	2	21	13K	8	16	7	1	25	29	30	19	14
Jul	20	9	4	13	5	25	30	17	10A	29A	22	21	16	11	26*
Aug	4	8	7	17	2	6	3	5K	1A	21A	14	22	13*	12*	20*
Sep	29	6	5	9	7	27	28	16	8K	4A	11	18	19	1	17
Oct	22	3	29	25	2	30K	14	15K	12	13	10	6	18	20*	5*
Nov	20	23	19	22	24	21	25A	1A	29A	18A	30	2	3	26	16*
Dec	7	6	5	9	23	24	8	1K	20A	10A	17	18	26	16	25

These days are arranged according to their degree of quietness or disturbance, respectively.

VERY QUIET INTERVALS, 1988

Kp not exceeding 1+ for at least 8 intervals
(= one day) in succession

First. . . . . last Eighth					Duration Eighths
Jan	09	E5	10	E6	10
	22	E8	24	E4	13
	28	E5	29	E5	9
	29	E7	Feb 02	E6	32
Feb	03	E2	04	E4	11
	07	E5	08	E6	10
	28	E8	Mar 01	E6	15
Mar	20	E6	21	E7	10
	22	E2	23	E4	11
May	13	E7	15	E1	11
	26	E7	29	E1	19
Jun	03	E1	05	E3	19
	06	E3	07	E2	8
	11	E8	12	E8	9

First. . . . . last Eighth					Duration Eighths
Jul	04	E3	05	E5	11
	09	E1	09	E8	8
	20	E1	21	E1	9
Aug	03	E6	05	E4	15
	07	E2	08	E7	14
Sep	05	E2	06	E6	13
	29	E1	30	E2	10
Oct	02	E6	04	E6	17
	22	E1	23	E2	10
	25	E3	26	E2	8
	29	E3	30	E6	12
Nov	19	E2	20	E8	15
Dec	04	E7	08	E1	27
	23	E3	24	E2	8

LIST OF MAGNETIC STORMS, 1988

Gives consecutive sequences of three-hour-intervals (Eighths E of the Greenwich day) in which at least one Kp reached or surpassed 7+, and no Kp was smaller than 5-.

Beginning			s.c. d. GMT		Duration Eighths	Number of Eighths with Kp= 7- 7o 7+	8- 8o 8+	9- 9o
Jan	14	E6	—		7	. 1 2	. . .	. .
Feb	21	E8	—		11	3 . 1	. . .	. .
Apr	04	E1	—		7	. . 1	. . .	. .
May	05	E8	06	04.27	8	1 2 2	. . .	. .
Oct	10	E3	10	02.31	6	. . 1	1 . .	. .

SECTION 5

RAPID VARIATIONS

5.1. List of ssc 1988 131

5.2. List of sfe 1988 137

SECTION 5

5.1. List of ssc 1988

STORM SUDDEN COMMENCEMENTS **(ssc)** 1988

Sudden commencements followed by a storm or a period of storminess, as selected from the monthly reports of 40 observatories listed below by their three letter code. The name of observatories together with their coordinates and operation dates are given in Section 2 (pages 29-36). The alternative codes used by the observatories are given in brackets.

SOD COL DOB NUR WNG WIT NGK VAL DOU BDV CLF HRB NAG GCK MMB AQU EBR COI BJI SPT FRD PEN ALM KAK HTY KNY QUE TEN LNP LUA PMG MPO GNA ACS CNB AMS TWA CZT PAF DRV.

Events are checked with the records of HON and EBR. Measurements of quality, duration and amplitude are from copies of the magnetogrammes provided by the five low-latitude Observatories (MBO, FUQ, HON, PMG, ABG) or their five supplementary Observatories (TEN, SJG, API, KNY, HYD).

JANUARY		1988							
04/01	20:13	x3223	6.1	38	6A	13B	3C	1si	(11-14)
06/01	16:31	12212	5.9	22	5A	8B	8C		(29-38)
13/01	23:30	12222	4.1	33	18A	12B	-		(28-33)

FEBRUARY		1988						
12/02	21:27	22222	5.2	26	13A	8B	2C	(26-31)
21/02	01:56	22222	2.9	22	15A	17B	1C	(54-60)

MARCH		1988						
07/03	17:26	22222	4.9	29	17A	13B	2C	(21-30)

APRIL		1988						
03/04	16:37	11111	3.4	10	4A	6B	4C	(36-39)
05/04	18:14	11101	3.2	5	-	1B	2C	(12-15)

MAY		1988						
06/05	04:28	22222	2.4	31	9A	6B	1C	(27-30)
25/05	20:48	11111	1.7	10	-	2B	1C	(47-49)

JUNE		1988								
05/06	12:21	11011	3.7	10	7A	12B	4C		1sfe	(18-23)
13/06	01:04	12011	8.3	12	-	3B	4C			(01-05)
24/06	00:29	12212	6.9	16	4A	9B	8C			(28-32)
29/06	04:09	22222	8.2	24	7A	10B	6C			(07-11)

JULY		1988								
05/07	15:58	11001	4.0	5	1A	9B	7C			(56-61)
21/07	03:17	22222	7.9	21	14A	14B	3C			(15-20)

AUGUST		1988								
09/08	05:09	11110	6.7	14	1A	9B	4C	2si	1sfe reversed	(06-10)
20/08	12:02	22211	4.0	23	5A	8B	2C			(57-05)
21/08	22:30	22222	5.8	31	20A	9B	4C			(28-32)
25/08	09:32	22222	2.7	25	9A	11B	5C			(31-33)
31/08	16:16	21102	5.1	8	-	-	1C			

SEPTEMBER		1988								
17/09	18:45	11101	10.5	25	6A	5B	4C			(44-47)
28/09	20:45	11011	4.5	8	1A	4B	8C	1si		(42-47)

OCTOBER		1988								
04/10	20:15	22222	6.1	18	3A	12B	4C			(14-20)
05/10	16:46	22111	6.9	23	3A	2B	1C			(44-51)
06/10	00:38	22122	4.4	30	12A	14B	-	1si		(34-40)
06/10	12:53	22122	12.0	22	-	-	1C			
10/10	02:32	22222	5.7	18	13A	15B	-			(30-35)
30/10	20:01	12222	6.2	24	9A	6B	7C			(00-02)

STORM SUDDEN COMMENCEMENTS **(ssc)** 1988 (continued)

NOVEMBER		1988								
11/11	07:53	11022	7.2	14	4A	6B	7C		1sfe	(51-57)
16/11	16:09	11110	4.1	13	1A	1B	1C	1si		(07-11)
30/11	08:00	33333	3.1	49	19A	11B	1C			

DECEMBER		1988								
11/12	02:45	11122	5.7	10	-	3B	7C			(39-50)
11/12	18:27	22112	3.4	15	6A	4B	3C	1si		(26-30)
12/12	03:00	22222	3.9	23	10A	7B	-			(58-02)
14/12	13:37	21121	5.4	9	1A	1B	4C		1sfe	(35-39)
16/12	13:19	20122	2.8	11	1A	1B	1C			(18-20)
17/12	18:24	23232	2.2	47	21A	9B	-			(20-29)

SECTION 5

5.2. List of sfe 1988

- Solar-flare effects 1988

Summary list 139

Extended list 141

- Doubtful solar-flare effects 1988

Summary list 149

Extended list 151

SOLAR - FLARE EFFECTS **(sfe)** - Summary List 1988

JANUARY	1988	None

FEBRUARY	1988	None

MARCH	1988							
20/03	11:28		11 A	20 B	22 C	3 D	1 E	3 X
25/03	11:18	C	0 A	7 B	27 C	12 D	1 E	3 X

APRIL	1988							
13/04	11:44		7 A	26 B	23 C	2 D	2 E	2 X
17/04	04:28	C	1 A	9 B	17 C	20 D	0 E	1 X

MAY	1988							
25/05	11:55		3 A	16 B	31 C	8 D	0 E	0 X

JUNE	1988							
23/06	09:17	C	10 A	15 B	19 C	4 D	0 E	4 X
23/06	17:51	C	2 A	8 B	31 C	5 D	1 E	2 X
24/06	04:19	C	20 A	18 B	12 C	5 D	3 E	2 X
30/06	09:03	C	15 A	14 B	24 C	2 D	1 E	2 X

