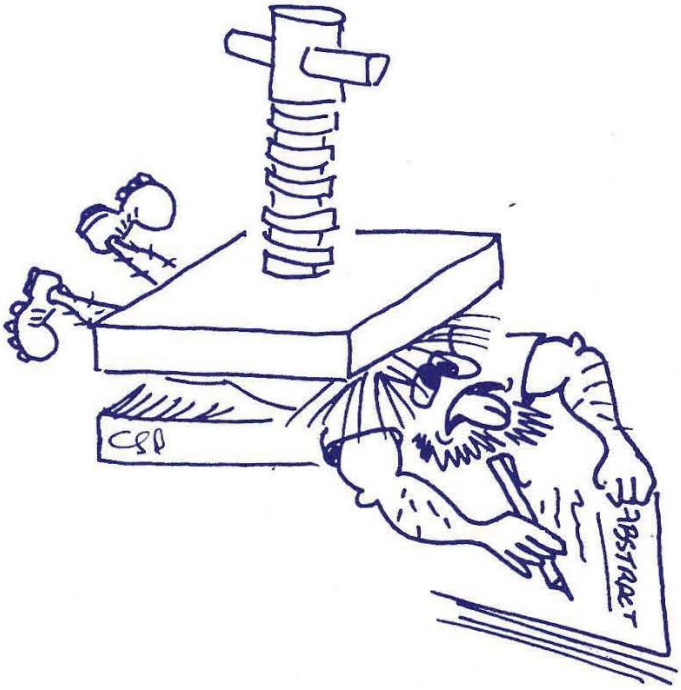
IAGA NEWS

December 1991 No:30



Dr D J Williams, President 1991-1995, and Mrs Williams

(**N.B.** Wood-burning stoves in the USA are very, very large.)

INDEX

Foreword 1

XXth General Assembly: Vienna (Austria) 1991
Minutes of the Conference of Delegates 3
Report by the Secretary-General.. 11
Report of the Finance Committee.. 14
Report of the President.. 15
Resolutions.. 23
Minutes of the Executive Committee 38

IAGA Structure 1991-1995 50

The Colaba-Alibag Observatories of India:
150 years of geomagnetic observations (B P Singh) .. 63
International Geomagnetic Reference Field:
1991 revision (R A Langel) 69

INTERMAGNET (Arthur W Green Jr) 77
Proton gyromagnetic ratio (Ole Rasmussen) 78
What is new in SCOSTEP? (H Oya) 79
ACCORD.. 81

Reports of Meetings 82
International Symposium on Geomagnetism (1990)
"South of the Workshop" (down Mexico way)

Notices of the Association.. 85
National Awards to Distinguished IAGA scientists; Noctilucent Clouds; Bulletin No.40; Optical Calibrations; IEEY Campaign Schedule; Compilation of Magnetic Data in the Arctic & North Atlantic Oceans; National repeat station network descriptions; Geomagnetic Sudden Storm Commencements 1868-1990; Type II solar radio bursts recorded at Weissenau 1966-1987; Executive Committee; IAGA News No.31

Forthcoming Meetings 89
7th SCIENTIFIC ASSEMBLY; Middle Atmosphere Science; Substorms; New Trends in Geomagnetism; Electromagnetic Induction; 29th COSPAR; IEEY

International Geophysical Calendar 1992 97

Olev Avaste (1933-1991) 99
Lydia Nickolaevna Ivanova (1937-1990) 100
Bernt Neeb Maehlum (1929-1991).. 101
Takesi Nagata (1913-1991) 102
Pamela Rothwell (1926-1991) 104

FOREWORD

Another General Assembly come and gone: on to the 7th Scientific Assembly to be held in Argentina - in Buenos Aires, not (as previously announced) in Cordoba. I have put an extended announcement into this issue of IAGA News [see pages 89 to 93] and the next issue will have in it the full listing of sessions, convenors, abstract deadline, and abstract format.

Preparing the abstracts will almost require the use of the apparatus sketched on the front cover. With some slight feeling of smugness, I will point any complaints about the draconian imposition of IAGA abstract format ["eight lines maximum, not more than 130 mm by 32 mm," or whatever seems right] to the Greater Vienna telephone directory format that we had at the Assembly.

There is always some clearing up to be done after an Assembly, philosophical as well as physical, and this time I sent out to all the convenors a postcard for filling in five figures, giving the number of no-show papers for the individual sessions. I had replies for 61 sessions out of a possible 77 (and cannot discern a pattern for the non-replies). With a total of 1721 abstracts submitted, 1086 were accepted for oral papers, 583 for posters. 155 oral papers were not given and 186 posters. Make what you will of these numbers; the problem of "no-shows" lies not in the grand total but in some particular sessions having a large fraction of scheduled papers (in one case, 19 papers out of a total 40) being withdrawn, for one reason or another.

Imposing a "printing fee" seems not to be practical, besides it would penalize those least able to afford it and be a restriction in the access of the IAGA community to the Assemblies. Submission of abstracts comes some time before registration and since the abstracts go to convenors, not to the local organizers, it would be a complicated matter to require some sort of returnable deposit. So I guess we must accept having many abstracts in the programme for papers that will not be given.

Lou Lanzerotti has suggested [see page 12] that the always-short IAGA funds could be increased usefully by asking for a voluntary donation of, say ten dollars, from the recipients of IAGA News. I floated this as a suggestion for the generosity of participants in Vienna and IAGA received one donation at the Assembly. Another good idea away, but Ian Gough has suggested a cunning modification of the scheme and I will not divulge this because part of the idea is that you will not notice what is being done!

With best wishes for a successful year of research in 1992 -

Michael Gadsden

CONFERENCE OF DELEGATES

Vienna (Austria)

1991 August 12 and August 20

The Secretary-General certified that more than half the number of accredited Chief Delegates [see page 10] were present and the President declared the meeting open at 10.04 on 1991 August 12. There were approximately 96 delegates, accompanists and members of the public present. The President, after welcoming them to the Assembly, announced that item 6 [Report from the Finance Committee] would, at the request of the Chairman of the Finance Committee, be held over until the second session of the Conference of Delegates.

1. **Minutes of the previous Conference of Delegates**

The meetings were held during the 6th Scientific Assembly in Exeter (UK) in 1989. The draft minutes have been published in IAGA News No.28, pages 3 - 15. After a brief comment from the Chief Delegate of Nigeria concerning postal delays in receiving IAGA News, the President declared that the minutes were approved.

2. **Matters arising from the Minutes**

There were no matters arising from the Minutes.

3. **Long-Service Awards**

The President reported that the Executive Committee was recommending awards to three persons and these were approved unanimously, by acclamation, as each name was announced and the President read an abbreviated citation:

Yoshiaki Mizuno [Kakioka Magnetic Observatory, Japan]
"Mr Mizuno worked between 1952 to now in the Memambetsu and the Kakioka Observatories. He 'oscillated' between these two observatories many times but each time he installed new equipments for observation of DC, ULF or ELF magnetic and electric fields and currents. He is the man who has maintained and maintains the high standard of observations of these two Japanese well-known observatories since almost 40 years. He deserves our recognition and I am pleased to present him this award." [Applause]

Anton Tlcik [Hurbanovo Geomagnetic Observatory, Czechoslovakia]
"Mr Tlcik had almost the same career, except that he started two years later, in 1954, and that he was operating in only

one observatory. But the quality of the data issued from the well-known Hurbanovo observatory has been maintained throughout the period 1954-1991 and he must be thanked for his contributions to this maintenance. On behalf of IAGA, I am pleased to present him the Long-Service Award." [Applause]

Akos Wallner [Nagycenk Observatory, Hungary]
"Mr Akos Wallner is a mining engineer who started his career in 1955 at the Geodetic and Geophysical Research Institute of Hungary. Since 1961, he was responsible for magnetic recording at the Nagycenk Observatory which includes absolute and relative measurements. He participated in regional magnetic surveys and he is enthusiastic about participating in the interconnection of the Hungarian geomagnetic observatory in the INTERMAGNET project. Mr Akos Wallner, on behalf of IAGA, I am pleased to present you the IAGA Long-Service Award." [Applause]

4. Honorary Membership of IAGA

The President announced that the Executive Committee was recommending the award of Honorary Membership of IAGA to Attia Ashour, past President of the IUGG, and active scientist of IAGA for many years. The Conference of Delegates approved this award unanimously and Ashour came forward to receive the certificate of Honorary Membership from the hands of the President.

5. Report by the Secretary-General

This is printed as an appendix to these minutes [pages 11-13].

6. Report from the Finance Committee

This is printed as an appendix to these Minutes [page 14].

7. Report from the Nominations Committee

The report of the Nominations Committee [Ashour, Cole (Chairman), Fukushima, Harrison and Powsner] was laid before the Conference of Delegates. The President reminded Chief Delegates that they (and they alone) had power under the Statutes to make extra nominations in writing to the Chairman of the Nominating Committee until 2 days before the date of the election (August 19).

8. Appointments

The President appointed McElhinny as Chairman of the Resolutions Committee, with Lefeuvre and Sucksdorff as members.

Ogunade and Soffel were appointed Tellers of the Ballot.

9. **Report on the scientific work of IAGA, 1987-1991**

The President presented a shortened version of his report which is reprinted in full on pages 15-22. McElhinny proposed a vote of thanks to the President for his report which was passed unanimously by acclamation. The Conference of Delegates was then adjourned until Tuesday, 20 August.

Upon the start of the adjourned session at 18.00 on Tuesday, 1991 August 20, the President reminded the Conference of Delegates that voting upon the IGRF motion and an amendment proposed by the Executive Committee was in progress. He announced that this vote would now close and called for any last minutes votes to be handed to the Secretary General in writing.

10. **Association Resolutions**

The Chairman of the Resolutions Committee presented the texts of fourteen resolutions [printed in English and in French on pages 23-37] and proposed the adoption of each resolution as it was presented:

Resolution 1: Seconded Harrison, passed nemine contradicente with 1 abstention. Resolution passed to the Union Resolutions Committee for adoption as a Union resolution.

Resolution 2: Ashour proposed that resolution 11 be considered at the same time as resolution 2 and this was agreed. After amendment of the last sentence of resolution 2 [proposed by Ashour, seconded by Cardus, passed 79 for, 7 against, 3 abstentions] the amended resolution was passed nemine contradicente.

Resolution 3: This was a resolution proposed to the Union, jointly with IASPEI. Lowes, seconded by Coles, proposed that "current" be changed to "present"; passed 13 for, 9 against. Creer, seconded by Langel, proposed deleting "present"; passed nemine contradicente. The amended resolution was proposed by McElhinny, seconded by Serafimov, passed nemine contradicente, with one abstention.

Resolution 4: Kataja asked that all the acronyms in this resolution be spelled out, at least as a footnote, and the Secretary General agreed to see to this (as far as he was able). Seconded by Vilas, passed nemine contradicente with three abstentions.

Resolution 5: McElhinny proposed, seconded by Serafimov, a change in the original text and this was passed, 25 for, 5 against. The amended resolution was seconded by Cardus, passed nemine contradicente.

Resolution 6: Seconded by Lastovicka, passed nemine contradicente, 5 abstentions.

Resolution 7: Seconded by Vilas, passed nemine contradicente, 5 abstentions.

Resolution 8: Lowes, seconded by the President, proposed a capital letter for the name of the satellite and this was passed with 12 for, 4 against. Rodger seconded the amended motion, passed 13 for, 2 against, 44 abstentions.

Reolution 9: Seconded by Serafimov, passed nemine contradicente.

Resolution 10: After amendment proposed by Barton, seconded by Coles, the motion was seconded by the President, passed nemine contradicente.

Resolution 11: Seconded by Coles, passed nemine contradicente, 2 abstentions.

Resolution 12: After amendment proposed by McFadden, seconded by Harrison, the amended motion was seconded by Menvielle, passed nemine contradicente.

Resolution 13: Seconded by Scherer, passed 53 for, 1 against, 5 abstentions.

Resolution 14: Seconded by the President, passed nemine contradicente.

11. The International Geomagnetic Reference Field

The National Body of Kenya proposed the following motion:

Considering that the IAGA, as the International body under whose auspices IGRF was conceived and is produced by adherant institutes, owns the rights to IGRF, it resolves that:

1. From this day IGRF will only be provided to commercial interest subject to contract and to the payment of a licence fee.

2. The revenue obtained from the arrangement will be used to establish and maintain observatories capable of producing accurate annual mean values of the geomagnetic elements in the countries of the Third World.

Notwithstanding (1) above, the IGRF will continue to be supplied on a personal basis to research scientists providing only that they agree not to pass it on to third parties and that they acknowledge any commercial interest in their work.

Consequent upon (1) and (2) above the IAGA will appoint an agent to negotiate conditions with commerce and interested government institutions of countries adhering to the IAGA, and to establish the administration of the arrangement with science and commerce and its accountability to the IAGA.

The Executive Committee, proposed the following amendment:

The **IAGA**

considering that it is the international organization under whose auspices the International Geomagnetic Reference Field [IGRF] was conceived and is produced by adhering institutes;

owns the right to control the use of the IGRF;

notes that the quality of the IGRF relies upon the continuing operation of magnetic observatories capable of producing annual mean values of the geomagnetic field parameters all over the surface of the Earth and that the maintenance of such observatories in many Third World countries is put into great danger because of a crucial lack of funds;

resolves that

1. from this day, IGRF will be provided for commercial interests through mutually-agreed contract, by which the user recognizes IAGA ownership of the IGRF; agrees not to distribute the IGRF to third parties; and contributes to the funding of continuous production of a good quality refererence field through a subvention to the IAGA;

2. a special fund will be established [the **IGRF fund**] to manage the monies received; the fund shall be used to maintain and modernize magnetic observatories in the Third World; the management of the fund shall be in accord with the laws of the country in which the Treasurer of IAGA is domiciled so as to guarantee the character of the IAGA as a non-profit organization;

3. the IGRF will continue to be supplied on a personal basis to research scientists; provided that they agree to use it for scientific research only, to notify the IAGA of any other use they wish to make of it, and not to pass the IGRF to third parties; and

4. the IGRF will continue to be supplied to government institutions which need it for the general development of their country.

The President declared that votes on the motion and on the amendment were to be treated as financial matters; that is to say, only accredited Chief Delegates could vote and their votes were to be weighted by the category of membership of the IUGG of the National Body of the Chief Delegate. This decision was open to challenge by any Chief Delegate but no challenge was made. The vote was also declared to be a postal vote (this also was unchallenged) and the Secretary General reported that some votes had been received by post before the opening of the present Conference of Delegates.

The voting on the Amendment was declared by the Secretary General to be 73 against, 36 for, and the Amendment was therefore lost.

The voting on the Motion was declared by the Secretary General to be 73 against, 22 for, and the Motion was therefore lost.

Langel proposed a vote of thanks to W F Stuart. He noted that it was Stuart who had brought the problem of continuing funding of operation of many geomagnetic observatories, particularly in the Third World, to the attention of the IAGA community and who had made great efforts, successfully, to get the community to give serious thought to the problems facing many of our colleagues. The Conference of Delegates approved this vote of thanks with heartfelt applause. Although the amendment and motion were both lost, said Langel, the problems have not gone away and he urged Delegates to be active in seeking solutions.