JULY	1988							
07/07	07:21	C	4 A	13 B	31 C	8 D	0 E	4 X
08/07	03:33	C	0 A	5 B	17 C	22 D	1 E	4 X
27/07	07:40	C	1 A	18 B	28 C	4 D	2 E	4 X
30/07	08:45	C	1 A	8 B	29 C	12 D	1 E	3 X

AUGUST		1988						
02/08	17:20	C	3 A	4 B	23 C	9 D	0 E	5 X

SEPTEMBER		1988						
28/09	23:04	C	5 A	12 B	6 C	2 D	0 E	5 X

OCTOBER		1988						
03/10	15:05	C	16 A	9 B	5 C	4 D	0 E	4 X
03/10	23:30	C	8 A	7 B	11 C	1 D	0 E	4 X
12/10	04:59	C	13 A	4 B	17 C	6 D	1 E	2 X
12/10	12:10	C	0 A	7 B	27 C	15 D	0 E	2 X

NOVEMBER		1988						
10/11	06:10	C	4 A	18 B	25 C	1 D	1 E	3 X

DECEMBER		1988						
09/12	03:15	C	1 A	6 B	24 C	5 D	0 E	2 X
17/12	03:45	C	0 A	4 B	21 C	6 D	4 E	3 X
17/12	04:52	C	2 A	12 B	28 C	5 D	4 E	3 X

SOLAR - FLARE EFFECTS **(sfe)** 1988

Times of commencements of solar-flare effects (sfe). The letter C indicates that the sfe is confirmed. The list of the observatories reporting a movement (A, B, C), or not (D, E, X, see text) are given for each event; normal brackets indicate stations in the twilight zone, square brackets stations in the nightside of earth.
The list of the collaborating 65 observatories is given below. They are identified by their IAGA three letter code, with alternative codes given in brackets (see list in Section 2, pages 29-36).

NOK KIR YAK NUR LER MGD LNN SV3 KZN BFE ESK MEA WNG PET IRT NGK VAL GTT HAD KIV DOU KGD BDV VIC HRB YSS THY ODE OTT GCK MMB AAA AQU TFS TKT EBR COI SPT FRD PEN KAK HTY TUC KNY QUE TEN LNP HON ABG SJG HYB GUA ETT PMG API PPT TAN MPO GNA HER ACS CNB TWA EYR AIA

JANUARY	1988	None

FEBRUARY	1988	None

MARCH	1988						20/03	11:28	
A	SV33 MPO2	WNG2 HER1	KIV3	ODE2	AAA3	TKT3	COI2	PEN3	ABG3
B	KIR- GTT0 EBR0	(YAK2) HAD0 AIA-	LER1 DOU2	LNN- BDV1	BFE2 HRB2	ESK0 OTT2	(MEA1) GCK0	NGK2 AQU2	VAL1 TFS3
C	NOK3 [KAK0] [PMG1]	[MGD1] [HTY0] [PPT0]	[PET1] [KNY0] (GNA0)	(IRT1) QUE1 [CNB0]	KGD0 TEN1	[VIC1] [LNP2]	[YSS0] SJG0	[MMB0] HYB1	SPT1 ETT0
D	FRD	ACS	TWA						
E	THY								
X	NUR	KZN	TAN						

MARCH	1988						25/03	11:18	C
A									
B	KIR-	SV32	KZN2	NGK1	TFS2	TKT0	MPO2		
C	NOK0 [PET0] THY1	(YAK2) (IRT0) ODE2	NUR1 VAL0 OTT0	LER1 GTT1 GCK0	[MGD0] KIV1 AQU0	LNN- KGD0 TEN2	BFE- BDV2 (LNP1)	ESK0 [VIC1] ABG0	WNG1 HRB1 ACS0
D	HAD HER	DOU TWA	EBR AIA	COI	SPT	FRD	PEN	SJG	ETT
E	HYB								
X	AAA	QUE	TAN						

APRIL	1988						13/04	11:44	
A	KIR-	SV32	NGK2	KIV2	BDV0	HRB3	COI2		
B	NOK1	(YAK2)	NUR1	LER1	(MGD1)	LNN-	BFE2	ESK2	(MEA2)
	WNG1	[PET2]	IRT1	VAL0	GTT2	HAD1	DOU1	ODE2	GCK0
	AAA0	AQU1	TFS2	EBR1	ABG2	HER1	[EYR1]	AIA-	
C	[YSS1]	THY2	OTT1	[MMB0]	TKT1	SPT1	FRD0	PEN1	[KAK0]
	[HTY0]	[KNY0]	QUE1	TEN0	[LNP1]	SJG0	HYB0	[GUA0]	ETT0
	[PMG1]	MPO2	[GNA0]	ACS0	[CNB0]				
D	TAN	TWA							
E	KZN	[PPT]							
X	KGD	(VIC)							

APRIL	1988						17/04	04:28	C
A	ABG3								
B	SV32	PET3	IRT1	MMB3	KAK3	KNY3	LNP3	GUA2	ETT1
C	YAK3	NUR1	MGD0	(MEA0)	WNG0	KIV1	KGD0	(VIC1)	YSS1
	AAA1	TKT2	HTY3	QUE1	[TEN0]	HYB2	MPO2	EYR0	
D	NOK	KIR	LNN	KZN	BFE	NGK	GTT	BDV	HRB
	THY	ODE	GCK	AQU	TFS	PEN	HON	PMG	API
	TAN	CNB							
E									
X	GNA								

MAY	1988						25/05	11:55	
A	KIR-	MEA2	COI3						
B	NUR1	LNN-	SV32	KZN2	WNG2	IRT2	VAL1	KIV2	KGD0
	ODE2	OTT2	AAA2	TFS1	FRD1	ABG3	SJG2		
C	NOK2	YAK2	(MGD1)	BFE2	ESK0	(PET1)	NGK1	GTT2	HAD0
	DOU2	BDV1	(VIC0)	HRB2	(YSS1)	GCK0	AQU1	TKT2	EBR1
	SPT1	PEN1	[HTY0]	(TUC0)	TEN1	(LNP0)	[HON0]	[GUA0]	[PMG1]
	MPO1	ACS0	[EYR0]	(AIA-)					
D	LER	THY	QUE	HYB	ETT	TAN	HER	TWA	
E									
X									

JUNE	1988						23/06	09:17	C
A	SV33 HER1	WNG3	HRB3	GCK2	COI3	LNP3	ABG3	HYB3	MPO3
B	NUR2 DOU2	KZN3 KGD1	BFE2 BDV3	PET2 AQU3	IRT1 TKT2	NGK3 TEN1	VAL1	HAD1	KIV2
C	NOK3 (OTT1) ETT0	YAK3 MMB0	LER0 TFS2	LNN- EBR0	ESK1 SPT2	(MEA1) KAK0	GTT1 HTY0	YSS1 KNY0	ODE2 (SJG0)
D	KIR	MGD	THY	TAN					
E									
X	AAA	PEN	QUE	[TWA]					

JUNE	1988						23/06	17:51	C
A	FRD2	SJG1							
B	KIR-	YAK1	LNN-	MEA1	WNG3	VIC2	OTT1	HON1	
C	NOK2 HAD0 EBR0 [MPO0]	NUR1 KIV1 COI2 [GNA1]	LER1 (KGD0) (PEN1) ACS0	(SV31) HRB0 TUC0 (AIA-)	BFE- THY0 TEN0	ESK1 (ODE2) [LNP0]	NGK1 GCK0 [ABG0]	VAL0 AQU0 [ETT0]	GTT0 (TFS1) [PMG1]
D	MGD	PET	DOU	SPT	PPT				
E	BDV								
X	[AAA]	TWA							