12. Report of the Tellers

The tellers reported that there had been two further nominations to membership of the Executive Committee. A written vote by the Chief Delegates, closing at noon the previous day, gave the new composition of the Executive Committee for the period 1991 to 1995 as:

D.J.Williams (USA), President
M.Kono (Japan), Vicepresident
J.F.Vilas (Argentina), Vicepresident
M.Gadsden (UK), Secretary-General
I.Eltayeb (Sudan)
G.Fischer (Switzerland)
G.Gregori (Italy)
O.A.Troshichev (USSR)
R.A.Vincent (Australia)
R.E.Gendrin (France), Past President

The President announced that the Executive Committee had appointed, after consultation with the Chairmen of the components of IAGA and careful consideration of the distribution by geographic areas of the candidates, subject to their being of acceptable scientific and administrative competence, the following Leaders of the IAGA component bodies:

Division I:

S-E.O.Hjelt (Finland)	Chairman
A.Adam (Hungary)	Co-Chairman
C.E.Barton (Australia)	Co-Chairman

Division II:

A.D.Richmond (USA)	Chairman
M-L.Chanin (France)	Co-Chairman
J.Lastovicka (Czechoslovakia)	Co-Chairman

Division III:

S.W.H.Cowley (UK)	Chairman
G.Atkinson (Canada)	Co-Chairman
N.Tsyganenko (USSR)	Co-Chairman

Division IV:

S.Grzedzielski (Poland)	Chairman
T.E.Cravens (USA)	Co-Chairman
I.S.Veselovsky (USSR)	Co-Chairman

Division V:

R.E.Kerridge (UK)	Chairman
J-A.Joselyn (USA)	Co-Chairman
S.Ogunade (Nigeria)	Co-Chairman

History:

M.Colacino (Italy)	Chairman
M.Barreto (Brazil)	Co-Chairman
W.Schroeder (Germany)	Co-Chairman

Developing Countries:

C.Onwumechili (Nigeria)	Chairman
B.V.Krishnamurty (India)	Co-Chairman
N.B.Trivedi (Brazil)	Co-Chairman

13. **Any other competent business**

Barton proposed a vote of thanks to the Secretary General in which he alleged that the Secretary General carries on the business of the Association with efficiency and humour. This was passed nemine contradicente with one abstention.

Oni, Chief Delegate for Nigeria, asked that copies of the resolutions be given to Chief Delegates before the end of the Assembly and the Secretary General agreed to do this.

The President, in closing the meeting, referred to the pleasure that he had had in presiding for four years over an active and a brilliant Association and that good humour and respect for other's opinions had invariably ruled. He reminded the Delegates that the new Executive Committee has important tasks:

- to maintain and reinforce international scientific cooperation in our fields of research during this much tormented epoch in international politics;

- to pursue efforts made to associate developing countries in the progress of our disciplines;

to strengthen the links between IAGA and the other Associations with which we cooperate;

-to take initiatives so that a IAGA voice will be heard and recognized in the organiation of big international projects.

"I am convinced these tasks will be achieved au-delà de toute esperance."

CHIEF DELEGATES
accredited to the Conference of Delegates

Cristina Pomposiello [Argentina]
Charles E Barton [Australia]
Siegfried J Bauer [Austria]
M Scherer [Belgium]
Igor I G Pacca [Brazil]
K Serafimov [Bulgaria]
D R McDiarmid [Canada]
Liu Qingling [China]
Milan Hvozdara [Czechoslovakia]
Eigil Friis-Christensen [Denmark]
A A Ashour [Egypt]
Eero Kataja [Finland]
Michel Menvielle [France]
Heinrich Soffel (vice K H Glassmeier) [Germany]
Jozsef Vero [Hungary]
A Roddy [Ireland]
F Mariani [Italy]
T Yukutake [Japan]
J P Patel [Kenya]
Sebasteao Mulambo [Mozambique]
Ebun Oni [Nigeria]
G Turner [New Zealand]
G J Kuhn [South Africa]
J O Cardus [Spain]
C-G.Falthammar (vice Marklund) [Sweden]
P-A.Schnegg [Switzerland]
Kenneth M Creer [UK]
Christopher Harrison (vice Donald Williams) [USA]
Victor Oraevsky [USSR]
Francis Podmore [Zimbabwe]

REPORT OF THE SECRETARY GENERAL

1. **Publications**

Two issues of IAGA News have been prepared, published and distributed: No.28 in March 1990 and No.29 in November 1990. The mailing of the latter became subjected to the United Nations embargo of Iraq at the end of last year and five issues were "returned to sender".

The updating of the publication schedule of IAGA Bulletin Series No.32 has been carried forward apace by Menvielle and Berthelier with financial assistance from UNESCO through the Federation of Astronomical and Geophysical data analysis Centres [FAGS]. I am very glad to report that they have reached the 1985 data, published two months ago in Bulletin **32p**. The gratitude of the entire IAGA scientific community is due to these two colleagues of ours who have performed a major task so well and so efficiently.

2. **Finances**

It is no secret that the IAGA funds are at a rather low level at the present time and your Executive Committee has discussed ways and means [minuted for the 1990 meeting in IAGA News No. **29**, pages 3-4].

I am happy to report that in the last three weeks, five thousand pounds have been given to IAGA by the Local Organizing Committee of the Sixth Scientific Assembly, held at Exeter in 1989. I welcome this very generous and, I believe, unprecedented gift. In this connection, it could be appropriate for me to muse aloud on the relationship between the Local Organizers of an Assembly and the IAGA. In my experience, the local organizers are required by their National Academy to be financially self-sufficient; this leads always to a lot of agonized estimation in advance of the cost of hiring lecture theatres, providing services during the Assembly (including perhaps free transport), printing the abstracts and programme books, registering delegates and seeing to the accommodation needs of delegates. All these things cost money which must be recovered through the registration fees. The great imponderable is to estimate in advance how many delegates will turn up to register. If there are more than expected, a profit results. If there were to be less, who then would cover the loss? I frequently am asked, as Secretary General, to "waive" the registration fee for some worthy person or another. I have to reply that, first, the Secretary General of IAGA (powerful, benevolent, despot though he or she may be) has no control over the local organizers; if the local organizers were, in their turn, to waive a fee then whom should they charge to make up the money? You, or you, or you?

I have received a letter from Dr Lanzerotti in which he makes flattering remarks about IAGA News, which my natural modesty forbids disclosing to you, and then he goes on to suggest that recipients of IAGA News might care to contribute $10 to IAGA funds at each Assembly. I have laid the letter before your Executive Committee and they agree with both the spirit and the proposal; if, then, you will collectively dig into your pockets, I can say that all contributions will be gratefully received. I might add that dollars are not an essential; I can absorb into the IAGA bank accounts any currency in this world (and I suspect that the Bank of Scotland can convert xoblogs from Mars if called upon to do so).

3. **Administrative details for this Assembly**

Resolutions for the second session of this Conference of Delegates should be channelled through one or other of the Leaders of Divisions and InterDivisional Commissions. I might add that they **must** be in the hands of the Chairman of the Resolutions Committee [Dr Michael McElhinny] no later than Monday morning, 19th August, and the sooner the better. An exception to this is made for Division V resolutions and I ask Dr Coles to hand the resolutions to Dr McElhinny immediately after the end of the Division V Business Meeting on Monday. It should be noted that if a resolution is intended for Union passage, it must be given to Dr McElhinny in both English and French.

In the second session of this Conference of Delegates, the agenda shows an item dealing with the IGRF. Voting is currently underway on this, and is restricted to Chief Delegates only. I must be informed by a letter of accreditation from the National Academy for a delegate to be named Chief Delegate for his or her country. At present I have names of 23 Chief Delegates. I may say to Chief Delegates that if they have not received, through National Correspondents if need be, copies of the motion and the amendment that are being voted on, please will they ask me for copies.

I am required by your Executive Committee, which met yesterday, to make the following statements about the IGRF amendment:

> The Amendment does not represent a reversal of the EC's opinion about the IGRF. The EC is still of the opinion that to commercialize the IGRF would be a mistake. The EC has asked me to say that a vote against commercialization of the IGRF is performed by voting NO to both the amendment and the motion. The EC hopes there will be much debate in the next eight days, before the vote closes.

One task in this Assembly for all delegates, in addition to the scientifically-luscious talking and discussion that is in prospect, is for each Division and InterDivisional Commission to decide upon working group leadership, reporters, et cetera for the next four-year period. The Leadership [Chairmen] of each component body is appointed by your Executive Committee

under the statutory requirement of ensuring proper coverage by discipline, ability and geographical coverage.

We should recognize the rather special efforts made in the organization of this Assembly by Professor Sunkel and Professor Hofmann-Wellenhof of the Technical University of Graz. For a number of reasons which are of no consequence to this Conference of Delegates, they came fresh to the organization in the last couple of months of last year. The skin crawls at the thought of what they faced and, speaking as one who has had a ringside seat over the last ten months, I am full of admiration for the organizing that they have done. I fully expect that at the end of this Assembly, in 12 days' time, we shall be ready to congratulate them, and their helpers, without stint.

4. **Obituaries**

Finally, it is my sad duty to advise you of the deaths of colleagues that have been notified to me in the two years since I last presented a report to you. I have three names:

Lydia Nickolaevna Ivanova
Takesi Nagata [President of IAGA 1967-1971]
Pamela Rothwell

I ask you to stand for a few moments in silent reflection upon these, our colleagues, who have each in their own way had a lasting effect upon our lives and our work.

Attendance figures for the Assembly:

I have received the following list from Professor Sunkel (Graz, Austria) which I give here because I think the IAGA community will find the numbers interesting, perhaps significant.

Affiliation	
IAG	572
IASPEI	593
IAVCEI	120
IAGA	**952**
IAMAP	610
IAPSO	430
IAHS	433
ICL	22
Others	474
Non-unique	125
TOTAL	**4331**

REPORT OF THE FINANCE COMMITTEE

As specified in the Statutes of the Association, the Executive Committee [EC] set up a Finance Committee consisting of Dr M Ackerman (Chairman; Brussels, Belgium), Dr F J Lowes (Newcastle upon Tyne, UK) and Dr R Schlich (Strasbourg, France), with the duty to "examine the accounts (for the four-year period 1987-1990) and report to the Conference of Delegates".

Dr Gadsden provided us with financial statements in the format specified by the IUGG, but these were not very informative as to the actual accounts; however, he was very cooperative in providing the extra information we requested.

Excluding US$25k for which IAGA was essentially just a handling agent, in this period its income was $128k, (109k from IUGG, unchanged for 12 years, $4k from sales, and 15k from bank interest).

The secretarial administration is being done most economically by Dr Gadsden; the Association was run for $54k (secretarial, excluding EC travel, 17k, Proceedings, now discontinued, 10k, and IAGA NEWS 27k). $97k was spent on IAGA Meetings (virtually all on travel grants), and $33k on IAGA sponsored Symposia (12k on administration, 21k on travel, including EC travel expenses). Total expenditure $184k.

So in 4 years IAGA spent 6 years' income! This was possible because it started the period with a balance equivalent to 2 years' income, and ended with virtually no balance. Clearly the Association cannot continue at its recent high level of activity. In fact assuming that over the next 4 years the IUGG grant is essentially unchanged, as are the running and EC costs, (and with no bank interest) expenditure on "scientific" activity (IAGA and other meetings) will have to drop from the 120k of the last four years to about 60k.

The Finance Committee recommend that in future the statements published in IAGA NEWS (and supplied to Finance Committees) be a more informative summary than is the Union format.

The Finance Committee point out that the IUGG cannot expect its Associations to continue to operate at a reasonable level if its grants are not increased at least in line with inflation.

The Finance Committee assume that the EC is giving serious consideration to the financial problem outlined above.

The EC should also consider making clearer the purpose of the Finance Committee; if, as seems likely, it is to comment on the financial policy of the Association, it needs to be told explicitly what that policy is, as well as given the accounts.

M Ackerman F J Lowes R Schlich August 1991

REPORT OF THE PRESIDENT
1987 - 1991
TO THE CONFERENCE OF DELEGATES

Roger E Gendrin
Wien, Osterreich

INTRODUCTION

Professor D. I. Gough, the previous President of IAGA, took the initiative of presenting a written report on the activities of the Association to the National Delegates. This initiative was very well received and the ensuing report was much appreciated. Though they are in general well aware of IAGA activities in all their aspects, National Delegates may appreciate receiving a written summary of the actions that have been undertaken by the Executive Committee members and by the President they have elected. Though my report is not as exhaustive as the one which Professor D.I. Gough presented at the Vancouver General Assembly , I hope that it will serve the purpose for which it is written.

GENERAL CONTEXT

Since the Vancouver General Assembly, the worldwide political situation has drastically evolved, with important consequences on the ways in which scientific cooperation should be envisaged. On the one hand, it will be much easier to organize common scientific programmes, and the the exchange of scientists will be facilitated. On the other hand practical actions must be undertaken in order to make modern technologies available to some countries.

In parallel, the consciousness that planet Earth is unique and that our environment must be studied in detail and protected has reached political circles, scientific managers, and governments. Consequently the financial support for geophycical sciences has been increased. However, this support is mostly directed towards studies that have societal implications with the implicit hope that practical results will be obtained quickly: finding natural resources, surveying and predicting climatic change, reducing the desastrous consequences of natural hazards, etc.

Our Association has had to adapt itself to this new context. Thanks to the dynamism of our Division and Working Group leaders, it did it perfectly. Through coordinated actions with our sister Associations within IUGG, or through the participation of IAGA scientists and IAGA representatives in COSPAR, SCOSTEP, etc..., programmes have been defined and implemented which satisfy both requests of increasing the scientific cooperation among the different countries and of enhancing fundamental studies that might allow to solve societal problems. Details about these programmes are given at different places in this report.

SCIENTIFIC ACHIEVEMENTS

During four years of scientific activity a lot of progress has been made in the understanding of geophysical processes that are related with geomagnetism and aeronomy, be these processes occurring within or around our own planet, or within or around other celestial bodies of the solar system. Details about these scientific achievements can be found in documents written by Division or Inter Division Commission leaders, who must be thanked for their contribution to the preparation of this report. Intermediate reports for the period 1987 - 1989 have been gathered by the Secretary General. They have been published in IUGG Chronicle (nr. 204, jan. 1991, pp. 28-58).

Solid Earth

As far as solid Earth in concerned, attention has been focused on the core-mantle boundary. Core surface velocity fields, as deduced from geomagnetic secular variation data have helped defining new constraints in dynamo theories. The development of electromagnetic sounding techniques and of 3-D treatments has led to important discoveries concerning the structure of the lithosphere and astenosphere in different regions of the Earth.

Induction scientists have contributed significantly to international programmes or campaigns like ILP (International Lithosphere Programme), SEDI (Sounding of the Earth Deep Interior), ELAS (Electrical conductivity of the astenosphere), Geotraverse and geotransects, EMSLAB, etc..., most of them being implemented in close coordination with other scientific Associations or Committees (IASPEI, ICL,...). Paleomagnetism and rock magnetism are vivid branches of solid Earth disciplines, with significant inputs into dynamo theories, large-scale and regional tectonics, polar wander paths, etc... . Special mention must be made of the publication of the Global Paleomagnetic Database (edited by J. Lock and M. W. Mc Elhinny) as a result of a resolution that was passed in Vancouver.

Magnetic perturbations that are induced by ionospheric or magnetospheric currents can also be used to study he internal structure of the Earth; at least these effects must be substracted if precise maps of crustal anomalies are to be produced. During the past four years important efforts have been made in this field of research; MAGSAT data have been reinterpreted and interesting results have been obtained concerning these currents, especially in the equatorial region. Another field of slightly growing activity in the joint study with IASPEI scientists of seismoelectromagnetic effects. More observations of such effects have been made during the past four years, on the ground or in space. If confirmed by valid statistical analysis, such observations could shed some light on the physical processes that occur during, before or after earthquakes, with obvious societal implications.

IAGA has the responsability of coordinating worldwide and permanent measurements of the Earth's magnetic field and of publishing the results of such measurements. This responsability has been perfectly assumed, thanks to the work of Division 5 members. The 1985 DGRF and the 1990

IGEF will be adopted in Vienna. The publication of geomagnetic indices, which was interrupted for a while, has been restarted following the decision taken in Vancouver to give the corresponding responsability to the Institut de Physique du Globe de Paris. A map of magnetic anomalies in the arctic region is in preparation, following a resolution passed at the Exeter Assembly.