JUNE	1988						24/06	04:19	C
A	YAK2 ODE2 ETT3	NUR2 MMB3 GNA2	LNN- AAA3	SV32 TKT3	WNG3 KAK3	PET2 HTY3	NGK1 KNY3	KIV2 LNP3	BDV3 ABG3
B	NOK3 (VIC2)	KIR- YSS2	LER1 [OTT2]	MGD1 AQU1	ESK0 TFS3	(MEA2) PEN2	GTT0 PMG1	HAD1 [ACS0]	KGD0 CNB2
C	KZN2 QUE1	BFE- [TEN0]	IRT2 (MPO1)	(VAL0)	DOU0	(EBR0)	(COI2)	(SPT0)	[FRD0]
D	THY	HON	GUA	API	EYR				
E	HRB	GCK	TAN						
X	HYB	[TWA]							

JUNE	1988						30/06	09:03	C
A	SV33 PEN3	IRT3 ABG3	HRB3 HYB3	THY3 TAN3	ODE2 MPO2	GCK3 HER1	AAA3	TKT3	COI3
B	NOK1 TFS3	KIR- QUE1	YAK3 TEN1	KZN3 LNP3	NGK2 ETT2	VAL0	KIV2	(VIC2)	AQU1
C	NUR1 BDV3 KNY0	MGD0 YSS2 (SJG0)	LNN- MMB0 (GUA1)	BFE- EBR1 GNA2	ESK0 SPT2 [ACS0]	WNG0 (FRD0) [AIA-]	PET1 KAK0	GTT1 HTY0	DOU0 [TUC0]
D	LER	HAD							
E	(MEA)								
X	KGD	[TWA]							

JULY	1988						07/07	07:21	C
A	(MEA2)	(VIC2)	LNP3	ABG3					
B	NOK2 TEN1	YAK3 ETT1	WNG3 TAN2	PET2 [ACS0]	IRT2	HRB3	(OTT2)	AQU0	TFS2
C	NUR1 HAD0 TKT1 HYB2	MGD1 KIV1 COI2 PMG1	LNN- DOU0 [FRD0] [PPT0]	SV32 BDV3 PEN2 HER0	KZN1 YSS1 KAK3	BFE- ODE2 HTY3	ESK0 GCK2 [TUC0]	NGK1 MMB3 KNY3	GTT0 AAA0 [SJG0]
D	KIR	LER	VAL	EBR	SPT	QUE	GUA	GNA	
E									
X	KGD	THY	MPO	[TWA]					

JULY	1988						08/07	03:33	C
A									
B	YAK1	TFS1	LNP3	ABG2	GUA2				
C	NOK0 YSS1	MGD0 ODE2	SV32 [OTT1]	(ESK0) MMB0	WNG1 KAK0	PET2 HTY1	IRT0 KNY0	GTT0 HYB1	VIC1
D	KIR HRB API	NUR GCK GNA	LER AAA CNB	LNN TKT EYR	KZN PEN	MEA QUE	NGK HON	KIV ETT	BDV PMG
E	BFE								
X	KGD	THY	TAN	[TWA]					

JULY	1988						27/07	07:40	C
A	ABG3								
B	NOK2 VAL1	KIR- BDV3	YAK2 [VIC2]	MGD0 HRB2	SV31 ODE2	ESK1 (OTT2)	WNG1 AQU0	PET1 TFS1	IRT2 LNP3
C	NUR1 DOU1 KAK0 [ACS0]	LER1 YSS1 HTY0	LNN- THY0 KNY0	KZN2 GCK0 TEN0	BFE- MMB0 HYB1	NGK1 AAA1 ETT0	GTT0 EBR0 PMG1	HAD0 COI2 MPO1	KIV1 SPT1 HER0
D	TKT	QUE	GUA	TAN					
E	(MEA)	[PPT]							
X	KGD	PEN	GNA	[TWA]					

JULY	1988						30/07	08:45	C
A	COI3								
B	YAK2	IRT2	ODE2	TFS1	LNP3	ABG2	TAN2	MPO1	
C	NOK0 PET1 GCK0 ETT0	KIR- NGK0 AAA2 HER0	NUR1 GTT0 AQU2	MGD0 HAD0 SPT0	SV31 KIV1 HTY0	KZN1 DOU0 [TUC0]	BFE- YSS3 QUE1	ESK0 THY2 (SJG0)	WNG1 (OTT1) HYB1
D	LER KNY	LNN TEN	VAL GNA	BDV	HRB	MMB	TKT	EBR	KAK
E	(MEA)								
X	KGD	PEN	[TWA]						

AUGUST	1988						02/08	17:20	C
A	FRD2	TUC1	SJG1						
B	WNG3	KIV1	HRB3	HON1					
C	(NOK0) NGK1 SPT0	KIR- GTT2 TEN0	(YAK2) DOU0 [LNP0]	NUR2 BDV2 [ABG0]	LNN- VIC1 [PMG1]	BFE2 (ODE2)	ESK0 GCK0	MEA1 AQU1	[IRT0] EBR0
D	LER	VAL	HAD	THY	OTT	COI	PPT	ACS	AIA
E									
X	(PET)	[KGD]	PEN	[GUA]	TWA				

SEPTEMBER 1988							28/09	23:04	C
A	PET3	LNP3	API3	PPT1	EYR1				
B	YAK2 (SJG3)	(IRT1) GUA0	VIC2 CNB2	YSS1	MMB0	KAK0	HTY0	KNY0	HON-
C	MGD0	[GTT0]	(FRD0)	TUC0	[ABG1]	PMG1			
D	MEA	GNA							
E									
X	[KIR]	[ESK]	[KGD]	[MPO]	(TWA)				

OCTOBER 1988							03/10	15:05	C
A	WNG3 COI3	VAL2 FRD3	HAD3 TUC3	DOU3 SJG3	VIC2 HER3	HRB3 ACS3	OTT2 AIA-	AQU3	EBR3
B	LER2	BFE2	MEA1	NGK3	GTT3	BDV3	GCK1	SPT2	TEN2
C	NUR1	[MGD1]	ODE2	[HON0]	[EYR0]				
D	KIR	LNN	KIV	THY					
E									
X	ESK	PEN	MPO	TWA					

OCTOBER 1988							03/10	23:30	C
A	PET3	LNP3	HON2	GUA1	API3	PPT2	CNB3	EYR3	
B	MEA2	VIC2	MMB3	KAK3	HTY0	TUC2	KNY3		
C	(NOK1) PMG2	YAK3 GNA2	[WNG0]	IRT0	[KGD0]	YSS1	[SPT0]	[QUE1]	[ABG1]
D	MGD								
E									
X	[ESK]	[PEN]	[MPO]	(TWA)					

	OCTOBER	1988					12/10	04:59	C
A	PET3 HYB0	MMB3 ETT3	AAA1 CNB3	TKT3 EYR3	KAK3	HTY3	KNY3	LNP3	ABG3
B	IRT2	TFS2	GUA1	PMG2					
C	NOK2 (GTT0)	(KIR-) KGD0	YAK3 YSS1	(LER0) ODE2	MGD0 [OTT1]	SV31 [SJG0]	KZN1 TAN0	(WNG0) GNA2	(NGK0)
D	LNN	KIV	PEN	QUE	API	HER			
E	[MEA]								
X	MPO	[TWA]							

	OCTOBER	1988					12/10	12:10	C
A									
B	[YAK1]	WNG3	[PET1]	[VIC2]	HRB1	TFS2	TEN0		
C	(NOK0) (IRT0) AQU0	NUR1 NGK1 EBR1	LER0 GTT2 COI1	[MGD0] HAD0 SPT1	SV32 KIV1 FRD1	KZN1 KGD0 PEN1	BFE- BDV2 [HON0]	ESK0 ODE2 ABG0	[MEA0] GCK0 TAN0
D	KIR SJG	LNN HYB	VAL ETT	DOU HER	THY ACS	OTT AIA	AAA	TKT	QUE
E									
X	MPO	TWA							