But IAGA scientists in the field have not restricted their activity to these "routine" tasks. They have also engaged themselves into actions that will prepare the future. One of these actions is the development of a network of digital magnetometers with almost real time transmission (the INTERMAGNET project). Another one is the study, by a working group, of the possibility of producing K-indices through automated methods. The need for a satellite devoted to a global magnetic survery has also been argumented, and, as a result, Space Agencies are considering different ways for satisfying this need. An important effort has also been made in order to develop, among the scientific community, the interest towards applications of geomagnetism and to improve forecasting techniques.

Middle and upper atmosphere

Activity in this field of research has been characterized by an increased cooperation with IAMAP scientists on the one hand (6 symposia are organized jointly in Vienna) and with IAGA scientists involved in magnetospheric studies on the other hand (6 joint symposia are also organized on common topics in Vienna). Indeed, the stratosphere and the mesosphere are regions where physical porcesses occur that are induced by phenomena originating in lower or upper layers, or that have important consequences on these layers.

IAGA scientists have participated to a lot of campaigns or programs that are aimed at the study of the middle and upper atmosphere and that are organized on a regional or global basis. Division 2 scientists have been (or are) engaged in more than a dozen of such campaigns or programmes, most of them being coordinated through SCOSTEP. The development of new techniques or the improvement of older ones (long duration balloons, coherent or incoherent radars, lidars, imaging or non-imaging optical instruments), the conjunction between ground-based and space measurements, has yielded a lot of new results concerning the role of relativistic electrons, of the atmospheric electric field, of noctilucent clouds, of metallic ions, or of gravity waves in the dynamics and the chemistry of these regions.

Following a joint meeting between IAGA and IAMAP scientists during the Exeter and Reading Assemblies in 1989, a common project has been prepared in order to include the study of the middle atmosphere into the Global Change programme. STIB (Stratosphere, Troposphere and their Interaction with Biosphere) is now considered as an IGBP "potential project". It will be adopted as a "core project" as soon as its pratical organization will be defined. There is no doubt that this project will become an important part of IAGA activities in this field of research and that it will enhance IAGA reputation as an Association able of taking scientific initiatives and of responding to societal requests

(the greenhouse effect, the ozone hole, ...). The participation of IAGA to two Union Symposia in Vienna (Anthropogenic and natural external forcing of the middles atmosphere, Enviromental effects on spacecraft trajectories and positioning) is also a proof of this ability.

Magnetosphere, solar wind and planets

Research concerning the far environment of the Earth has been actively pursued. Ground measurements made with powerful radars, ionosonde networks or magnetometer chains have brought new information on the global characteristies and consequences of magnetospheric perturbations. Detailed maps of convection electric field and associated field-aligned currents have been obtained. The very large magnetic storms of March 1989 and January 1990 have given the opportunity to study in detail auroral and polar cap processes in both hemispheres during very disturbed conditions.

Fundamental results on the nature and origin of magnetospheric wave generation and on their relation with particle acceleration mechanisms have been obtained through the analysis of spacecraft data (VIKING, DYNAMIC EXPLORER). More will be learned on these generation and acceleration processes with the ongoing ISTP (International Solar-Terrestrial Programme) which is coordinated by Space Agencies, and which involves a large number of multispacecraft missions (GGS, CLUSTER, INTERBOL, REGATTA, GEOTAIL). Simultaneous measurements performed in the solar wind will help studying the Sun, the fore-shock region of the Earth and solar wind-magnetosphere interactions (WIND, SOHO, ...). Rocket and satellite experiments have been, and will be, performed in order to study such processes in a more controlled manner (CRIT, AMPTE, CRRES).

Some of the most exciting space missions aimed at the study of the solar system that have been achieved during the past four years are the successful launches of ULYSSES (study of the solar wind out of the ecliptic), GALILEO (study of Jupiter's magnetospher), and MAGELLAN (study of the Venus' atmosphere and surface). Worth mentioning are also the successful visits of Neptune by VOYAGER and of Mars by PHOBOS. The continuity of solar wind, planetary and cometary programmes is guaranteed by approved or envisaged missions around Mars, Saturn and its satellite Titan, around or on the surface of different comets and even in the very vicinity of our own star, the Sun.

Such a hudge amount of experimental data has fostered theoretical studies of fundamental plasma processes: magnetic reconnection, double-layers generation, interaction of plasmas with neutrals, processes associated with dusty plasmas and with pick-up ions. Numerical simulation of such processes is increasingly used for data interpretation an for experiment definition. Powerful Magnetohydrodynamic (MHD) codes have been implemented, that are able to reproduce the structure and the dynamics of the magnetospheric cavity. Particle and hydrid codes have been developed in order to understand and to interpret the vast variety of wave-particle interaction processes (including their non linear phase) that take place in different regions of the magnetosphere.

ORGANIZATION

The Executive Committee has the duty of coordinating scientific activities within the Association or in conjunction with other scientific organizations. This duty was assumed during the meetings that the EC has had every year (Vancouver, 1987 ; Helsinki, 1988 ; Exeter, 1989 ; Prague, 1990), the minutes of which can be found in IAGA News nr 26 - 29.

As far as internal problems are concerned, the major decisions, which were approved by the Conference of Delegate, were the structural changes adopted at Vancouver and at Exeter : suppression of two IDC's and changes in the repartition of responsabilities between Divisions 1 and 5. Up to now, such changes have proven to be beneficial to the life of the Association. Yet, they could not have been implemented without the active comprehension of Division and Working Group leaders, nor without the organizational efficiency of the IAGA Secretary General, Michael Gadsden, who has been in charge of the preparation of scientific or general assemblies in this new context.

As far as external relationships are concerned, it is worth mentioning the effort that has been made by the IUGG Bureau to strengthen the links between its constitutive Associations. The Presidents of the Associations met with the Bureau in Trieste (November, 1988) in order to discuss strengthes and weaknesses of the Union. Two other meetings took place in Edimburgh (August, 1989) and Washington (May, 1990) in order to define a better approach of interdisciplinary problems and to propose more efficient working procedures. Indeed IAGA has had always excellent scientific relations with the other Associations, in particular with IASPEI and IAMAP. These relations have been reinforced during the past four years, as reported in the previous section. Yet the scientific and societal challenges that our disciplines are presently faced to deserve a closer coordination between the different Associations, and agreed interdisciplinary projects need a better transparency with regards to ICSU. The ways in which this coordination could be better organized and this transparency could be better achieved will probably be the subject of discussions at the IUGG Council during this Assembly. National Delegates to IAGA should keep themselves informed of these discussions and try to make IAGA's interests defended by their representative to the Council.

Our relationslips with other ICSU Unions or Committees are very friendly and in general very efficient. Every year, IAGA sponsorship has been given to workshops or symposia organized by SCOSTEP, COSPAR, IAU and URSI, among others (A list of these sponsorships can be found in the yearly published minutes of the EC meetings). The enthousiastic participation of IAGA scientists to the organization of these workshops or symposia must be acknowledged. The rights of IAGA and/or of IUGG to participate to the definition of the scientific policy of the ICSU committees must however be preserved.

Next year will be the International Space Year. This manifestation will give to geophysicists, astrophysicits, and other scientists who use space techniques, the opportunity to demonstrate the value and the interest of their work. The contribution of IAGA to this demonstration must correspond to its achievements.

PROBLEMS

Like the other scientific organizations, IAGA is faced to two important problems. The first one is related to developing countries : these countries must reach a scientific level that will allow them to fully participate to the development of research and to get the practical benefits of this development. The second one concerns the teaching of science at all levels : young people must be trained in scientific disciplines in order that they can understand the world in which they are living and that a sufficient fraction of them be motivated towards scientific research. These two problems are somewhat interrelated.

Developing countries

During the past four years, the Inter Division Commission on Developing Countries has much invested in defining projects that are of interest to the scientific community in general and of direct interest to the developing countries. Two such projects are in development : the Network of Low Latitude Geomagnetic Measurements (NOLLGM), and the International Equatorial Electrojet Year (IEEY). Reports on these two projects will be presented at this assembly.

The IDCDC has also tried to organize two international or regional training summer schools, one in Brazil, the other one in Nigeria. Unfortunately, because of a lack of funds, these two projects had to be postponed. On the other hand, a conference or "Major scientific problems of the atmospheric system and the developing countries" has been successfully organized, with the contribution of SCOSTEP and IAMAP, following an invitation by the International Center for Environmental Earth and Marine Sciences (ICEM). It will be held in Trieste this November.

One of the major problem that developing countries are faced to is the maintenance and modernization of their geophysical observatories. A study of the actual situation of these observatories, as far as geomagnetism is concerned, has been undertaken under the auspices of Division 5. The ensuing report by Dr. J. P. Patel (IAGA News nr. 29, pp. 47-48) demonstrates the urgent need of finding solutions for maintaining the operational capabilities of these observatories. (Indeed the problem is not restricted only to developing countries). Attempts to find such solutions have been made, both at the Association level (creation of a IAGA fund-raising Committee) and at the Union level (possible creation of a Fundation with participation of private companies), with not much success one must admit. Another attempt is the proposal of commercializing the IAGA-produced

International Geomagnetic Reference Field, a proposal that gave rise to much debate among the scientific communities and organizations, and which you, National Delegates, will have to vote one. Since the decision is now in your hands, I do not feel the right to make any comments on that proposal.

I just hope that the reputation of IAGA as the recognized International Association which is in charge of gathering data, keeping archives, and publishing high-quality models or indices in geomagnetic disciplines for the benefit of all will be preserved. I also hope that a solution will be found to the throbbing problem of the maintenance and improvement of the participation of developing countries to the progress of our scientific disciplines.

Teaching of Science

There is an ICSU Committee on the Teaching of Science (ICSU/CTS) which meets every two years in Paris with representatives of the Unions and of different international organizations like UNESCO, COSTED, UNDP, ICASE, ...(1). I Have been twice designated as the IUGG representative to these meetings (April, 1989 ; May, 1991). Ensuing reports (available on request) have been sent to the IAGA Executive Committee and to the IUGG Bureau.

Teaching and training activities in geomagnetism and aeronomy that have been organized by IAGA Divisions can be compared favourably with corresponding activities of the other IUGG Associations. A lot of efforts have been made to train observers and scientists about the use of modern geophysical equipments (Nürmijarvi, Finland, 1989 ; Tihami, Hungary, 1990) ; users manuals have been or will be edited. In the field of simulation techniques, two international schools have been organized (La Londe-les-Maures, France, 1987 ; Kyoto, Japan, 1991). In the field of atmospheric physics, the already mentioned conference in Trieste, which will be followed by a summer school next year, demonstrates IAGA's concern in teaching activities. Therefore, IAGA can be proud of its efforts in disseminating scientific and technical knowledge in its own field of research, at the tertiary level of education.

However, not much efforts are made to prepare teaching material for the secondary level, though important is the sensitivation of youngsters towards geophysical sciences. This is a task that the new Executive Committee could consider. Similarly, IUGG could examine the necessity of creating a Commission on Education and Training, as exists in many other Unions. The role that will be devoted to geophysical sciences in the managements of our planet during the next decades (centuries ?) makes such a coordination of teaching activities truly mandatory.

---

(1) COSTED : Committee on Science and Technology in Developing Countries (ICSU)
UNDP : United Nations Development Program (UN)
ICASE : International Council of the Associations of Science Educators (independent)

As far as communication with the media is concerned, a sensible effort has been made, thanks to motivated IAGA scientists, with the publication of the "IAGA brochure", whose principle was adopted at he EC meeting in Prague, last September, and which will be widely distributed.

OBITUARY NOTE

Unfortunately, every two years the list of our deceased colleagues increases. Since the last General Assembly, we have lost the benefit of the scientific contribution of J. R. Barcus, J. de Carmen Quentero Bermendez, E. J. Chernovsky, A. V. Cox, F. Eleman, E. M. Fournier d'Albe, J. A. Gledhill, T. Nagata, M. Rakotondrainibe, J. A. Ratchffe, P. Rothwell, D. G. Singleton, C. U. Wagner, among others.

Because of the leading role they plaid in the life of our Association, some of them are better known than the others. Yet, all of them have contributed to the development of our research, and all of them equally deserve a place in our memory.

CONCLUSION

Without shame, I cannot do better than reproducing the conclusion that Professor D.I. Gough gave in the report he presented to you at Vancouver :

"This report , much of which is compiled from notes provided by others, gives some idea of the very wide range of sciences united in this Association. IAGA is the vigorous and effective organization it is, because by their nature, geomagnetic and aeronomic sciences require global data acquisition and scientific collaboration. The many tasks we undertake, always added to our official and paid occupations, are done and done well because they are shared out among over a hundred active leaders, and the several hundreds of our colleagues who attend Assemblies and communicate through hearing and giving papers. No one individual, not even our superb Secretary General, is loaded beyond what he or she can do efficiently, and so the tasks are done. If this short Report has given Delegates a picture of an admirable Association in very good health, it has served its purpose."

I have tried to fulfil my duties along the same lines as he did, and I greatly appreciated his advices on many occasions. I must also express my thanks to the other members of the Executive Committee whom you have so wisely elected. I am convinced that the next one will do its job with a similar enthousiasm and an even better competence.

R. Gendrin

August 1991

RESOLUTION NO.1

The IAGA

recognizing that global geophysical and geodetic studies are essential to understand the Earth system, and are urgently needed to elucidate many aspects of Global Change;

recognizing that the Mission to Planet Earth is to be a joint mission, relying heavily on international cooperation, and that measurements made at the surface of the planet are an integral and essential part of this mission;

noting that

1) technological advances have recently led to significant improvements in geodetic and geophysical instrumentation and data acquisition systems, both on land and at the bottom of the oceans,

2) collection, analysis and international exchange of digital geodetic and geophysical data sets is now possible on a global scale,

3) scientists from IAGA and several other IUGG associations (IAG, IASPEI, IAPSO) are actively deploying global geophysical and geodetic networks, such as IRS/GSN, GEOSCOPE, INTERMAGNET, VLBI, IGS,

4) considerable economies of scale, and substantial scientific benefits can be derived from co-located measurements using different techniques;

recommends that relevant organizations, agencies and member countries

1) should review the services under their control, as well as the deployment of global networks supporting them, and should co-locate as many of these instruments as is practical, provided that the performance of all instruments is not compromised,

2) should encourage the implementation of multi-disciplinary global digital data collection and data information systems which should proceed in parallel with the deployment of instrument networks, and

3) should improve methods for rapid international exchange of global data sets

---

RESOLUTION NO.1

IAGA

reconnaissant que les études des globales en géodésie et géophysique sont essentielles pour la compréhension du système "Terre" et qu'elles doivent être enterprises de facon urgente pour élucider de nombreux aspects du Changement Global,

reconnaissant que la Mission vers la Planète Terre doit être une mission conjointe, qui repose fortement sur la coopération internationale, et que les mesures faites à la surface de la planète sont une partie intégrale et essentielle de cette mission,

notant que

(1) les avancées technologiques ont conduit récemment à des améliorations significatives de l'instrumentation géophysique et géodésique et des systemes d'acquisition de données, à la fois sur la terre et au fond des océans,

(2) la collecte, l'analyse et l'échange par voie instrumentale d'ensembles de données géophysiques et géodésiques sous forme digitale est maintenant possible à l'échelle du globe

(3) les scientifiques de l'AIGA et de plusieurs autres associations de l'UGGI (AIG, AISPIY, AISPO) déploient activement des réseaux de mesures géophysiques et géodésiques à l'échelle du globe, tels que IRIS/GSN, GEOSCOPE, INTERMAGNET, VLBI, IGS,

(4) une économie d'échelle considérable, et de substantiels bénéfices scientifiques peuvent être obtenus par la co-localisation de mesures utilisant des techniques différentes,

recommande que les organisations et agences concernées, ainsi que les pays adhérents

(1) passent en revue les services qui sont sous leur dépendance ainsi que les réseaux de collecte de données à l'échelle du globe qui supportent ceux-ci, et co-localisent autant de ces instruments qu'il est possible, pourvu que les performances de tous les instruments ne soit par compromises,

(2) encouragent la mise en place de réseaux de collecte de données digitales et de systèmes d'information de données à l'échelle du globe, en parallèle avec le déploiement des systèmes instrumentaux,

(3) amèliorent les méthodes d'échange international rapide d'ensembles de données à l'échelle du globe.