	NOVEMBER	1988					10/11	06:10	C
A	LNP3	ABG3	GNA3	CNB2					
B	NOK1 TFS2	YAK3 KAK0	(MGD0) HTY0	SV32 KNY0	(PET2) GUA0	IRT1 ETT1	KIV1 TAN2	[OTT2] EYR0	MMB0 (AIA-)
C	(KIR-) HRB1 [TEN0]	LNN- YSS1 [SJG0]	(BFE-) ODE2 HYB2	(ESK0) GCK0 PMG1	(WNG1) AAA1 MPO1	(NGK1) (AQU0) HER0	(GTT0) TKT1 [ACS0]	KGD0 (SPT1)	[VIC1] QUE1
D	KZN								
E	[MEA]								
X	THY	PEN	[TWA]						

	DECEMBER 1988						09/12	03:15	C
A	EYR3								
B	[FRD0]	LNP3	GUA1	ETT2	PMG2	(AIA-)			
C	YAK3	PET1	IRT0	[NGK0]	[GTT0]	KGD0	YSS1	[ODE2]	MMB0
	AAA0	[COI2]	[PEN0]	KAK0	HTY0	[TUC0]	KNY0	HON0	ABG1
	[SJG0]	HYB1	API1	MPO1	GNA2	CNB3			
D	MGD	TKT	QUE	PPT	TAN				
E									
X	[EBR]	[TWA]							

	DECEMBER 1988							17/12	03:45	C
A										
B	KGD0	ABG2	PMG2	EYR1						
C	(NOK1)	[KIR-]	YAK3	MGD0	[WNG0]	PET1	IRT1	[NGK1]	[VIC0]	
	YSS1	MMB0	AAA0	KAK0	HTY0	KNY0	LNP3	GUA0	ETT0	
	TAN0	CNB2	(AIA-)							
D	TKT	QUE	HON	API	PPT	HER				
E	[MEA]	HYB	MPO	GNA						
X	[EBR]	[PEN]	[TWA]							

	DECEMBER 1988							17/12	04:52	C
A	[KIR-]	[COI2]								
B	YAK3	(NUR1)	SV32	(KZN1)	[WNG0]	IRT2	(KIV1)	KGD0	(ODE2)	
	AAA0	LNP3	ABG2							
C	(NOK1)	[LER0]	(MGD0)	[BFE-]	PET1	[NGK1]	[VAL0]	[GTT0]	[DOU0]	
	[BDV0]	(HRB1)	YSS1	[OTT0]	(GCK0)	MMB0	[AQU1]	TKT2	KAK0	
	HTY0	KNY0	[TEN0]	[SJG0]	HYB1	PMG1	TAN0	HER0	EYR0	
	(AIA-)									
D	TFS	QUE	GUA	API	CNB					
E	[MEA]	ETT	MPO	GNA						
X	[EBR]	(PEN)	[TWA]							

DOUBTFUL SOLAR - FLARE EFFECTS **(sfe)** - Summary List 1988

JANUARY	1988	None

FEBRUARY	1988							
14/02	11:42		17 A	28 B	12 C	1 D	1 E	2 X

MARCH	1988							
10/03	11:41		12 A	30 B	15 C	1 D	1 E	4 X
15/03	11:18	C	8 A	17 B	24 C	5 D	3 E	4 X
16/03	14:07	C	2 A	13 B	39 C	1 D	0 E	3 X
24/03	10:20	C	1 A	7 B	28 C	12 D	1 E	3 X

APRIL	1988							
13/04	04:16	C	14 A	19 B	24 C	3 D	0 E	3 X
18/04	00:58		1 A	3 B	15 C	14 D	0 E	1 X
18/04	05:21	C	2 A	4 B	19 C	29 D	0 E	2 X
21/04	09:19	C	0 A	4 B	23 C	19 D	0 E	3 X
24/04	01:14	C	1 A	3 B	22 C	10 D	0 E	2 X

MAY	1988							
24/05	13:32	C	8 A	19 B	30 C	2 D	2 E	1 X
27/05	13:42	C	3 A	10 B	18 C	17 D	0 E	2 X

JUNE	1988							
02/06	07:09		3 A	15 B	30 C	12 D	0 E	2 X
04/06	14:33		1 A	18 B	29 C	6 D	0 E	2 X
06/06	15:49		11 A	31 B	15 C	1 D	1 E	4 X
08/06	11:20		0 A	13 B	32 C	9 D	0 E	2 X
29/06	07:38	C	14 A	14 B	7 C	0 D	25 E	3 X
30/06	10:01	C	1 A	4 B	35 C	13 D	1 E	2 X

DOUBTFUL SOLAR - FLARE EFFECTS **(sfe)** - Summary List 1988 (continued)

JULY		1988						
01/07	10:42		3 A	26 B	21 C	2 D	6 E	3 X
03/07	14:17		0 A	3 B	29 C	13 D	0 E	2 X

AUGUST	1988	None

SEPTEMBER		1988						
08/09	12:34	C	0 A	3 B	29 C	17 D	0 E	4 X
22/09	10:29	C	2 A	19 B	23 C	4 D	4 E	5 X
26/09	12:07	C	18 A	19 B	17 C	1 D	1 E	3 X

OCTOBER		1988						
03/10	13:21	C	1 A	2 B	19 C	13 D	0 E	4 X
05/10	06:16	C	8 A	17 B	7 C	1 D	28 E	3 X

NOVEMBER		1988						
16/11	04:10	C	3 A	9 B	22 C	4 D	0 E	3 X
17/11	13:06		2 A	7 B	33 C	8 D	2 E	2 X

DECEMBER		1988						
15/12	04:57	C	0 A	13 B	20 C	6 D	2 E	3 X
20/12	09:14	C	4 A	15 B	34 C	3 D	1 E	4 X
24/12	02:05	C	1 A	4 B	27 C	8 D	0 E	6 X
29/12	12:30		8 A	22 B	16 C	2 D	6 E	7 X

DOUBTFUL SOLAR - FLARE EFFECTS **(sfe)** 1988

JANUARY	1988	None

FEBRUARY	1988						14/02	11:42	
A	KIR- EBR0	WNG1 COI3	[PET1] PEN1	HAD1 [LNP2]	DOU2 [PMG1]	BDV1 [PPT1]	THY3 MPO1	ODE2 [EYR1]	AAA0
B	(NOK1) VAL1 [KAK0] AIA-	[YAK3] GTT0 [HTY0]	NUR2 KIV2 [KNY0]	LER1 HRB1 TEN1	LNN- [YSS1] ABG2	SV32 (OTT2) ETT0	BFE2 [MMB0] TAN0	ESK0 AQU1 HER0	[MEA2] TFS3 [CNB0]
C	[MGD0] (GNA0)	KZN2 ACS0	(IRT1) TWA0	NGK2	KGD0	TKT2	SPT2	QUE1	SJG0
D	HYB								
E	GCK								
X	[VIC]	(FRD)							

MARCH	1988						10/03	11:41	
A	KIR- COI3	NUR2 MPO2	BFE2 ACS0	WNG2	NGK3	KIV3	DOU2	BDV0	GCK1
B	(NOK0) HAD1 PEN2 [PMG1]	[YAK3] [VIC2] [KAK0] HER0	LER1 HRB0 [KNY0] AIA-	LNN- ODE2 TEN1	SV32 [MMB0] [LNP2]	[MEA2] AAA0 [HON0]	[PET1] AQU1 ABG2	VAL1 TFS2 SJG1	GTT0 EBR1 [GUA1]
C	[MGD0] [HTY0]	KZN1 ETT0	ESK0 [API1]	(IRT1) [PPT1]	KGD0 [CNB0]	[YSS1] TWA0	THY0	TKT2	FRD0
D	QUE								
E	HYB								
X	OTT	SPT	TAN	(GNA)					