RESOLUTION NO.2

L' AIGA

insistant sur l'importance du maintien de la globalité du réseau d'observatoires magnétiques comme base première d'investigation de phénomènes géophysiques et comme moyen de rafraîchissement des données du champ gèomagnètique de référence,

notant que de nombreux observatoires clefs dans les pays en voie de dèveloppement ont un soutien inadéquat et sont faces à une fermeture imminente, et

reconnaissant que les organismes de pays développés sont les principaux utilisateurs des données des observatoires à travers le monde,

recommande que chacun des organismes appartenant à un pays développé et conduisant des programmes liés à des observatoires magnétiques adopte un ou plusieurs observatories ayant ce type de problème et fournisse l'assistance nécessaire et la formation pour assurer des opèrations continues à un niveau suffisant, et que les agences gouvernementales qui les financent considèrent cette charge comme une part routinière de leurs obligations internationales envers les pays en voie de développement.

RESOLUTION NO.2

I A G A

emphasizing the importance of maintaining the global network of magnetic observatories as the primary basis for investigating geomagnetic phenomena and updating geomagnetic reference field information,

noting that many key observatories in developing countries have inadequate support and are facing imminent closure, and

recognizing that organizations in the developed countries are the main users of observatory data world-wide,

recommends that those organizations in the developed countries that run magnetic observatory programs should each adopt one or more observatories facing problems and provide the necessary assistance and training to ensure continuing operation at a satisfactory standard, and that government funding agencies should consider this as a routine part of their international obligation to developing countries.

RESOLUTION NO.3

I A G A

recognizing the importance of an observation network in the oceans, and the almost total lack of ocean bottom installations, and

noting that telephone companies will soon be retiring their submarine cables

requests of these telephone companies that they keep these submarine cables open for scientific research, and

urges funding agencies to facilitate this action by providing financial support for the installation and operation of ocean-bottom observing systems that use these cables.

RESOLUTION NO.3

L'AIGA

reconnaissant l'importance d'un réseau d'observations dans les océans, et l'absence presque totale d'installations au fond des océans, et

notant que les compagnies de téléphone vont bientôt retierer leurs cables sous-marins,

demande à ces compagnies de téléphone de garder ces cables sous-marins disponibles pour la recherche scientifique, et

demande instamment aux agences de financement de faciliter cette requête en fournissant le support financier pour l'installation et l'opération de systèmes d'observations au fond des océans, utilisant ces cables.

RESOLUTION NO.4

L'AIGA

reconnaissant que le programme ISTP/GGS deviendra opérationel dans la période 1992-1995 où les lancements des satellites GEOTAIL, WIND et POLAR sont attendus, en même temps que d'autres missions magnétosphériques et ionosphériques majeures telles que UARS, INTERBALL, CLUSTER et APEX,

demande instamment que les nations conduisant des recherches dans l'atmosphère supérieur et la physique spatiale à partir de l'Antartique continuent d'assurer leurs programmes pendant cette période.

RESOLUTION NO.4

I A G A

recognizing that the ISTP/GGS programme will become operational in the 1992-1995 timeframe with the expected launch of GEOTAIL, WIND and POLAR spacecraft, together with other major magnetospheric and atmospheric spacecraft missions such as UARS, INTERBALL, CLUSTER and APEX,

urges that nations conducting upper atmospheric and space physics research from Antarctica make every effort to ensure continuity of their programmes during this period.

Explanation of acronyms etc (provided by President Gendrin):

ISTP/GGS: Programme International Soleil-Terre/Satellite Global pour les Géosciences

International Solar-Terrestrial Programme/Global Geosciences Satellite

GEOTAIL: Japanese satellite in ISTP for the study of the magnetospheric tail

WIND: US satellite in the solar wind (ISTP/GGS)

POLAR: US polar orbiter (ISTP/GGS)

UARS: Upper Atmosphere Research Satellite

INTERBALL: USSR/international pair of spacecraft for the study of the magnetosphere (one in polar orbit, the other in the tail)

CLUSTER: Four ESA/NASA satellites (ISTP)

APEX: Expérience de plasma active dans la magnétosphère terrestre

Active Plasma Experiment in the Earth's Magnetosphere

RESOLUTION NO.5

I A G A

recognizing the need to understand the UV radiation environment and the processes that control it, including the changes in total column ozone, and to investigate the response of the biosphere

recommends that national funding agencies support the establishment of a global observation network to determine the present day distribution of UV spectra at the Earth`s surface and to detect long term (decade) trends, based upon standardized algorithms and instrument calibration.

RESOLUTION NO.5

L'AIGA

reconnaissant le besoin de comprendre les caractéristiques du rayonnement UV et les processus qui les contrôlent, y compris les changements dans le contenu total de la colonne d'ozone, et d'étudier la réponse de la biosphère,

recommande que les agences nationales qui financent soutiennent l'établissement d'un réseau global d'observation pour déterminer la distribution actuelle du spectre UV à la surface de la terre et pour détecter les tendances à long terme (10 ans), basées sur des algorithmes standards et sur la calibration des instruments.

RESOLUTION NO.6

L'AIGA

notant l'importance centrale des flux d'ultraviolet lointain [FUV] et d'ultraviolet extrême [EUV] dans le spectre solaire pour étudier la thermosphère, l'ionosphère et la magnétosphère de la terre, et

reconnaissant les limitations des indices disponibles dans la spécification des flux spectraux pour des études quantitatives,

recommande que des efforts de coopération entre nations et entre agences soient initiés pour fournir des mesures à long-terme à bord d'engins spatiaux des flux FUV/EUV du spectre solaire.

RESOLUTION NO.6

I A G A

noting the central importance of solar spectral far ultraviolet (FUV) and extreme ultraviolet (EUV) fluxes to studies of the Earth's thermosphere, ionosphere and mesosphere and

recognizing the limitations of available indices in the specification of spectral fluxes for quantitative studies,

recommends that international and inter-agency cooperative efforts be initiated to provide for future spaceborne, long-term solar FUV/EUV spectral flux measurements.

RESOLUTION NO.7

I A G A

noting that plans for incoherent scatter radars in the polar cap region are already far advanced, and

recognizing that such observations are required in support of several spacecraft programmes, in particular CLUSTER,

recommends to all concerned National Agencies that such radars be installed and tested so that they are operational in time for relevant space missions.

RESOLUTION NO.7

L'AIGA

notant que les plans de construction de radars incohérents dans la calotte polaire sont déjà tres avancés, et

reconnaissant que de telles observations sont requises en soutien de plusieurs programmes satellites, et en particulier CLUSTER,

recommande à toutes les agences nationales concernées que de tels radars soient installés et testés de telle sorte qu'ils soient opérationnels en temps voulu pour toutes les missions spatiales relevantes.

RESOLUTION NO.8

L'AIGA

notant que le satellite Equatorial chargé de couvrir les régions équatoriales de la magnétosphère jouait un rôle indispensable dans l'aspect synergétique du programme GGS original, tel qu'initialement développé par la communauté scientifique agissant au travers de conseils scientifiques et de comités de sélection variés,

constate avec inquiétude que ce satellite a disparu d'un programme bien équilibré, pour des raisons autres que scientifiques, et que les tentatives faites pour réintroduire cette partie scientifique n'ont pas abouti,

recommande que les dernières tentatives de réintroduction avec un satellite de petite taille (Equator-S) soit poursuitent

- pour remplir le trou évident fait dans le programme GGS
- et pour démontrer la possibilité de faire de la bonne science avec des ressources modérées.

RESOLUTION NO.8

I A G A

noting that the Equator spacecraft to survey the equatorial regions of the magnetosphere was an indispensible part of the synergistic aspects of the original GGS program, as originally developed by the scientific community acting through the various advisory and selection committees

views with concern that this spacecraft was removed from the well balanced program for other than scientific reasons and the attempts to recover this science have not yet finally materialized

recommends that the latest attempt to do so with a small scale (Equator-S) satellite be pursued

- to fill the obvious gap in the GGS program
- and to demonstrate the possibilities of carrying out fruitful science with moderate resources.

RESOLUTION NO.9

I A G A

noting that our understanding of solar activity is often too limited to predict such processes as solar flares and geomagnetic storms and their influence on the Earth;

stresses the necessity for outer-atmospheric observations of the Sun and solar-terrestrial interaction processes;

recommends that appropriate national agencies in each country facilitate participation in the spacecraft project ACCORD (spacecraft APEX and CORONAS, 1992-1995) in conjunction with ground-based, balloon and rocket experiments, and

invites SCOSTEP and COSPAR to participate in the project.

RESOLUTION NO.9

L'AIGA

notant que notre connaissance de l'activité solaire est souvent trop limitée pour prédire des phénomenes tels que les éruptions solaires, les orages géomagnétiques et leur influence sur la Terre,

insiste sur la nécessité d'observations dans l'atmosphère externe du soleil et des processus d'intéraction soleil/terre,

recommande que dans chaque pays les agences nationales appropriées facilitent la participation dans le projet spatial ACCORD (satellites APEX et CORONAS,1992-1995) en conjonction avec les expériences sols, ballons et fusées, et

invite le SCOSTPE et le COSPAR à participer au projet.

RESOLUTION NO.10

L'AIGA

reconnaissant l'importance des stations de répétition de mesures magnétiques pour déterminer les variations géomagnétiques séculaires dans les régions sans observatoires magnétiques, et

notant qu'une connaissance précise des changements séculaires du champ géomagnetique est essentielle à la mise à jour des ensembles de données magnétiques continues, globales et régionales,

recommande que des réseaux nationaux de stations de répétition soient établis, maintenus et opérés, avec un niveau de précision aussi élevé que possible, et que toutes les données magnétiques de surveillance des stations de répétition soient envoyées rapidement au centre de données mondiale A, en utilisant le format recommandé par AIGA.

RESOLUTION NO.10

I A G A

recognizing the importance of magnetic repeat station observations for determining the geomagnetic secular variation in regions without magnetic observatories, and

noting that an accurate knowledge of the secular change of the geomagnetic field is essential for updating global and regional magnetic survey data sets,

urges that national networks of magnetic repeat stations be established, maintained and operated at the highest possible level of accuracy, and that all magnetic repeat station survey data be sent promptly to World Data Center-A, using the format recommended by IAGA.

RESOLUTION NO.11

I A G A

recognizing the importance of continued long-term monitoring of the geomagnetic field for scientific, industrial and other purposes,

noting that many key observatories throughout the world have inadequate support and are under threat of closure,

encourages the creation of a federation of those institutes operating magnetic observatories, working closely with IAGA, that will strengthen and coordinate their efforts,

- by maintaining standards set by IAGA
- by working towards an improved distribution of observatories
- by establishing and coordinating bi-lateral or multilateral assistance programs among participating institutes
- by actively pursuing all sources of funding

RESOLUTION NO.11

L'AIGA

reconnaissant l'importance de la poursuite des mesures à long-terme du champ géomagnétique pour des raison scientifiques, industrielles et autres,

notant que de nombreux observatoires clefs à travers le monde n'ont pas de soutien adéquat et sont sous la menace de fermeture,

encourage la création d'une fédération des instituts en charge d'observatoires magnétiques, travaillant en rapport étroit avec l'AIGA, qui renforcerait et coordonnerait leurs efforts

- en maintenant les standards définis par l'AIGA,
- en travaillant sur une meilleure distribution des observatoires,
- en établissant et en coordonnant des programmes d'assistance bi-latéraux ou multi-latéraux entre les instituts participants,
- et en recherchant activement des sources de financement.

RESOLUTION NO.12

L'AIGA

reconnaissant que les variations temporelles du champ magnétique principal qui sont directement observables ont des constantes de temps allant des quelques années à quelques siècles, et qu'il est crucial de disposer de mesures des ces variations sur toute la gamme de périodes pour l'étude des proprietés du noyau et du manteau intérieur, et pour celle de leur couplage;

reconnaissant que les mesures à haute résolutions des anomalies géomagnetiques peuvent fournir des informations significatives sur la lithosphère et sa structure tectonique, à un niveau de détail jamais atteint;

reconnaissant que les données magnétiques de grande précision à bord de satellites constituent une partie essentielle de ces mesures et

notant que douze ans se sont maintenant écoulés depuis les dernières mesures magnétiques effectuées à bord de satellites,

demande urgente à l'ESA et la NASA qu'elles donnent la plus haute priorité à la réalisation de la mission ARISTOTELES.

RESOLUTION NO.12

I A G A

recognizing that time scales of directly observable geomagnetic main field changes range from years to centuries and that measurement of changes over the entire range of periods is crucial for the study of properties of the Earth's core and lower mantle and of the coupling between the two;

recognizing that high resolution measurements of the geomagnetic anomaly field can provide significant information about the lithosphere and its tectonic structure in a detail never before achieved and that the acquisition of satellite magnetic field data of high accuracy is a crucial part of such measurements and

noting that twelve years have passed since the acquisition of suitable satellite magnetic field data

urges most strongly ESA and NASA that they give their plans for the ARISTOTELES mission a high priority.

RESOLUTION NO.13

I A G A

noting that advanced technological systems (especially electric power distribution and radio communications) are increasingly sensitive to natural variations in the Earth's magnetic field, magnetosphere and ionosphere, and

noting that considerable progress has been made in quantitative understanding of the physical relations between solar wind parameters and the responses in geophysical parameters,

recommends that the solar wind plasma and interplanetary magnetic field parameters be monitored upstream of the Earth in near real-time, and that the data be distributed internationally to anticipate possible terrestrial responses to severe solar wind fluctuations.

RESOLUTION NO.13

L'AIGA

notant que les systèmes technologiques avancés (en particulier les lignes de distribution électriques et les communications radio) sont de plus en plus sensibles aux variations naturelles du champ magnétique terrestre, de la magnétosphère et de l'ionosphère, et

notant que des progrès considérables ont été réalisés dans la compréhension quantitative des relations physiques entre les paramètres du vent solaire et les réponses des paramètres géophysiques,

recommande que des mesures du plasma du vent solaire et des paramètres du champ magnétique interplanétaire soient effectuées en amont de la terre en temps presque réel, et que les données soient distribuées de facon internationale pour anticiper les réponses de l'environnement terrestre à des fluctuations sévères du vent solaire.

RESOLUTION NO.14

L'AIGA

notant l'imminence de l'année internationale de l'électrojet équatorial [AIEE] - Septembre 1991 à Mars 1993,

reconnaissant l'importance extrême de ce programme pour la compréhension de l'environnement terrestre proche dans la region équatoriale, fortement controlée par le champ géomagnétique et par la dynamique de l'ionosphère et de l'atmosphère,

demande instamment que tous les pays membre concernés soutiennent les organisations et les scientifiques participant à ce projet.

RESOLUTION NO.14

I A G A

noting the imminent initiation of the International Equatorial Electrojet Year (IEEY) - September 1991 to March 1993,

recognizing the great importance of this programme for understanding the Earth's near space environment in the equatorial region, strongly controlled by the geomagnetic field and ionosphere-atmosphere dynamics,

urges all the member countries concerned to support the participating organizations and scientists.

EXECUTIVE COMMITTEE

Minutes

Vienna (Austria)

11 August and 22 August, 1991

Present: R E Gendrin (President), U Schmucker, D J Williams (Vice Presidents), M Gadsden (Secretary-General), M W McElhinny, M Sugiura, J Taubenheim, O L Vaisberg, J F Vilas.

The President attending a meeting of the Union Council, Vice President Williams took the chair and opened the first meeting of the Executive Committee at 10.35am on Sunday, 11 August. Apologies for absence were received from D Ian Gough and the Executive Committee sent to his wife, Wendy, best wishes for a successful outcome of the treatment that she was about to begin.

I. Minutes of the previous meeting

The draft minutes have been published in **IAGA News** No.29, pages 3 - 12. A misprint was noted in Minute IV (mispelling of "Executive" and in Minute III, the reference to Working Group II-G should be to II-F.

The Secretary General reported that he had been asked by W F Stuart to request confirmation of the accuracy of Minute IV in setting out the procedure for nomination and selection of recipients of long-service awards. The Executive Committee confirmed that the Minute was accurate.

Sugiura requested a change to the wording of Minute IX and this was agreed. The Minute now reads:

> Accuracy of digital geomagnetic data: Sugiura drew to the attention of the Executive Committee that there can be serious problems in the application of "informatics" to the harvesting of geomagnetic data. These data are not necessarily more reliable than analogue data because it takes time to determine proper baselines. With the rapid dissemination of data through publication in compact or optical disc form, the error may become embedded in the global data base which a later correction does not reach. Rapid entry of data into data bases carries risks which may not be given as much weight as they ought to have. Sugiura agreed to write on this matter in IAGA News.

Subject to these changes, Williams (seconded by McElhinny) proposed adoption of the Minutes: passed nemine contradicente.

II. Matters arising from the minutes, not covered under subsequent agenda items.

Minute IV contains a brief note on the procedure for appointment of Leaders of the IAGA Components [Divisions and InterDivisional Commissions]. The Executive Committee discussed the current state of the proposals for the Leadership for the next four years. The provisions of ByLaw 3 were emphasized: the appointments are by the Executive Committee and are for one period only. The ByLaw does not specifically forbid reappointment of a Leader or Leaders but the Executive Committee decided that this would be neither desirable nor acceptable except in unusual circumstances. The Executive Committee also noted that some of the Bodies were now proposing three, in some cases four or more, cochairmen. The Executive Committee concluded that the position of cochairman is akin to that of deputy, to take over the running of the Division or Commission if the chairman should become "bad, mad or dead". On the proposal of McElhinny, approved without formal voting, the Executive Committee decided that for the coming period [1991-1995], each Division and Commission should have but two cochairmen and that the next Executive Committee was recommended to reduce this number to one for the period 1995-1999.

III. Report from the Secretary-General

The Secretary General laid before the Executive Committee the IAGA Accounts for the year 1990, the Summary for the period 1987-1990 and the ledger account for the year to date [see pages 47-49]. He drew attention to the marked fall in amount of cash held in reserve over the last period. This had been done at the suggestion of the previous Executive Committee who had received an informal comment from the Union Finance Committee at the General Assembly in 1987 that IAGA's reserves were rather high for the Association to be claiming that it was short of money. Much of the decrease occurred through the relatively-high level of expenditure at the Scientific Assembly in 1989. In this regard, the Secretary General announced that a few weeks previously IAGA had received an ex gratia payment of five thousand pounds from the Local Organizing Committee of the Exeter Assembly; the Executive Committee expressed its very great pleasure at this unexpected and unprecedented windfall and directed the Secretary General to write to the Chairman [Professor D J Southwood] of the Local Organizing Committee to express the gratitude of the Association.

IV. IAGA Structure for the period 1991-1995

The Executive Committee reviewed the current structure of the Divisions and Commissions and expressed satisfaction at the activity and effectiveness of the Component Bodies. The Divisions' recommendations for the new Leadership were

reviewed and a list of Chairmen, with two Cochairmen, drawn up in accordance with the recommendations and, as required by ByLaw 5, taking into account scientific and administrative competence and at the same time ensuring adequate geographical representation.

The InterDivisional Commission of History wished to have the current Chairman, W Schroder, to continue for another period but this request was refused. The InterDivisional Commission for Developing Countries reported that it had been unable to agree on a slate at its Business Meeting and the Executive Committee requested that a second Business Meeting be held to resolve the matter. This was and did.

V. International Geomagnetic Reference Field

The Executive Committee took note that a vote by correspondence was in progress (papers circulated to the Committee members by copy of letter dated 8 May 1991 to National Correspondents or to Chief Delegates accredited at that time). The Secretary General reported that he had received some votes by mail before the start of the Assembly and that therefore no formal discussion within the Conference of Delegates should be scheduled. The Executive Committee requested the Secretary General to make the following statements at the Conference of Delegates:

> The Amendment does not represent a reversal of the Executive Committee's opinion about the IGRF. The Executive Committee is still of the opinion that to commercialize the IGRF would be a mistake. The Executive Committee has asked me to say that a vote against commercialization of the IGRF is performed by voting NO to both the amendment and the motion. The Executive Committee hopes there will be much debate in the next eight days, before the vote closes.

VI. International programmes

Suggestions for an international project Global Electric Chain had been received by the Secretary General and circulated to the Executive Committee. The Executive Committee decided that the papers should be circulated to Divisions II (and especially to Working Group II-A), III and V for a collective response and proposal of an Association Resolution if appropriate.

A letter dated May 23 to the President from the Chairman of Divison V had been received and circulated to the Executive Committee for comment. The Executive Committee welcomed the strong international involvement of IAGA scientists in preparation of the Magnetic Anomaly Map of the Arctic and suggested to Division V that a resolution of support for this valuable initiative might be appropriate. The Executive Committee noted that progress was well underway on the Map and that initial difficulties in organization were now amicably

resolved. The Executive Committee was happy to endorse the project on behalf of the IAGA.

A letter sent to the Secretary General by Vanyan concerning Electrical Conductivity Studies of the Lower Crust of Euroasia integrated with Seismological, Geothermal and Petrological Data was considered by the Executive Committee and referred to Division I (and particularly to Working Group I-2) for development of an IAGA response.

Oraevsky had submitted a letter with a short description of a proposed international project Apex Coordinated with Coronas Discovery [ACCORD] with satellite programmes APEX and CORONAS being developed in the USSR in the frame of the Intercosmos Council. The Executive Committee referred this matter to Divisions II, III and IV for discussion at their Business Meetings. It was suggested that the project be brought also to the attention of the Solar Terrestrial Energy Program [STEP] Committee, with IAGA support for it. The Secretary General was directed to provide an information item on the project for inclusion in **IAGA News** which he agreed to do [see page 81].

A document concerning Fiducial Laboratories for an International Natural Science Network [FLINN] was received from Minster [USA]. Minster also submitted a draft resolution for IUGG and the matter was referred to McElhinny, the Chairman of the Resolutions Committee, for consideration.

The President reported on the current status of the Stratosphere, Troposphere and Interaction with the Biosphere [STIB] project, part of the International Geosphere-Biosphere Programme [IGBP]. He noted that a report to be submitted to the Scientific Committee for the IGBP recommends that STIB ought not to be considered as core project of the IGBP. He said that IAMAP was expressing concern at this and received the approval of the Executive Committee to write, as President of IAGA, a letter to the President of the IGBP Scientific Committee and to the Executive Director of IGBP expressing the strong hope that STIB will be regarded as a core project of the IGBP to reinforce the links that IAGA scientists have with biologists. Splitting the reponsibility for such studies between different organizational units would have an adverse effect on the development of the science in such areas.

A report on the International Real Time Geomagnetic Observatory Network [INTERMAGNET] by Green was laid before the Executive Committee and this was accepted with pleasure, the Executive Committee noting that travel on INTERMAGNET operational business has been supported generously by ICSU through the good offices of IUGG. [The report is printed in this issue of **IAGA News** on page 77.]

The President noted that he had received a proposal from Pokhotelov and Nicolaev for a resolution concerning Man-Made Induced Natural Disasters and reported that the Resolutions Committee had rejected this. The Executive Committee received the proposal and noted it; the Committee recommends the

proposers to develop further the scientific aspects in discussion with the relevant Divisions.

VII. Sponsorship of meetings by IAGA

A request was received from Hirota [Japan] for sponsorship of a IAMAP/IAGA symposium on the middle atmospheric sciences to be arranged by the local organizing committee of the IAMAP Assembly in Japan in July 1993. The Executive Committee noted that this symposium would take place just a few weeks before the 7th Scientific Assembly in Córdoba (Argentina) - a location almost antipodal to Japan. Williams spoke of the need to continue good relations between the two Associations and to avoid a division in the scientific cooperation in the field of middle atmosphere science. The Executive Committee recalled with pleasure that IAMAP scientists from the Commissions on Meteorology of the Upper Atmosphere and on Radiation had joined with IAGA for the Joint Assembly in 1985 [Prague, Czechoslovakia]. It was therefore decided that the IAGA middle atmosphere scientific sessions would take place at the IAMAP Assembly, as part of the principal programme. Since Division II would be involved in what would therefore be a joint IAMAP/IAGA Assembly, it was not appropriate to talk of "sponsorship" of a middle atmosphere symposium.

A request for sponsorship of the International Symposium on Middle Atmosphere Science, to be held in Kyoto (Japan) on March 23-27, 1992, was approved. Taubenheim drew attention to there being **two** middle atmosphere meetings now scheduled to be held in Japan (in 1992 and in 1993) and suggested that many European scientists would be unable to attend either of them. He suggested that there is a real risk of depriving a significant part of the IAGA community of the opportunity of participating in a middle atmosphere symposium before 1994 or 1995 - and remarked that this was particularly unfortunate as the Upper Atmosphere Research Satellite [UARS] results could be expected to be published and discussed in the next two years.

A request for sponsorship of the third "castle meeting" on New Trends in Geomagnetism - Palaeomagnetism, Rock Magnetism and Databases [see page 95] was approved.

A request for IAGA sponsorship of a number of sessions at the 29th COSPAR meeting was discussed at some length by the Executive Committee and sponsorship of the following sessions was suggested:

A.2-S	Global Change and Relevant Space Observations
A.7-M	The Middle Atmosphere after the Upper Atmosphere Research Satellite (UARS)
B.3-S	Galileo: Results to date
B.4-S	New Directions in Research on Comets and the Outer Solar System

B.5-S	Future Exploration of Mars
C.2-S	The Middle Atmosphere: Its Energetics, Chemistry and Dynamics and Coupling to Regions above and below
C.3-M	Solar Tides and related Wave-Wind Interactions 80-150 km
C.4-M	Validation of UARS Wind and Temperature Measurements at and above the Mesopause
C.5-M	Phenomena and Processes of Thermosphere/Ionosphere Coupling
C.6-M	Verification and New Development of International Reference Atmosphere
C.7-M	Verification of CIRA and Suggestion for its Future Development
D.1-S	Ulysses Encounter with Jupiter
D.2-S	Observations of the Outer Heliosphere
D.5-M	Active Experiments in Space Plasma
D.7-M	Plasma-Satellite-Dust Interactions
E.1-S	The Structure and Physical Properties of the Quiet Solar Corona
E.3-S	Fundamental Problems in Solar Activity
P.2-M	Chemical Pollution of the Atmosphere

The Executive Committee directed the Secretary-General to write to the COSPAR Secretary-General proposing this level of sponsorship.

An invitation to send a representative to the commemoration of 150 years of geomagnetic observations at Bombay (India) was received with appreciation by by the Executive Committee. The Executive Committee offers its congratulations to the Indian scientific community on having supported uninterrupted recording at the Colaba-Alibag observatory since the first records were obtained in 1841. [See the article by B P Singh, pages 63-68, in this issue of IAGA News.] Because of the current financial problems of IAGA, the Executive Committee was unable to name a representative to attend the celebrations but felt sure that the very strong, continuing, and active community of IAGA scientists resident and working in India would be able to represent the IAGA interest effectively and appropriately.

VIII. Cooperation with other bodies

The Secretary General reported that he had been advised by Melchior, the Union Secretary General, that two ICSU grants had been awarded since the date of the last Executive Committee meeting. The first was of $7000 for INTERMAGNET Executive and Committee meetings; the second (notified only in the last few days) is of $8000 for the International Workshop

on Data Oragnization and Analyses for the International Equatorial Electrojet Year [IEEY]. The Executive Committee welcomed the news of these generous grants.

The President summarised for the Executive Committee the content of many discussions he has had concerning the proposed new Charter and ByLaws for COSPAR and reported that the COSPAR leadership was willing to try to accommodate changes that would ease the worries of the IUGG and its Associations about a possible conflict of scope within the ICSU family. He reported that the President of COSPAR was to visit Vienna on Friday, 23rd August, to meet Union and Association representatives to discuss the points of difficulty. The fundamental problem is, as Williams pointed out, that it was not sensible for different component parts of ICSU doing essentially the same things. Vaisberg suggested that there should be recognition that the IUGG scientific sessions are science-oriented while the COSPAR sessions should be mission-oriented.

The President reported that he had stepped down from his position as Union representative on the ICSU Committee on the Teaching of Science and also that Goldberg has given up his role within NASA that was involved with the teaching of science. The Executive Committee discussed the problem of giving IAGA science more public visibility: the colour brochure [**Your Earth: from the deep interior to outer space**] produced and distributed by the President, and printed at no cost to IAGA by the CNET [the Research Center of France Telecom] was recognized as being a major contribution to this. The Executive Committee expressed its thanks to the President for the efforts he and his co-authors [Coles (Canada), Richmond (USA), Tsurutani (USA), Joselyn (USA)] had made to write, design and see to the printing of this very successful pamphlet. In addition, the Executive Committee noted with gratitude the efforts made by the Chairman of the InterDivisional Commission on History [Schroder (Germany)] to gain publicity for IAGA during the Assembly. The President reported that there was to be a 30-minute feature on Austrian radio on the Saturday evening after the end of the Assembly.

The International Commission on the Lithosphere is to be renewed for a further four years and the Executive Committee received this information without comment.

The Executive Committee received a copy of the first issue of the Newsletter of the International Commission for Earth Sciences in Africa [ICESA]. The President informed the Executive Committee that the previous day he had sent a letter to the Union Executive Committee stating that IAGA appreciates the efforts made by African geophysicists to organize themselves on a continental basis for promoting geophysical research in both its fundamental and applied aspects; that IAGA is ready to contribute to the success of this initiative provided that an adequate representation is given to IAGA scientific interests; that IAGA is willing to include in its programme of scientific and general assemblies, sessions in

which reports of the activities of the ICESA would be presented, through the InterDivisional Commission on Developing Countries; and that IAGA expects the ICESA will work in close coordination with the Associations that are directly involved in the progress of geophysical sciences on the African continent.

A note on the establishment of an international forum on geospace sciences for developing countries at the International Centre for Science and High Technology [Trieste, Italy] was received and noted.

The President informed the Executive Committee that he had been told that IAMAP, IAHS and IAPSO were proposing to the Union Executive Committee the formation of a Fluid Earth Scientific Committee. The Executive Committee considered that IAGA's scientific interests would be marginal in such a committee and thus will not seek to join IAGA into the committee; nevertheless, the Executive Committee supported the formation of the committee and will watch future development closely.

The Executive Committee made the following appointments of representatives of IAGA:

P Simon (Belgium) on the IUGG Committee for Geochemistry

W J Hinze (USA) on the ad hoc Committee for Liaison with Applied Geophysics Societies

and recommended to the Union the appointment of R E Gendrin (France) as IUGG representative to COSPAR.

IX. The Seventh Scientific Assembly of IAGA (1993)

The Executive Committee received a report from Vilas concerning the current state of arrangements for the 7th Scientific Assembly. He reported that financial support from the National Council of Science had been received and that the Local Organizing Committee was active in encouraging organizations such as the European Economic Community [EEC] to help researchers in central Europe to travel to Argentina for the Assembly. The zeroth Circular of the meeting [in Spanish] has been circulated in Latin American countries.

The lecture theatre accommodation in Cordoba has been reserved and consists of a self-contained set of seven rooms capable of seating 1800 people in total. The accommodation is divided into seven lecture theatres, with 2 holding 150 each, four holding 250 each and one large theatre for 500. The poster area is immediately adjacent to the theatre accommodation. In addition to the principal accommodation, Vilas noted that there will be two offices, two small rooms (20-30 people) for meetings, and a movie projection room. Fax and telephones will be provided. The Local Organizing Committee is estimating an attendance of 800 delegates with 400 "extras" and provisionally considers a registration fee in the range $240 to $350. The Executive Committee took note of all this and

expressed general satisfaction with how things were coming on, congratulating the Local Organizing Committee on their obvious enthusiasm and spirit.