MARCH	1988						15/03	11:18	C
A	WNG3	(IRT0)	NGK3	BDV2	AAA3	ABG3	[PMG1]	MPO2	
B	NOK2 HAD1	(YAK2) [VIC2]	NUR1 AQU1	LER1 TFS1	[MGD0] FRD0	LNN- HER0	ESK1 ACS0	[MEA2] TWA0	[PET1]
C	SV32 [MMB0] SJG0	BFE- TKT1 [GUA0]	VAL0 COI2 ETT0	GTT0 [KAK0] (GNA0)	KIV1 [HTY0] [CNB0]	DOU1 [TUC0] AIA-	KGD0 [KNY0]	ODE2 QUE1	GCK0 TEN0
D	KZN	THY	OTT	EBR	PEN				
E	HRB	HYB	[PPT]						
X	KIR	SPT	[LNP]	TAN					

MARCH	1988						16/03	14:07	C
A	COI3	MPO2							
B	KIR- (ABG1)	NUR2 SJG2	WNG3 HER0	HAD1 [EYR0]	KIV2	HRB3	TFS1	TEN2	[LNP0]
C	(NOK0) [PET1] THY0 [KAK0] [CNB0]	[YAK2] NGK2 ODE2 [HTY0] TWA0	[MGD1] VAL0 OTT0 TUC0 AIA-	LNN- GTT1 GCK0 [KNY0]	(SV32) DOU1 [MMB0] (QUE1)	KZN1 (KGD0) AQU1 [HON0]	BFE2 BDV2 EBR0 [PMG1]	ESK1 (VIC0) FRD1 [GNA0]	MEA1 [YSS0] PEN1 ACS0
D	LER								
E									
X	SPT	[API]	TAN						

MARCH	1988						24/03	10:20	C
A	HRB3								
B	NUR2	WNG3	[PET1]	NGK1	KIV2	TFS1	ACS1		
C	NOK2 IRT0 AQU1 [EYR0]	(YAK2) GTT0 EBR1	LER1 DOU1 [KAK0]	(MGD0) KGD0 [HTY0]	LNN- BDV3 (KNY0)	SV32 ODE2 (LNP1)	BFE- GCK0 ABG1	ESK1 [MMB0] [PMG1]	[MEA0] AAA0 HER0
D	KIR QUE	KZN TEN	VAL ETT	HAD	THY	TKT	COI	SPT	PEN
E	HYB								
X	[VIC]	TAN	MPO						

APRIL	1988						13/04	04:16	C
A	KIR- ODE2	NUR2 AAA2	SV33 [COI3]	KZN1 ABG2	IRT2 TAN3	(VAL1)	KIV2	(DOU2)	THY3
B	NOK2 HRB1 [AIA-]	YAK3 GCK0	(LER0) TFS3	(BFE2) TKT3	(ESK0) PEN2	(MEA2) LNP2	(WNG0) GNA1	(HAD0) (HER0)	(BDV1) EYR1
C	MGD2 (SPT1) ETT0	LNN- [FRD0] (PPT0)	PET1 KAK0 MPO1	(NGK1) HTY0 [ACS0]	(GTT0) KNY0 CNB1	YSS2 QUE1 [TWA0]	[OTT1] [TEN0]	MMB0 [SJG0]	(AQU1) GUA1
D	HON	HYB	API						
E									
X	KGD	(VIC)	PMG						

APRIL	1988							18/04	00:58	
A	MEA2									
B	(KIR-)	YAK1	IRT1							
C	NOK2 KAK1	MGD0 KNY3	(SV32) (QUE1)	[WNG0] LNP2	PET2 ABG1	KGD0 GNA2	VIC1	(OTT1)	MMB1
D	YSS PMG	AAA API	TKT PPT	HTY CNB	TUC EYR	HON	HYB	GUA	ETT
E									
X	[COI]								

APRIL	1988						18/04	05:21	C
A	[MEA2]	ABG2							
B	KIR-	YAK1	PET2	ETT0					
C	NOK1 [FRD0] EYR0	MGD0 KAK3	WNG0 HTY3	(HAD0) [TUC0]	KGD0 KNY3	[VIC1] LNP2	ODE2 [SJG0]	[OTT1] PMG1	MMB3 MPO1
D	NUR GTT AQU HER	LER KIV TFS CNB	LNN DOU TKT	SV3 BDV EBR	KZN HRB PEN	BFE YSS QUE	ESK THY GUA	IRT GCK TAN	NGK AAA GNA
E									
X	(COI)	HYB							

APRIL	1988						21/04	09:19	C
A									
B	KIR-	NUR1	WNG3	IRT1					
C	NOK1 KIV1 GCK0	YAK0 DOU0 AQU1	SV32 KGD0 PEN1	BFE2 BDV2 [PMG1]	ESK1 [VIC0] HER0	(PET1) HRB1	NGK1 THY0	GTT0 ODE2	HAD0 (OTT1)
D	LER COI GNA	MGD SPT	LNN KNY	KZN QUE	YSS TEN	AAA LNP	TFS ABG	TKT ETT	EBR TAN
E									
X	VAL	HYB	MPO						

APRIL	1988						24/04	01:14	C
A	AAA3								
B	SV32	IRT1	GUA1						
C	NOK2 VIC1 LNP1	YAK3 (OTT1) ABG1	MGD2 MMB0 PMG1	[WNG0] (TFS1) EYR0	PET1 KAK0	[NGK0] HTY0	[HAD0] KNY0	[DOU0] QUE1	KGD0 [TEN0]
D	YSS CNB	TKT	TUC	HON	HYB	ETT	API	PPT	GNA
E									
X	MEA	[MPO]							

MAY	1988						24/05	13:32	C
A	NOK2	KIR-	(PET2)	(IRT3)	VIC2	COI2	ABG3	[GNA0]	
B	(YAK3) KIV1 (AIA-)	NUR1 HRB2	(MGD2) ODE2	LNN- OTT1	BFE2 AAA0	MEA2 AQU2	WNG2 TFS2	VAL0 EBR2	HAD1 [EYR0]
C	LER1 THY1 TUC0 MPO1	KZN2 GCK0 [KNY0] ACS0	ESK1 [MMB0] QUE1 TWA0	NGK1 TKT1 TEN2	GTT1 SPT1 [HON0]	DOU1 FRD0 SJG0	KGD0 PEN2 [GUA0]	BDV1 [KAK0] (ETT0)	[YSS2] [HTY0] [PMG1]
D	TAN	HER							
E	SV3	(HYB)							
X	[LNP]								

MAY	1988						27/05	13:42	C
A	HRB3	COI3	PEN2						
B	KIR- MPO2	SV32	WNG3	KIV2	KGD0	ODE2	GCK0	AQU2	SPT2
C	(YAK1) THY0	NUR1 OTT0	BFE2 TFS2	(PET1) EBR2	(IRT1) [LNP0]	NGK1 (ABG1)	GTT2 [GNA0]	BDV3 HER0	VIC0 (AIA-)
D	LER FRD	LNN TUC	KZN QUE	ESK TEN	MEA SJG	HAD TAN	DOU ACS	AAA TWA	TKT
E									
X	NOK	VAL							

JUNE	1988						02/06	07:09	
A	LNP2	[SJG0]	MPO2						
B	(MEA1) ABG2	PET2 GUA1	KGD0 ETT1	AAA3 GNA0	AQU2 [EYR1]	TFS1 [AIA-]	[FRD0]	[TUC0]	[HON0]
C	NOK0 GTT1 COI2 HER1	KIR- KIV1 SPT0 [ACS0]	YAK2 BDV1 PEN2 (CNB0)	NUR1 (VIC1) HTY1	MGD1 HRB2 QUE1	BFE- YSS1 TEN0	WNG1 ODE2 HYB2	IRT1 GCK0 PMG2	NGK1 TKT2 TAN0
D	LER EBR	LNN KAK	SV3 KNY	KZN	ESK	VAL	HAD	THY	MMB
E									
X	DOU	[TWA]							