The Secretary General reported that he had received a letter from Oraevsky requesting that, in view of the current financial difficulties facing the USSR, registration fees are not charged for Soviet convenors, co-convenors and invited speakers to the Assembly. The Executive Committee, while sympathising with the plight of their Soviet colleagues (which is shared by scientists in many other countries, some to greater extent, others not so much), regretted that since the collection and use of registration fees is not under the control of IAGA but is the responsibility of the Local Organizing Committee of any particular Assembly, there was nothing that IAGA or its Executive Committee could do to satisfy the request of the Soviet Chief Delegate.

The Executive Committee discussed possible variations of the straight "two-weeks" registration fee, noting that at the current Assembly, there was an option provided by the Austrian Local Organizing Committee of registering for one day or for a number of days. The break point was understood to be at five days; for attendance for a smaller time, it was worth taking the reduced registration fee. The Executive Committee recommended that Chief Delegates should make clear to their national funding agencies that deciding who is to be supported late in the period running up to the start of an Assembly causes totally unnecessary hardship in making the delegates liable to the penalty of the late-registration fee.

X. Any other competent business

There being no other business, the President declared the Executive Committee meeting ended at 18.30 on Thursday, 22 August.

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY
Financial Report for the year 1990
Amounts in US Dollars Exchange rate $1.6465 = £1.000

RECEIPTS	IUGG	GRANTS & CONTRACTS
15 IUGG ALLOCATION	25700.00	x
2 UNESCO GRANTS	x	x
3 OTHER GRANTS	3898.89	5628.28
4 CONTRACTS WITH UNESCO, etc	x	x
5 SALES OF PUBLICATIONS	1185.06	x
6 MISCELLANEOUS	1152.88	x
7 TOTAL RECEIPTS	31936.83	5628.26
8 CASH ON HAND AND IN BANKS Jan 1, 1990	4762.33	x
9 INVESTMENTS & RESERVES Jan 1, 1990	1598.48	2018.91
10 TOTAL	38297.64	7647.17

EXPENDITURES	IUGG	GRANTS & CONTRACTS
11 ADMINISTRATION	6030.17	x
12 PUBLICATIONS	12656.94	x
13 ASSEMBLIES	x	x
14 SYMPOSIA & SCIENTIFIC MEETINGS	18403.89	5475.89
16 GRANTS (Permanent Services etc)	x	x
17 CONTRACTS WITH UNESCO etc	x	x
18 MISCELLANEOUS	x	716.90
19 TOTAL EXPENDITURE	37091.00	6192.79
20 CASH ON HAND AND IN BANKS Dec 31, 1990	1206.64	1454.38
21 INVESTMENTS & RESERVES Dec 31, 1990	x	x
22 TOTAL	38297.64	7647.17

	January 1, 1990	December 31, 1990
23 ACCOUNTS RECEIVABLE	0.00	0.00
24 ACCOUNTS PAYABLE	0.00	0.00

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY
Financial Report for the period 1987-1990
Amounts in US Dollars Exchange rate $1.7199 = £1.000

RECEIPTS	IUGG	GRANTS & CONTRACTS
15 IUGG ALLOCATION	108800.00	x
2 UNESCO GRANTS	x	x
3 OTHER GRANTS	4072.67	18963.99
4 CONTRACTS WITH UNESCO, etc	x	2213.70
5 SALES OF PUBLICATIONS	3764.89	x
6 MISCELLANEOUS	14861.44	75.80
7 TOTAL RECEIPTS	131499.00	21253.49
8 CASH ON HAND AND IN BANKS Jan 1, 1987	2766.74	x
9 INVESTMENTS & RESERVES Jan 1, 1987	58100.00	x
10 TOTAL	192365.74	21253.49

EXPENDITURES	IUGG	GRANTS & CONTRACTS
11 ADMINISTRATION		
11.1 Personnel	460.94	x
11.2 Quarters (rents & services)	x	x
11.3 Supplies & Equipment	4860.35	x
11.4 Communications	9134.58	x
11.5 Travel (admin. only)	2257.58	x
11.6 Miscellaneous	548.57	x
12 PUBLICATIONS		
12.1 Proceedings of Assemblies	10610.63	x
12.2 Proceedings of Symposia	x	x
12.3 Periodicals	26916.92	x
12.4 Others	665.16	x
13 ASSEMBLIES		
13.1 Organization	934.08	x
13.2 Travel	96309.66	x
14 SYMPOSIA & SCIENTIFIC MEETINGS		
14.1 Organization	12034.23	x
14.2 Travel	25356.84	5719.95
16 GRANTS (Permanent Services etc)	x	10820.63
17 CONTRACTS WITH UNESCO etc	x	2444.86
18 MISCELLANEOUS	1015.78	748.85
19 TOTAL EXPENDITURE	191105.32	19734.29
20 CASH ON HAND AND IN BANKS Dec 31, 1990	1260.42	1519.20
21 INVESTMENTS & RESERVES Dec 31, 1990	x	x
22 TOTAL	192365.74	21253.49

	January 1, 1987	December 31, 1990
23 ACCOUNTS RECEIVABLE	0.00	0.00
24 ACCOUNTS PAYABLE	0.00	0.00

LEDGER ACCOUNT

1 January through 6 August 1991

[Amounts are in pounds sterling]

Cash in hand and at bank	1616.14	
Receipts [IUGG]	15574.58	
Publications	637.79	
Grants [Intermagnet]	4008.16	
Contracts [Geophys. Inst. Prague]	931.34	
6th Scientific Assembly	5000.00	
Interest [Investment account]		27768.01

Expenditures:

Administration		
Personnel	0.00	
Supplies and Equipment	113.30	
Communications	876.50	
Travel	0.00	
Miscellaneous	17.00	1006.80
Association		
Publications	10.30	
Assemblies	692.49	
Meetings & Symposia	0.00	
Grants	1211.49	
Contracts	0.00	
Miscellaneous	0.00	1914.28
Deposit account	16000.00	
Current account	8846.93	23846.93
		27768.01

IAGA STRUCTURE 1991-1995

EXECUTIVE COMMITTEE:

President: DONALD J WILLIAMS, Johns Hopkins University, Applied Physics Laboratory, Johns Hopkins Road, Laurel, Maryland 20723, USA

Vice Presidents: MASARU KONO, Department of Applied Physics, Tokyo Institute of Technology, Ookayama 2-12-1, Meguro-ku, Tokyo 152, JAPAN

JUAN F VILAS, Departamento de Ciencias Geológicas, Universidad de Buenos Aires, Ciudad Universitaria, cp 1428 Buenos Aires, ARGENTINA

Secretary-General: MICHAEL GADSDEN, Physics Unit, Fraser Noble Building, Aberdeen University, Aberdeen AB9 2UE, SCOTLAND (UK)

Members: IBRAHIM A ELTAYEB, Department of Mathematics & Computing, College of Science, Sultan Qaboos University, PO Box 32486, Al-Khodh, Muscat, SULTANATE OF OMAN

GASTON FISCHER, Observatoire Cantonal, Avenue de Beauregard 3, CH-2036 Cormondrèche, SWITZERLAND

ROGER E GENDRIN, Expèditions Polaires Francaises, 47 Avenue du Marèchal Fayolle, 75116 Paris, FRANCE

GIOVANNI P GREGORI, IFA (CNR), Sturzo 31, 00144 Roma, ITALY

OLEG TROSHICHEV, Arctic and Antarctic Research Institute, Beringst 38, St Petersburg 199226, RUSSIA

ROBERT A VINCENT, Department of Physics and Mathematical Physics, University of Adelaide, GPO Box 498, Adelaide 5001, AUSTRALIA

HONORARY MEMBERS OF IAGA:

L R ALLDREDGE, 4475 Chippewa Drive, Boulder Colorado 80303, USA

HONORARY MEMBERS OF IAGA: [continued]

A ASHOUR, Faculty of Science, Cairo University, Giza, EGYPT

J O CARDUS, Observatorio del Ebro, Roquetas, Tarragona, 43520 SPAIN

K D COLE, Physics Department, La Trobe University, Bundoora Victoria, AUSTRALIA 3083

J COULOMB, 46 rue Émile Dubois, 75014 Paris, FRANCE

N FUKUSHIMA, Chofu-shi, Wakabacho 1-1-94, Tokyo 182, JAPAN

V LAURSEN, Drejogade 40, DK-2100 Copenhagen, DENMARK

M NICOLET, 30 Avenue den Doorn, B-1180 Bruxelles, BELGIUM

J G ROEDERER, Geophysical Institute, University of Alaska, Fairbanks Alaska 99775-0800, USA

V A TROITSKAYA, Physics Department, La Trobe University, Bundoora Victoria, AUSTRALIA 3083

Division I - INTERNAL MAGNETIC FIELDS:

Chairman: SVEN-ERIK HJELT, Department of Geophysics, University of Oulu, SF-90570 Oulu, FINLAND

CoChairmen: ANTAR ADAM, Geodetical and Geophysical Research Institute of the Hungarian Academy of Sciences, PO Box 5, H-9401 Sopron, HUNGARY

CHARLES S BARTON, Bureau of Mineral Resources, PO Box 378, Canberra ACT 2601, AUSTRALIA

Working Group I-1: Theory of Planetary Magnetic Fields and Geomagnetic Secular Variation

Chairman: Friedrich H Busse, Physikalisches Institut, Theoretische Physik IV, Universitat Bayreuth, D-8580 Bayreuth, GERMANY

Working Group I-1: Theory of Planetary Magnetic Fields and Geomagnetic Secular Variation [continued]

Vicechairman: Andrew M Soward, School of Mathematics, University of Newcastle upon Tyne, Newcastle upon Tyne NE17 7RU, UK

Working Group I-2: Electromagnetic Induction and Electrical Conductivity

Chairman: Alfred G Duba, Experimental Geophysics Group, L201 Lawrence Livermore National Laboratory, Box 808, Livermore CA 94550, USA

Vicechairman: Alan G Jones, Department of Energy, Mines and Resources/Geological Survey of Canada, Seismology and Electromagnetism, Continental geoscience, 1 Observatory Crescent, Ottawa Ontario, CANADA K1A 0Y3

Working Group I-3: Palaeomagnetism

Chairman: Kenneth A Hoffman, Physics Department, California Polytechnic State University, San Luis Obispo CA 93407, USA

Vicechairman: Lauri J Pesonen, Department of Geophysics, Geological Survey of Finland, SF-02150 Espoo, FINLAND

Working Group I-4: Rock Magnetism

Chairman: Elisabeth McClelland, Department of Earth Science, Oxford University, Oxford OX1 3PR, UK

Vicechairman: Valera Shcherbakov, Borok Geophysical Observatory, Borok Nekouzskii region, Yaroslavskaja Obl., 152742 RUSSIA

Division II - AERONOMIC PHENOMENA

Chairman: A D RICHMOND, NCAR-HAO, P.O.Box 3000, 1850 Table Mesa Drive, Boulder CO 80307-3000, USA

CoChairmen: M-L CHANIN, Service d'Aeronomie, BP No 3, 91370 Verrieres le Buisson, FRANCE

J LASTOVICKA, Geophysical Institute, Czechoslovak Academy of Science, Bocni II, 141 31 Praha 4, CZECHOSLOVAKIA

Working Group II-A: Electrodynamics of the middle atmosphere

Chairman: R Goldberg, NASA Goddard Space Flight Centre, Code 961, Greenbelt, MD 20771, USA

CoChairman: E Thrane, Norwegian Defence Research, Establishment, POB 25, N2007 Kjeller, NORWAY

Working Group II-B: Thermospheric dynamics

Chairman: Roger W Smith, Geophysical Institute, University of Alaska, Fairbanks AK 99701, USA

CoChairmen: Timothy L Killeen, Dept of Atmospheric and Oceanic Science, Michigan University, Ann Arbor Michigan 48109-2143, USA

R Sridharan, 656 Physical Research Laboratory, Navrangpura, 380009 Ahmedabad, INDIA

Working Group II-C: Calibration of radiometric systems for geophysical observations

Chairman: Ernest Hilsenrath, Code 916, Goddard Space Flight Center, Greenbelt MD 20770, USA

CoChairmen: H Lauche, Max-Planck Institut fuer Aeronomie, D-3411 Katlenburg-Lindau 3, Postfach 20, GERMANY

D J McEwen, Institute of Space & Atmos Studies, University of Saskatchewan, Saskatoon S7N 0W0, CANADA

Working Group II-D: External forcing of the middle atmosphere

Chairman: J Lastovicka, Geophysical Institute, Czechoslovak Academy of Science, Bocni II, 141 31 Praha 4, CZECHOSLOVAKIA

CoChairman: L L Hood, Lunar & Planetary Laboratory, University of Arizona, Tucson Arizona 85721, USA

Working Group II-E: Ionospheric irregularities, fields, and waves

Chairmen: R A Greenwald, Applied Physics Laboratory, Johns Hopkins University, Laurel MD 20707, USA

J-P St-Maurice, CASS, Utah State University, Logan Utah 84322, USA

Working Group II-F: Extension of the Auroral Oval and Polar Cap into the Magnetosphere [Joint with Division III]

Chairman: P H Reiff, Department of Space Physics and Astronomy, Rice University, PO Box 1892, Houston TX 77251-1892, USA

CoChairmen: R J Pellinen, Finnish Meteorological Institute, PO Box 503, SF-00101 Helsinki 10, FINLAND

H E J Koskinen, Finnish Meteorological Institute, PO Box 503, SF-00101 Helsinki 10, FINLAND

Working Group II-G: Antarctic Research [Joint with Division III]

Chairman: J R Dudeney, British Antarctic Survey, Madingley Road, Cambridge CB3 0ET, UK

CoChairmen: M Candidi, Instituto di Fisica dello Spazio Interplanetario, Consiglio Nazionale dele Richerche, PO Box 27, 00044 Frascati, ITALY

T J Rosenberg, Institute of Physical Sciences and Technology, University of Maryland, College Park MA 20742-2431, USA

A N Zaitzev, IZMIRAN, 142092 Troitsk, Moscow Region, RUSSIA

Division III - MAGNETOSPHERIC PHENOMENA

Chairman: S W H COWLEY, Blackett Laboratory, Imperial College, London SW7 2BZ, UK

CoChairmen: G ATKINSON, Canadian Space Agency, PO Box 7275, Vanier Postal Station, Ottawa Ontario K1L 8E3, CANADA

N A TSYGANENKO, Institute of Physics, University of St Petersburg, Stary Petergof 198904, St Petersburg, RUSSIA

Working Group III-1: ULF Waves in Magnetospheres

Chairman: M Lester, Department of Physics and Astronomy, University of Leicester, Leicester LE1 7RH, UK

Working Group III-2: Physical Processes in Multi-Ion Space Plasmas [Joint with Division IV]

CoChairmen: S A Fuselier, Space Sciences Laboratory, Lockheed Palo Alto Research Laboratory, Dept 91-20 Bldg 255, 3251 Hanover Street, Palo Alto CA 94304, USA

R Lundin, Swedish Institute of Space Physics, PO Box 812, S-981 28 Kiruna, SWEDEN

Working Group III-2: Quantitative Magnetospheric Models

Chairman: G H Voigt, Department of Space Physics and Astronomy, Rice University, PO Box 1892, Houston TX 77251-1892, USA

CoChairman: N A Tsyganenko, Institute of Physics, University of St Petersburg, Stary Petergof 198904, St Petersburg, RUSSIA

Working Group III-4: Extension of the Auroral Oval and Polar Cap into the Magnetosphere [Joint with Division II]

Chairman: P H Reiff, Department of Space Physics and Astronomy, Rice University, PO Box 1892, Houston TX 77251-1892, USA