JUNE	1988						04/06	14:33	
A	COI2								
B	KIR- KIV2	NUR1 VIC2	LNN- HRB2	SV32 ODE2	KZN2 TFS1	BFE2 [LNP0]	ESK0 (ABG1)	MEA2 (TAN2)	WNG2 MPO2
C	NOK3 BDV0 EBR1 [PMG1]	(YAK3) [YSS0] FRD1 ACS0	LER0 THY1 PEN2	(PET2) OTT1 [KAK0]	(IRT1) GCK0 [HTY0]	NGK1 [MMB0] [KNY0]	VAL0 (AAA2) (QUE1)	GTT1 AQU2 TEN0	DOU0 TKT1 (HYB1)
D	HAD	SPT	TUC	SJG	HER	AIA			
E									
X	KGD	TWA							

JUNE	1988						06/06	15:49	
A	SV32 SJG3	MEA2 ACS2	WNG2	(PET2)	VAL1	VIC2	HRB3	COI3	[ABG1]
B	NUR1 (KGD0) EBR1 (PPT1)	LER2 BDV0 FRD3 (MPO1)	LNN- ODE2 [KAK0] [GNA0]	KZN2 OTT1 TUC1 AIA-	BFE2 GCK0 [KNY0]	ESK1 [MMB0] TEN0	HAD1 (AAA1) [LNP0]	KIV2 AQU2 (HON2)	DOU2 TFS2 [GUA0]
C	NOK3 SPT0	(YAK3) [HTY0]	(MGD3) [ETT0]	(IRT2) [API1]	NGK1 [TAN0]	GTT1 (HER0)	[YSS1]	THY1	(TKT3)
D	PEN								
E	[HYB]								
X	KIR	(QUE)	[PMG]	TWA					

JUNE	1988						08/06	11:20	
A									
B	SV32 (KNY0)	(PET2) (LNP1)	IRT1 ABG2	KIV2 MPO2	KGD0	(MMB0)	AAA0	TFS2	(KAK0)
C	NOK2 NGK0 GCK0 HYB2	YAK2 GTT1 AQU2 ETT0	NUR1 HAD0 TKT1 [PMG1]	(MGD0) BDV0 COI2 [GNA0]	LNN- (VIC0) PEN1 HER0	BFE- HRB1 (HTY0)	ESK0 THY0 QUE1	MEA0 ODE2 TEN1	WNG1 OTT1 SJG0
D	LER	KZN	VAL	DOU	EBR	SPT	FRD	TAN	ACS
E									
X	KIR	(TWA)							

JUNE	1988						29/06	07:38	C
A	YAK2 HTY0	WNG3 ABG3	PET2 PMG1	IRT3 HER0	NGK2 [ACS0]	YSS1	TFS2	TKT3	PEN3
B	NOK3 AQU1	KIR- EBR1	MGD0 LNP3	LNN- [SJG0]	VAL0 TAN2	GTT0	KIV2	DOU0	(OTT2)
C	(VIC1)	THY0	ODE2	COI2	SPT1	QUE1	TEN1		
D									
E	NUR HRB ETT	LER GCK [API]	SV3 MMB [PPT]	KZN AAA MPO	BFE [FRD] GNA	ESK KAK (CNB)	(MEA) KNY [AIA]	HAD HYB	BDV GUA
X	KGD	[HON]	[TWA]						

JUNE	1988						30/06	10:01	C
A	IRT3								
B	KIR-	YAK1	KZN2	VAL1					
C	NOK0	NUR1	LER0	MGD0	LNN-	SV32	BFE-	ESK0	WNG0
	(PET1)	NGK1	GTT2	HAD0	KIV1	DOU0	BDV0	(VIC1)	HRB2
	THY1	ODE2	OTT0	GCK0	(MMB0)	AAA0	AQU2	EBR0	COI2
	(KAK0)	KNY0	LNP1	ABG1	[PMG1]	[PPT0]	MPO0	(ACS0)	
D	YSS	TFS	TKT	SPT	FRD	PEN	QUE	TEN	SJG
	HYB	ETT	TAN	HER					
E	(MEA)								
X	KGD	[TWA]							

JULY	1988						01/07	10:42	
A	IRT2	COI3	SJG1						
B	NOK1	YAK3	NUR1	LER1	SV32	ESK0	WNG2	(PET1)	VAL1
	KIV2	DOU2	(VIC1)	THY3	OTT2	AAA0	AQU0	TFS1	FRD0
	(TUC1)	TEN0	(LNP2)	[HON0]	[PPT1]	MPO2	HER1	[AIA-]	
C	MGD1	LNN-	BFE-	NGK0	GTT0	HAD0	(YSS1)	ODE2	(MMB0)
	TKT1	EBR1	SPT1	(KAK0)	(HTY0)	(KNY0)	QUE1	ABG1	[GUA0]
	ETT0	[PMG1]	(GNA0)						
D	HYB	TAN							
E	KZN	(MEA)	BDV	HRB	GCK	PEN			
X	KIR	KGD	(TWA)						

JULY	1988						03/07	14:17	
A									
B	MEA2	HRB3	TEN1						
C	(YAK0)	NUR1	(MGD0)	LNN-	SV30	KZN1	BFE-	ESK0	WNG1
	(IRT0)	NGK0	VAL0	GTT0	KIV1	BDV3	VIC1	ODE2	OTT2
	GCK0	AQU1	COI1	FRD0	PEN1	TUC1	QUE1	(ABG0)	SJG1
	MPO1	(AIA-)							
D	NOK	KIR	LER	HAD	DOU	THY	AAA	TFS	TKT
	EBR	SPT	HER	ACS					
E									
X	KGD	TWA							

AUGUST	1988	None

SEPTEMBER	1988	08/09	12:34	C

A									
B	WNG2	(IRT0)	ODE2						
C	NOK0	(YAK1)	NUR1	LER0	[MGD0]	KZN2	BFE2	ESK0	[PET1]
	NGK1	GTT0	KIV1	BDV3	(VIC1)	HRB1	[YSS1]	OTT1	GCK0
	AQU0	TFS2	EBR1	SPT1	PEN1	[LNP2]	ABG1	SJG2	[PMG1]
	ACS0	AIA-							
D	KIR	LNN	SV3	VAL	HAD	DOU	THY	AAA	TKT
	COI	FRD	QUE	TEN	HYB	ETT	TAN	HER	
E									
X	KGD	[API]	MPO	TWA					

SEPTEMBER	1988	22/09	10:29	C

A	(YAK2)	COI2							
B	NOK2	KIR-	NUR1	(MGD1)	LNN-	SV31	WNG3	[PET2]	IRT0
	NGK1	VAL0	GTT1	KIV2	DOU1	BDV3	ODE2	AQU0	TFS1
	ABG2								
C	LER0	HAD0	[VIC1]	(OTT0)	[MMB0]	AAA0	TKT1	EBR0	SPT1
	(FRD0)	PEN1	[KAK0]	[HTY0]	(KNY0)	TEN0	(LNP0)	SJG0	[PMG1]
	(GNA0)	HER0	ACS0	[CNB0]	AIA-				
D	KZN	QUE	HYB	TAN					
E	BFE	ESK	HRB	GCK					
X	KGD	THY	ETT	MPO	TWA				

SEPTEMBER	1988	26/09	12:07	C

A	NUR2	LER1	SV32	ESK1	WNG2	NGK3	KIV2	BDV0	HRB3
	OTT2	[MMB0]	AAA2	EBR0	PEN3	[KAK0]	[KNY0]	ABG3	ACS0
B	[YAK2]	[MGD0]	LNN-	BFE2	(MEA2)	[PET2]	(IRT1)	VAL0	GTT2
	HAD1	DOU2	[YSS2]	ODE2	GCK0	AQU0	TFS3	QUE1	HER0
	AIA-								
C	(NOK1)	KIR-	KZN1	[VIC2]	THY1	TKT2	COI2	SPT1	FRD0
	[HTY0]	TEN0	[HON0]	SJG0	[PMG1]	TAN0	[GNA0]	[EYR0]	
D	ETT								
E	HYB								
X	KGD	MPO	TWA						