CoChairmen: R J Pellinen, Finnish Meteorological Institute, PO Box 503, SF-00101 Helsinki 10, FINLAND

Working Group III-4: Extension of the Auroral Oval and Polar Cap into the Magnetosphere [Joint with Division II] [continued]

H E J Koskinen, Finnish Meteorological Institute, PO Box 503, SF-00101 Helsinki 10, FINLAND

Working Group III-5: Antarctic Research [Joint with Division II]

Chairman: J R Dudeney, British Antarctic Survey, Madingley Road, Cambridge CB3 0ET, UK

CoChairmen: M Candidi, Instituto di Fisica dello Spazio Interplanetario, Consiglio Nazionale delle Richerche, PO Box 27, 00044 Frascati, ITALY

T J Rosenberg, Institute of Physical Sciences and Technology, University of Maryland, College Park MA 20742-2431, USA

A N Zaitzev, IZMIRAN, 142092 Troitsk, Moscow Region, RUSSIA

Division IV - SOLAR WIND AND INTERPLANETARY FIELD:

Chairman: STANISLAW GRZEDZIELSKI, Space Research Centre, Polish Academy of Sciences, 01-237 Warsaw, Ordona 21, POLAND

CoChairmen: THOMAS E CRAVENS, Space Physics Research Laboratory, College of Engineering, University of Michigan, Ann Arbor Michigan 48109-2143, USA

I S VESELOVSKY, Institute of Nuclear Physics, Moscow State University, Moscow 119899, RUSSIA

Working Group IV-1 The solar wind and structure of the heliosphere

Chairman: Tamas Gombosi, Department of Atmospheric, Ocean and Space Science, Michigan University, 2455 Hayward Avenue, Ann Arbor Michigan 48109, USA

Working Group IV-2: Shocks and turbulence in the solar wind

Chairman: I S Veselovsky, Institute of Nuclear Physics, Moscow State University, Moscow 119899, RUSSIA

Working Group IV-3 Solar wind interaction with comets and non-magnetic bodies

Chairman: Thomas E Cravens, Space Physics Research Laboratory, College of Engineering, University of Michigan, Ann Arbor Michigan 48109-2143, USA

Working Group IV-4: Physical Processes in Multi-Ion Space Plasmas [Joint with Division III]

CoChairmen: S A Fuselier, Space Sciences Laboratory, Lockheed Palo Alto Research Laboratory, Dept 91-20 Bldg 255, 3251 Hanover Street, Palo Alto CA 94304, USA

R Lundin, Swedish Institute of Space Physics, PO Box 812, S-981 28 Kiruna, SWEDEN

Division V - OBSERVATORIES, INSTRUMENTS, SURVEYS AND ANALYSES

Chairman: D J KERRIDGE, Geomagnetism Group, British Geological Survey, Murchison House, West Mains Road, Edinburgh EH9 3LA, SCOTLAND (UK)

CoChairmen: J A JOSELYN, US Department of Commerce, NOAA Space Environment Laboratory, 325 Broadway, Boulder Colorado 80303, USA

S O OGUNADE, Department of Physics, Obafemi Awolowo University, Ile-Ife, NIGERIA

Working group V-1: Geomagnetic Observatories, Instruments and Standards

Chairman: O Rasmussen, Division of Geophysics, Danish Meteorological Institute, 100 Lyngbyvej, DK-2100 Copenhagen, DENMARK

Working group V-1: Geomagnetic Observatories, Instruments and Standards [continued]

CoChairman: L Hegymegi, Eotvos Lorand Geophysical Institute, PO Box 35, Budapest H-1440, HUNGARY

Working Group V-2: Geomagnetic Applications and Data Services

Chairman: D H Boteler, Geophysics Division, Geological Survey of Canada, 1 Observatory Crescent, Ottawa, CANADA K1A 0Y3

CoChairmen: A N Zaitzev, IZMIRAN, Troitsk, Moscow region 142092, RUSSIA

E Friis-Christensen, Division of Geophysics, Danish Meteorological Institute, 100 Lyngbyvej, DK-2100 Copenhagen, DENMARK

Working Group V-3: External/Internal Geomagnetic Relations

Chairman: W H Campbell, US Geological Survey, PO Box 25046, MS 968, Denver Federal Center, Denver CO 80225-0046, USA

CoChairman: H A Deebes, Academy of scientific Research & Technology, Helwan Institute of Astronomy & Geophysics, Helwan, Cairo, EGYPT

Working Group V-4: Magnetic Surveys and Charts

Chairman: J Bitterly, Institut de Physique du Globe Strasbourg, 5 rue Rene Descartes, 67084 Strasbourg Cedex, FRANCE

CoChairman: L R Newitt, Geophysics Division, Geological Survey of Canada, 1 Observatory Crescent, Ottawa, CANADA K1A 0Y3

Working Group V-5: Geophysical Indices

Chairman: M Menvielle, Laboratoire de Physique de la Terre et des Planetes, Bat 504, Universite Paris Sud, F-91405 Orsay Cedex, FRANCE

Working Group V-5: Geophysical Indices [continued]

CoChairman: T Araki, Data Analysis Center for Geomagnetism & Space Magnetism, Faculty of Science, Kyoto University, Kyoto 606, JAPAN

Working Group V-7: Earth and Planetary Magnetic Survey

Chairman: J M Quinn, Geopotential Division, US Naval Oceanographic Office, Stennis Space Center, MS 39522-5001, USA

CoChairman: Yves Cohen, Institut de Physique du Globe de Paris, 4 place Jussieu, Tour 24-25, 75252 Paris Cedex 05, FRANCE

Working Group V-8: Analysis of the Main Field and Secular Variations

Chairman: N Peddie, US Geological Survey, PO Box 25046, MS 968, Denver Federal Center, Denver CO 80225-0046, USA

CoChairman: C E Barton, Division of Geophysics, Bureau of Mineral Resources, GPO Box 378, Canberra ACT 2601, AUSTRALIA

Working Group V-9: Magnetic Anomalies (Land and Sea)

Chairman: Colin V Reeves, Geophysical Mapping Programme, Bureau of Mineral Resources, GPO Box 378, Canberra ACT 2601, AUSTRALIA

CoChairman: Sergey Maschenkov, All-Union Research Institute for Geological and Mineral Resources of the World Ocean, 1 Maklina Pr, St Petersburg 190121, RUSSIA

ad hoc Working Group Geomagnetic Field Variation Models

Chairman: V O Papitashvili, Geomagnetic Variations Laboratory, IZMIRAN, Troitsk, Moscow Region 142092, RUSSIA

CoChairmen: J K Walker, Geophysics Division, Geological Survey of Canada, 1 Observatory Crescent, Ottawa, CANADA K1A 0Y3

J F Hermance, Geophysical Electromagnetics Laboratory, Department of Geological Sciences, Brown University, Providence RI 02912-1846, USA

ad hoc Working Group Geomagnetic Field Variation Models [continued]

N Peddie, US Geological Survey, PO Box 25046, MS 968, Denver Federal Center, Denver CO 80225-0046, USA

INTERDIVISIONAL COMMISSIONS

HISTORY:

Chairman: M COLACINO, IFA (CNR), Sturzo 31, 00144 Roma , ITALY

CoChairmen: LUIZ MUNIZ BARRETO, Observatorio Nacional, Rua General Bruce 586, Sao Cristavao, 20 921 Rio de Janeiro RJ, BRAZIL

W SCHROEDER, Geophysikalische Station, D-282 Bremen-Roennebeck, Hechelstrasse 8, GERMANY

DEVELOPING COUNTRIES:

Chairman: C AGODI ONWUMECHILI, 69 Lansdowne Drive, Hackney, London E8 3EP, UK

CoChairmen: B V KRISHNAMURTHY, Space Physics Laboratory, Vikram Sarabhai Space Centre, Trivandrum 695 022, INDIA

NALIN B TRIVEDI, INPE C P-515, Sao Jose dos Campos 12200, Sao-Paulo State, BRAZIL

IAGA NATIONAL CORRESPONDENTS

A Henni;Centre National d'Astronomie d'Astrophysique et de Geophysique;Universite d'Alger;BP 1137 Alger;ALGERIA:
Jose M Febrer;Centro Espacial de San Miguel;Av Mitre 3100;1663 - San Miguel;Prov de Buenos Aires;ARGENTINA:
Chairman;SubCommittee for Geomagnetism & Aeronomy;Australian Academy of Science;GPO Box 783;Canberra ACT 2601;AUSTRALIA:
P Steinhauser;Zentra fuer Meteo & Geo;Hohe Warte 38;Vienna;AUSTRIA:
M Scherer;Instituut voor Ruimte Aeronomie;Ringlaan 3;1180 Brussel;BELGIUM:
C Aguirre;Inst De Invest Fisicas;Uni mayor De San Andres;La Paz;BOLIVIA:
I G Pacca;IAG;Universidade de Sao Paulo;CP 30627;01051 Sao Paulo;BRAZIL:
P B Mozharov;Geophysical Institute;Akad G Bonchev Str;Bl 13 Sofia 113;BULGARIA:
Tin-Aye Dirgeo;Burma Geology Department;226 Delhousie Street;Rangoon;BURMA:
R L Coles;Earth Physics Branch EMR;1 Observatory Crescent;Ottawa K1A 0Y3;CANADA:
C A Sgolia;Institute Geografico Militar;Castro 354;Santiago;CHILE:
Liu Qingling;Institute of Space Physics;Academia Sinica;PO Box 2701;Beijing;CHINA:
M Hvozdara;Geofyziklany ustav SAV;Dubravska cesta;842 28 Bratislava;CZECHOSLOVAKIA:
E Friis-Christensen;Meteorological Institute;Lyngbyvej 100;Dk-2100 Copehagen;DENMARK:
M Fahim;Helwan Observatory;Helwan;EGYPT:
Ghebrebrhan Ogubazghi;Geophysical Observatory;Faculty of Science;Addis Ababa University;PO Box 1176;Addis Ababa;ETHIOPIA:
E Kataja;Geophysical Observatory;SF-99600 Sodankyla;FINLAND:
Michel Menvielle;IPGP Universite Pierre et Marie Curie;Paris VII;Tour 24, 2e etage;4 place Jussieu;75005 Paris;FRANCE:
H Soffel;Institut fuer Allgemaine und Angewandte Geophysik;Universitaet Muenchen;Theresienstr 41-IV;D-8000 Muenchen 2;GERMANY:
I Drakopoulos;Dept of Geophysics;University of Athens;GR-15701 Athens;GREECE:
J F Godoy Orantes;Inst Geografico Nacional;Avenida las Americas 5-76;Zona 13;Ciudad de Guatemala;GUATEMALA:
Jozsef Vero;GGKI;Csatkai E.u. 6-8;H-9400 Sopron;HUNGARY:
T Saemundsson;Science Institute;Univ of Iceland;Dunhaga 3;Reykjavik;ICELAND:
B P Singh;Indian Institute of Geomagnetism;Colaba;Bombay-400 005;INDIA:
Hendar Gunawan;Meteorological and Geophysical Agency;Jalan Arief Rakhman Hakim No.3;PO Box 3540;Jakarta Pusat;INDONESIA:
N H Guya;Institute of Geophysics;Amirabad;Tehran;IRAN:
Fitian Al-Rawi;Seismology Unit;SRC Building Research Centre;Jadriya;PO Box 2136;Baghdad;IRAQ:
A Brock;Applied Geophysics Unit;University College Galway;Galway;IRELAND:
A Eviatar;Dept of Geophysics and Planetary Sci;Tel Aviv University;Ramat Aviv;Tel Aviv;ISRAEL:
Franco Mariani;Dipartimento di Fisica;Universita' Tor Vergata;Via Orazio Raimondo;00173 Roma;ITALY:
Masahisa Sugiura;Geophysical Institute;Faculty of Science;Kyoto University;Kyoto 606;JAPAN:
Oqlah H Dhaimat;Royal Jordanian Geographic Centre;PO Box 20214;Amman;JORDAN:
J P Patel;Department of Physics;University of Nairobi;P O Box 30197;Nairobi;KENYA:
Choi Zong Gi;Hydrometeorological Institute;PO Box 100;Pyongyang;DEMOCRATIC PEOPLES REPUBLIC OF KOREA:
Byung-So Pak;Department of Physics;Sogang University;Seoul 121;REPUBLIC OF KOREA:

A Sursock;P O Box 11-8281;Beirut;LEBANON:
M M Unis;Surveying Dept of Libya;P O Box 600;Tripoli;LIBYA:
J Flick;National Comm For IUGG;25 Rue Louis XIV;LUXEMBOURG:
Jean Bruno Ratsimbazafy;Geophysical Observatory;BP 3843;Antananarivo 101;MADAGASCAR:
Chung Sooi Keong;Geological Survey of West Malaysia;Survey Building;Jalan Gurney;Kuala Lumpur 15-01;MALAYSIA:
A Orozco;Instituto de Geofisica;UNAM;Circuito Exterior;Ciudad Universitaria;Mexico 20 D F;MEXICO:
National Committee for IUGG;Centre Scientifique;16 Boulevard de Suisse;Monte Carlo;MONACO:
A Demnati;Service De Geophysique;Direction Des Mines de la Geologie et de l'Energie;Rabat;MOROCCO:
K L Shrestha;Department of Physics;Tribhuvan University;Kirtipur;Kathmandu;NEPAL:
J A As;Pr Irenelaan 2;3402 CE Ijsselstein;THE NETHERLANDS:
E M Poulter;Physics and Engineering Laboratory;DSIR;Private Bag;Lower Hutt;NEW ZEALAND:
E Oni;Department of Physics;University of Ibadan;Ibadan;NIGERIA:
Jan A Holtet;Institute of Physics;University of Oslo;P O Box 1048;Blindern;N-0316 Oslo 3;NORWAY:
Shaukat Ali Amjad;Geophysical Centre;PO Box No 2;Quetta;PAKISTAN:
V L Badillo;Manila Observatory;P O Box 1231;Manila;PHILIPPINES:
J Jankowski;Institute of Geophysics;Polish Academy of Sciences;PO Box 155;00-973 Warsaw;POLAND:
L A da Mata;Instituto Nacional de Meteorologicia e Geofisica;Rua C do Aeroporte;1700 Lisbon;PORTUGAL:
D V Steflea;Inst Earth Phys & Seismology;Magurele-Platform;P O Box MG-2;Bucharest;RUMANIA:
R Reiss;Department of Physics;Faculte des Sciences;Dakar-Fann;SENEGAL:
G J Kuhn;Magnetic Observatory;PO Box 32;Hermanus 7200;REPUBLIC OF SOUTH AFRICA:
J O Cardus SJ;Observatorio del Ebro;Roquetas Tarragona;SPAIN:
I A Eltayeb;School of Mathematics;University of Khartoum;P O Box 321;Khartoum;SUDAN:
C G Falthammar;Institutionem for plasmafysik;Kungl tekniska hogskolan;S-100 44 Stockholm;SWEDEN:
Gaston Fischer;Observatoire Cantonal;Avenue de Beauregard 3;CH-2036 Cormondrèche;SWITZERLAND:
Elias Abou-Chahine;IAGA National Correspondent;Faculte Des Sciences Section De Physique;Universite De Damas;SYRIA:
P B Vitta;Department of Physics;The University;Box 35063;Dar es Salaam;TANZANIA:
S Patchimkul;Royal Thai Survey Department;Supreme Command HQ;Bangkok 2;THAILAND:
Habib El Amri;Office de la Topographie et de la Cartographie;13 Rue De Jordanie;Tunis;TUNISIA:
A Mete Isikara;Kandilli Observatory and Earthquake Research Institute;Bogazici University;81220 Cengelkoy-Istanbul;TURKEY:
K M Creer;Department of Geophysics;The University;James Clerk Maxwell Building;Mayfield Road;Edinburgh EH9 3JZ;UK:
Christopher G A Harrison;RSMAS;4600 Rickenbacker Causeway;Miami Florida 33149;USA:
Victor Oraevsky;IZMIRAN;142092 Troitsk;Moscow Region;RUSSIA:
W H Subiza;Servicio Geographico Militar;8 de Octubre 3255;Montevideo;URUGUAY:
F Villamendiana;Consejo de Desarrollo Cientifico y Humanidades;Universidad del Zulia;Maracaibo;VENEZUELA:
Nguyen Manh Duc;Centre de Recherche Geophysique;CNRS du Vietnam;Nghia do;Tu Liem;Hanoi;VIETNAM:
P Jovanovic;Institue za Geomagnetism i Aeronomie;11306 Gracka kod Beograda;Belgrade;YUGOSLAVIA:;
D L Jones;Physics Department;University of Zimbabwe;PO Box MP167 Mount Pleasant;Harare;ZIMBABWE:

THE COLABA-ALIBAG OBSERVATORIES OF INDIA: 150 YEARS OF GEOMAGNETIC OBSERVATIONS

B P Singh
Indian Institute of Geomagnetism
Colaba Bombay 400 005
INDIA

Location and Usefulness In 1991, the Colaba-Alibag observatories of India completed 150 years of continuous geomagnetic observations. They thus join the select group of observatories with 150 years of continuous data - Sverdlovsk magnetic observatory in Russia [IAGA News No.28, pp 34-38, 1990], Greenwich/Abinger/Hartland in the UK, and Melbourne/Toolangi/Canberra in Australia.