	OCTOBER	1988					03/10	13:21	C
A	(VIC1)								
B	WNG3	HRB3							
C	(NOK2) OTT1 ACS0	NUR1 GCK0	BFE- AQU2	NGK1 EBR0	GTT2 COI2	KIV1 SPT1	BDV3 TEN0	THY0 SJG1	ODE2 HER0
D	KIR FRD	LER QUE	LNN TAN	SV3 AIA	KZN	VAL	HAD	DOU	TFS
E									
X	ESK	PEN	MPO	TWA					

	OCTOBER	1988					05/10	06:16	C
A	PET2	IRT2	NGK1	KIV2	TKT3	QUE1	ABG3	GNA2	
B	NOK0 [OTT1]	KIR- AQU0	YAK2 TFS2	MGD1 LNP3	[MEA2] PMG1	(VAL0) TAN2	GTT0 HER0	DOU1 [ACS0]	KGD1
C	LNN-	KZN2	ODE2	EBR0	(COI2)	(SPT1)	(TEN0)		
D	HRB								
E	NUR THY [HON] (AIA)	(LER) GCK [SJG]	SV3 MMB HYB	BFE AAA GUA	(ESK) [FRD] ETT	WNG KAK (API)	(HAD) HTY [PPT]	BDV [TUC] CNB	YSS KNY EYR
X	PEN	MPO	[TWA]						

	NOVEMBER	1988					16/11	04:10	C
A	ABG3	MPO1	EYR1						
B	IRT2	[OTT2]	HTY0	GUA1	PMG2	TAN2	GNA2	HER0	CNB2
C	(NOK0) [VIC2] QUE1	[KIR-] YSS2 LNP2	YAK2 (ODE2) HYB1	MGD0 MMB0 (AIA-)	[ESK0] AAA0	[WNG0] [EBR0]	PET2 [FRD0]	[HAD0] KAK0	KGD0 KNY0
D	SV3	TKT	API	PPT					
E									
X	(PEN)	ETT	[TWA]						

	NOVEMBER 1988						17/11	13:06	
A	(ABG2)	[EYR0]							
B	[IRT1]	VAL0	TFS1	FRD0	[LNP2]	MPO2	ACS0		
C	[NOK0]	(KIR-)	[YAK2]	NUR1	[MGD0]	LNN-	(SV32)	ESK0	WNG1
	[PET1]	NGK0	GTT0	HAD0	KIV1	(KGD0)	[VIC2]	HRB3	THY1
	ODE2	(AAA0)	AQU0	COI2	SPT0	[HTY0]	(TUC0)	(QUE1)	TEN0
	SJG1	[GUA0]	(ETT0)	[PMG1]	TAN0	[CNB0]			
D	LER	BFE	DOU	BDV	OTT	EBR	HER	AIA	
E	GCK	(HYB)							
X	PEN	TWA							

	DECEMBER 1988						15/12	04:57	C
A									
B	[KIR-]	[MEA1]	[WNG0]	KGD0	[VIC2]	[OTT2]	MMB1	KAK3	HTY3
	KNY3	ABG2	HER2	EYR1					
C	(NOK0)	YAK2	(MGD0)	(LNN-)	SV31	(KZN2)	[ESK0]	PET1	IRT2
	[NGK1]	[GTT0]	[HAD0]	(ODE2)	AAA0	TFS1	LNP3	ETT0	PMG1
	API1	MPO1							
D	YSS	TKT	QUE	HYB	GUA	TAN			
E	GNA	CNB							
X	(THY)	[EBR]	[TWA]						

	DECEMBER 1988						20/12	09:14	C
A	(KIR-)	DOU3	COI3	ABG2					
B	NUR2	SV31	ESK1	[PET2]	(IRT2)	NGK1	VAL0	GTT2	HRB1
	ODE2	AQU1	TFS2	(LNP2)	TAN2	ACS0			
C	(NOK0)	[YAK3]	[MGD0]	LNN-	KZN1	BFE-	[MEA1]	HAD1	KIV1
	KGD0	BDV0	[VIC1]	[YSS0]	THY0	[OTT1]	GCK0	[MMB0]	AAA0
	TKT2	SPT1	[KAK0]	[HTY0]	(KNY0)	QUE1	TEN0	[SJG0]	(GUA0)
	ETT0	(PMG1)	MPO1	GNA0	CNB0	(EYR0)	AIA-		
D	WNG	HYB	HER						
E	[PPT]								
X	(LER)	EBR	PEN	TWA					

	DECEMBER 1988						24/12	02:05	C
A	[COI2]								
B	[ODE2]	[AQU0]	LNP3	AIA-					
C	(NOK1)	YAK2	MGD2	[ESK0]	[WNG0]	PET2	IRT0	[NGK1]	[GTT0]
	[DOU1]	(KGD0)	[HRB1]	YSS1	[OTT1]	[GCK0]	MMB0	[TFS2]	[SPT1]
	[FRD0]	KAK0	HTY1	KNY0	(QUE1)	[TEN0]	ABG1	GUA0	PMG1
D	HON	HYB	ETT	API	PPT	GNA	CNB	EYR	
E									
X	[KIR]	[EBR]	[PEN]	(TAN)	(MPO)	(TWA)			

	DECEMBER 1988						29/12	12:30	
A	[YAK3]	WNG2	[IRT0]	NGK1	TFS1	COI3	[TUC0]	ACS0	
B	[NOK1]	LER1	[MGD0]	(SV31)	[PET2]	VAL0	GTT0	HAD1	KIV2
	DOU1	(KGD0)	HRB1	(OTT1)	GCK0	(AAA0)	AQU0	(TKT1)	FRD0
	[LNP1]	ABG2	SJG2	MPO1					
C	NUR1	LNN-	[VIC2]	THY0	ODE2	[MMB0]	SPT1	[KAK0]	[HTY0]
	[KNY0]	TEN0	[HON0]	[GUA0]	(ETT0)	[PMG1]	HER0		
D	PEN	AIA							
E	BFE	[MEA]	BDV	(HYB)	(GNA)	[CNB]			
X	(KIR)	ESK	EBR	QUE	[API]	TAN	TWA		

TRANSACTIONS OF IAGA MEETINGS

	Bulletin
Transactions of the Rome Meeting, 1922	No. 3
Transactions of the Madrid Meeting, 1924	No. 5
Comptes rendus de l'Assemblée de Stockholm, 1930	No. 8
Transactions of the Oslo Meeting, 1948	No. 13
Transactions of the Brussels Meeting, 1951	No. 14
Le Noyau Terrestre, Rome, 1954	No. 15a
Problèmes de la Physique de la haute atmosphère, 1954	No. 15b
Transactions of the Toronto Meeting, 1957	No. 16
Paléomagnétisme et Variation Séculaire, Toronto, 1957	No. 16a
Aéronomie, Toronto, 1957	No. 16b
Rapid Magnetic Variations, Utrecht, 1959	No. 16c
Transactions of the Helsinki and Berkeley Meetings 1960/1963	No. 19
Atlas of Indices K (Vol. 1 : Text ; Vol. 2 : Figures)	No. 21
Programme and Abstracts of the St Gall Meeting, 1957	No. 24
Transactions of the St Gall Meeting, 1967	No. 25
Programme and abstracts of the General Scientific Assembly, Madrid, 1969	No. 26
Transactions of the General Scientific Assembly, Madrid, 1969	No. 27
The World Magnetic Survey, 1957-1969	No. 28
Grid values for the IGRF 1965	No. 29
Transactions of the XV General Assembly, Moscow, 1971	No. 31
Programme and abstracts for the Second General Scientific Assembly, Kyoto, 1973 No. 34	
Transactions of the Second General Scientific Assembly, Kyoto, 1973	No. 35
Programme and Abstracts of the XVI General Assembly, Grenoble, 1975	No. 36
Transactions of the XVI General Assembly, Grenoble, 1975	No. 37
Grid values and charts of the IGRF 1975	No. 38
Transactions of the III General Scientific Assembly, Seattle, 1977	No. 41
Transactions of the XVII General Assembly, Canberra, 1979	No. 44
Program and abstracts of the IV General Scientific Assembly, Edimbourg, 1981	No. 45
Transactions of the IV General Scientific Assembly, Edimbourg, 1981	No. 46
Program and abstracts of the XVIII General Assembly, Hambourg, 1983	No. 48a
Program and abstracts of the IAGA/IAMAT Joint symposium on middle atmospheric sciences Hambourg, 1983	No. 48b
Transactions of the XVIII General Assembly, Hambourg, (1983-1985)	No. 49
Program and abstracts of the V Scientific Assembly, Prague, 1985	No. 50
Transactions of the V Scientific Assembly, Prague, 1985	No. 51
Grid-Point Values and Charts for the IGRF 1985	No. 52
Program and abstracts of the VI Scientific Assembly, Exeter, 1989	No. 53
Tables and Maps of the DGRF 1985 and IGRF 1990	No. 54

PROCEEDINGS OF IAGA SYMPOSIA

IAGA Symposium No. 2, Communications présentées à la Réunion de Berkeley, 1963
IAGA Symposium No. 3, Symposium on Magnetism of the Earth's Interior, Pittsburgh, 1964
IAGA Symposium No. 4, Communications présentées à la Réunion de Cambridge (Mass.),1965
IAGA Symposium No. 5, Communications présentées à la Réunion de Sao José dos Campos (Brésil),
IAGA Symposium No. 6, Symposium on Aurora and Magnetic Storms, Birkeland, 1967
IAGA Symposium No. 7, Symposium on Upper Atmospheric Winds, Waves and Ionospheric Drifts, St Gall, 1967
IAGA Symposium No. 8, Symposium on Laboratory Measurements of Aeronomic Interest, Toronto, 1963
IAGA Symposium No. 9, Symposium on Multidisciplinary Studies of Unusual Regions of the Upper Mantle, Madrid, 1969

Users Information **Indices 1988 on Diskette** **("README")**

The included diskette contains files of IAGA indices presented following the same formats as those of the tables published in the IAGA Bulletin n°32s for 1988, and a software for visualizing the tables. The software (interaa.exe) is installed at the root level on a: , and the data files used are in the directory a:\ind88.

The names of the files for indices aa, an(3Kn), as(3Ks), am(3Km), Kp(ap), Dst and AE are:

- ...88.dat for hourly or three hourly, and daily values
- ...88.mya for monthly and yearly values since the inception of the series
- ...88.dmv for daily and monthly values (only Dst)

You can use the visualization software in two ways :

1 - Directly from the diskette :
Hit the command : INTERAA, then give the current year : 1988

2 - Installation on a drive of your computer
Hit INSTAL <drive>: , then ENTER (Example : INSTAL C:)
Hit the command : INTERAA, then give the current year : 1988

If you have diskettes for previous years (1982 to 1987 are available), you can use the same software (interaa.exe), provided that the data files for the corresponding years are on the directories <drive>:\indAA (AA for 82 to 87 years, respectively)

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY

The following IAGA Publications are available at the ISGI Publications Office,
4, Avenue de Neptune, F-94100 SAINT MAUR DES FOSSES, France

GEOMAGNETIC INDICES AND GEOMAGNETIC DATA

	Bulletin
Geomagnetic Indices, K and C, 1940-1946	No. 12
Geomagnetic Indices, K and C, 1947	No. 12a
Geomagnetic Indices, K and C, 1948	No. 12b
Geomagnetic Indices, K and C, 1949	No. 12c
Geomagnetic K-Indices, International Polar Year, August 1932 to 1933	No. 12d
Geomagnetic Indices, K and C, 1950	No. 12e
Geomagnetic Indices, K and C, 1951	No. 12f
Geomagnetic Indices, K and C, 1952	No. 12g
Geomagnetic Indices, K and C, 1953	No. 12h
Geomagnetic Indices, K and C, 1954	No. 12i
Geomagnetic Indices, K and C, 1955	No. 12j
Geomagnetic Indices, K and C, 1956	No. 12k
Geomagnetic Data, 1957, Indices K and C, Rapid Variations	No. 12l

Geomagnetic Data, 1958, Indices K and C	No. 12m1,	Rapid Variations	No. 12m2
Geomagnetic Data, 1959, Indices K and C	No. 12n1,	Rapid Variations	No. 12n2
Geomagnetic Data, 1960, Indices K and C	No. 12o1,	Rapid Variations	No. 12o2
Geomagnetic Data, 1961, Indices K and C	No. 12p1,	Rapid Variations	No. 12p2
Geomagnetic Data, 1962, Indices K and C	No. 12q1,	Rapid Variations	No. 12q2
Geomagnetic Data, 1963, Indices K and C	No. 12r1,	Rapid Variations	No. 12r2
Geomagnetic Data, 1964, Indices K and C	No. 12s1,	Rapid Variations	No. 12s2
Geomagnetic Data, 1965, Indices K and C	No. 12t1,	Rapid Variations	No. 12t2
Geomagnetic Data, 1966, Indices K and C	No. 12u1,	Rapid Variations	No. 12u2
Geomagnetic Data, 1967, Indices K and C	No. 12v1,	Rapid Variations	No. 12v2
Geomagnetic Data, 1968, Indices K and C	No. 12w1,	Rapid Variations	No. 12w2
Geomagnetic Data, 1969, Indices K and C	No. 12x1,	Rapid Variations	No. 12x2

Geomagnetic Planetary Indices Kp, Ap and Cp, 1932 to 1961	No. 18
List of Geomagnetic Observatories	No. 20
Atlas of K Indices (Vol. 1 : Text ; Vol. 2 : Figures)	No. 21
Geomagnetic Data, 1970, Indices, Rapid Variations, Magnetic Storms	No. 32a
Geomagnetic Data, 1971, Indices, Rapid Variations, Special Intervals	No. 32b
Geomagnetic Data, 1972, Indices, Rapid Variations, Special Intervals	No. 32c
Geomagnetic Data, 1973, Indices, Rapid Variations, Special Intervals	No. 32d
Geomagnetic Data, 1974, Indices, Rapid Variations, Special Intervals	No. 32e
Geomagnetic Data, 1975, Indices, Rapid Variations, Special Intervals	No. 32f
Geomagnetic Data, 1976, Indices, Rapid Variations, Special Intervals	No. 32g
Geomagnetic Data, 1977, Indices, Rapid Variations, Special Intervals	No. 32h
Geomagnetic Data, 1978, Indices, Rapid Variations, Special Intervals	No. 32i
Geomagnetic Data, 1979, Indices, Rapid Variations, Special Intervals	No. 32j
Geomagnetic Data, 1980, Indices, Rapid Variations, Special Intervals	No. 32k
Geomagnetic Data, 1981, IAGA indices : aa, Am, Kp, Dst, AE, Rapid Variations	No. 32l
Geomagnetic Data, 1982, IAGA indices : aa, Am, Kp, Dst, AE	No. 32m
Geomagnetic Data, 1983, IAGA indices : aa, Am, Kp, Dst, AE	No. 32n
Geomagnetic Data, 1984, IAGA indices : aa, Am, Kp, Dst, AE	No. 32o
Geomagnetic Data, 1985, IAGA indices : aa, Am, Kp, Dst, AE, Rapid Variations	No. 32p
Geomagnetic Data, 1986, IAGA indices : aa, am, Kp, Dst, AE, Rapid Variations	No. 32q
Geomagnetic Data, 1987, IAGA indices : aa, am, Kp, Dst, AE, Rapid Variations	No. 32r
Geomagnetic Data, 1988, IAGA indices : aa, am, Kp, Dst, AE, Rapid Variations	No. 32s
A hundred year series of Geomagnetic Data 1868-1967	No. 33
Supplementary Geomagnetic Data, 1957-1975	No. 39
Dst Equatorial Index 1957-1986	No. 40