Colaba is at 73 E longitude, 18 54'N latitude and Alibag is at 72 52'E, 18 38'N. The dipole latitudes are practically the same, 9.5 N. It is thus a typical low-latitude location, well outside the region of the equatorial electrojet currents.

Colaba-Alibag data have been extensively used by the IAGA community in studies of ionospheric-magnetospheric currents and various other other aspects of solar-terrestrial interactions. As the only station at low latitude with an unbroken series of measurements extending over a period of 150 years, the data have been continually in great demand. On many occasions, the Institute has been approached by the IAGA community to deposit the complete series with a World Data Centre. The series is invaluable in understanding secular variations of the geomagnetic field. Furthermore, a series like this has an intrinsic potential for unravelling still-unknown facts about the geomagnetic field.

In recent years, use of the data has increased still further following the establishment of Trivandrum underneath the equatorial electrojet. For the last two decades the difference in daytime variation in the H-component between Trivandrum and Alibag is accepted as an index of the equatorial electrojet (EEJ) in the vicinity of India. Efforts are also in progress to develop a modified index of DST which includes Alibag H values. At present this index is computed from four low-latitude observatories - Honolulu, San Juan, Hermanus, and Kakioka. Their distribution in longitude is rather uneven.

In April 1971, Colaba observatory was reconstituted as the Indian Institute of Geomagnetism [IIG], Bombay, and in its new form functions as an autonomous research institute of the Department of Science and Technology, Government of India. The Institute maintains eight standard magnetic observatories distributed in latitude over India, and also a magnetic observatory in Antarctica at the Indian antarctic station MAITRI.

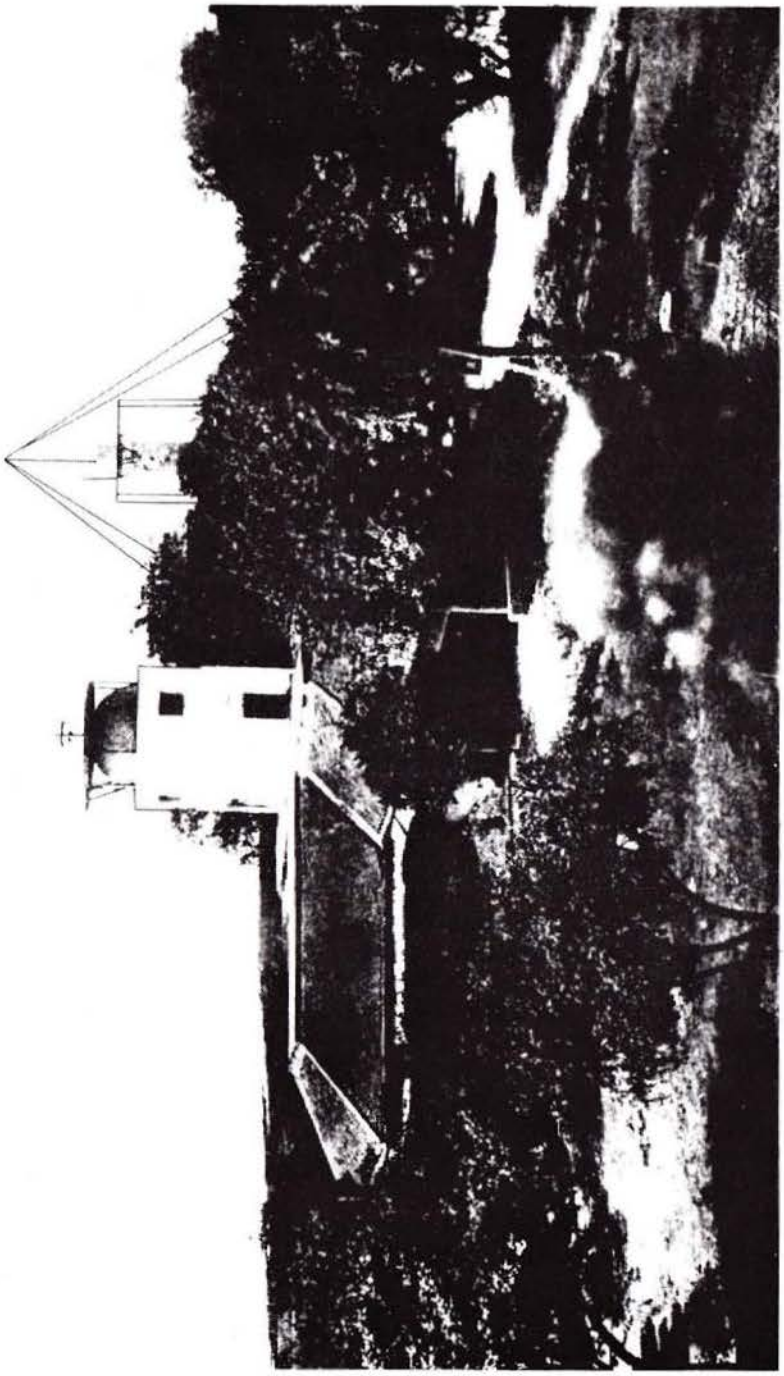


Figure 1: Colaba Observatory, Bombay. (Founded 1826. Photograph of 1877)

The IIG operates arrays of magnetometers and magnetotelluric stations in various parts of India for geophysical studies of the Earth's interior. Year books of hourly magnetic data ["Indian Magnetic Data"] are regularly brought out and are supplied to the World Data Centres. IIG has active groups of scientists involved in research in some form at the frontiers of geophysics.

The morphological characteristics of geomagnetic storms identified from 60 years of magnetic data (1846-1905) at Colaba along with other correlated geophysical and solar phenomena were published in two volumes by N A F Moos, the first Indian Director of the observatory, described by Sydney Chapman as "truly monumental" works.

Early geomagnetic observatories in India The first geomagnetic observations in India began within a couple of years of the start of regular measurements in London and in Paris. The Indian observations were begun in 1822 at Madras Observatory, built in 1792 by the East India Company for meteorological observations. Madras hourly observations exist for the period 1822-1861 with less frequent observation until 1881.

Trivandrum observatory was set up in 1841 by the Maharajah of Travancore. This enlightened ruler was aware of the rapid developments in science then taking place in Europe and knew that the Earth's magnetic equator crossed India in the vicinity of Trivandrum.

A few points about Trivandrum merit attention. John Allan Broun was brought in as Director in 1849 from the Makerstoun Observatory in Scotland. Using the geomagnetic measurements he made and studies of the data, he established the presence of a lunar semidiurnal component. This, and other findings of his, are summarised in "Observations of Magnetic Declination made at the Trivandrum and Agustia Observatories"; J A Broun (Henry S King & Co, London), 1874.

Another nineteenth-century observatory, located at Simla, collected magnetic measurements over the period 1841-1861. Madras, Simla, and Trivandrum formed part of the Gottingen Magnetic Union of worldwide magnetic observatories, organised by Gauss and Weber in 1834 at the instance of von Humboldt.

A Brief History of the Colaba-Alibag Observatories The Colaba Observatory was built in 1826 by the EastIndia Company to make astronomical observations and provide a timekeeping service for ships using the port of Bombay. The building is shown in Figure 1 [opposite], which is taken from an 1877 photograph. This building is occupied now by the IIG.

Geomagnetic observations were started in 1841 by Arthur Bedford Orlebar, professor of astronomy at Elphinstone College in Bombay. The earliest measurements were visual observations through a microscope of the end of a freely-suspended magnet. The self-recording photographic magnetometer devised by Charles Brook in the UK was introduced into Colaba in 1871,

under the directorship of Charles Chambers. Chambers' successor was Nanabhoy Ardeshir Framji Moos, the first Indian director.

Figure 2: The Alibag Observatory, southeast of Bombay

During Moos' tenure, the existence of Colaba as a magnetic observatory was threatened by the decision to replace horse-drawn trams with electric trams. Moos has the credit of selecting a new site at Alibag, 30km to the southeast of Bombay, "far enough from Bombay to be free from the threatened electromagnetic noise and yet near enough to retain the same geomagnetic characteristics". These characteristics were checked out carefully by simultaneous recordings at both Alibag and Colaba over the period 1904-1906. Recording at Colaba discontinued in 1906, before the electric tram service began in Bombay.

N A F Moos retired in 1919 and from then until 1971, seventeen directors successively steered the observatories through years of meticulous and uninterrupted geomagnetic recording with regular publication both of the data and of the research.

A picture of Alibag Observatory in given in Figure 2 [opposite]. The entire building is made of hand-picked, nonmagnetic, Porbandar sandstone. Magnetic recording is carried on in a room built with such good thermal insulation that the variation in temperature within the room is just over one degree Celsius through an entire day.

Apart from daily magnetic charts obtained from quartz magnetometers, the equipment in current use is a digital variometer system using quartz sensors, a digital micropulsation (Pc3 and Pc4) recording unit, a national calibration facility for magnetometers, and a palaeomagnetic laboratory with a magnetic vacuum system [MAVACS] for the thermal cleaning of rock samples.

In conclusion, India has today a network of eleven geomagnetic observatories [see the map in Figure 3; page 68] whose data are published as hourly mean values in annual volumes of Indian Magnetic Data. These publications are used in fundamental research in Earth, Space, and Solar-Terrestrial Physics, and in applications for prospecting for natural resources.

In the words of Fr Mayaud (1973): ".... the (continuous) records of Colaba and Alibag were found to form a beautiful series, beginning in 1871, and making up, perhaps, the most complete collection of records in this world. Their quality and especially their regularity were particularly impressive even in comparison with the Kew and Melbourne records." [P N Mayaud: "A hundred years series of geomagnetic data 1868-1967"; IAGA Bulletin No.33, page 20]

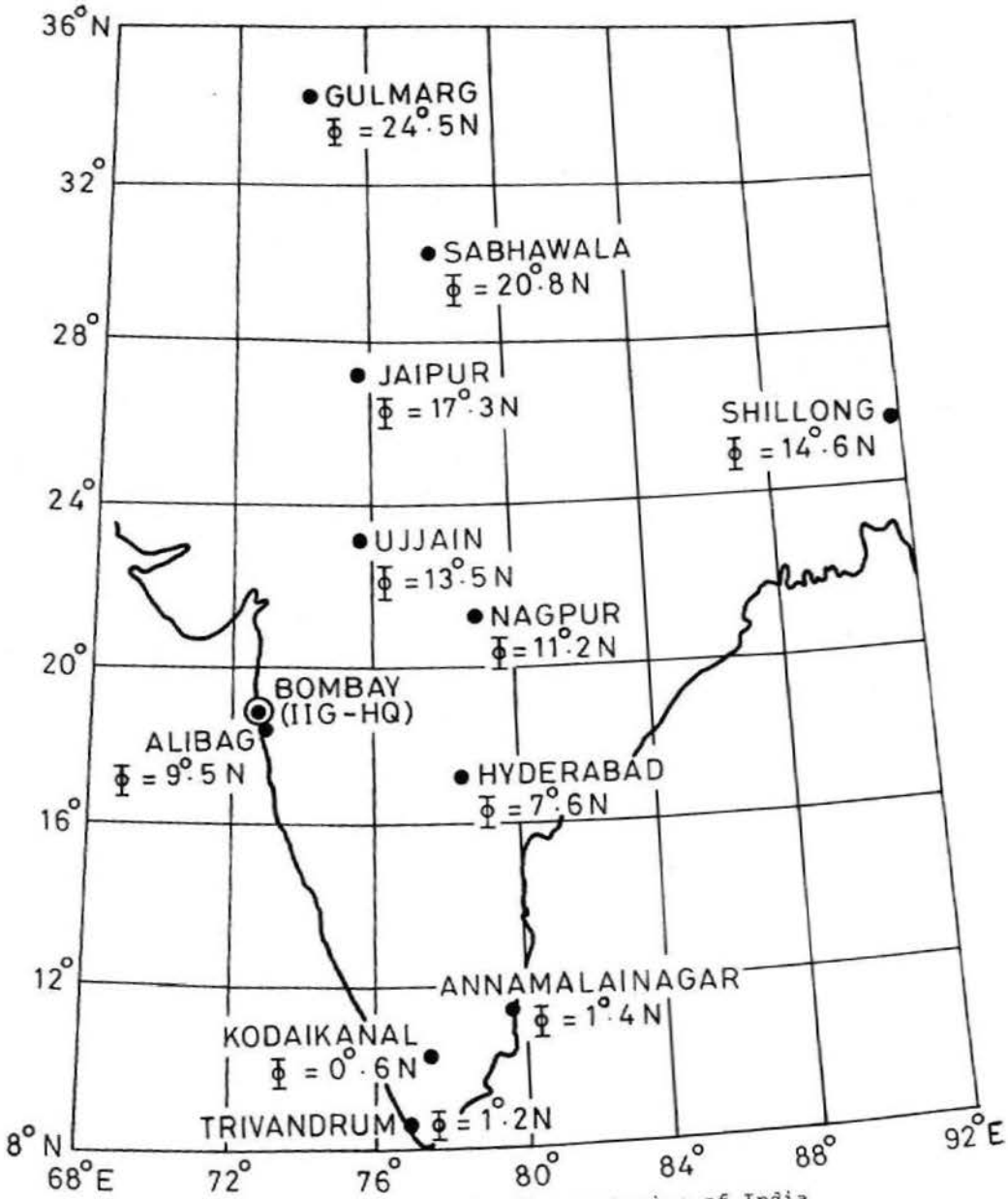


Figure 3: Geomagnetic Observatories of India

INTERNATIONAL GEOMAGNETIC REFERENCE FIELD, 1991 REVISION

International Association of Geomagnetism and Aeronomy (IAGA) Division V, Working Group 8: Analysis of the main field and secular variation, R.A. Langel, Chairman.

The International Geomagnetic Reference Field (IGRF) is a series of mathematical models of the main geomagnetic field and its secular variation. Each model consists of a set of spherical harmonic (or Gauss) coefficients, the g's and h's in a series expansion of the geomagnetic potential

$$V = a \sum_{n=1}^{N} \sum_{m=0}^{n} (a/r)^{n+1} \, [g_n^m \cos m\phi + h_n^m \sin m\phi] \, P_n^m(\cos\theta)$$

where a is the mean radius of the Earth (6371.2 km); r the radial distance from the center of the Earth; ϕ the east longitude measured from Greenwich; θ the geocentric colatitude; and $P_n^m(\cos\theta)$ the associated Legendre function of degree n and order m, normalized according to the convention of Schmidt (see, e.g., Langel, 1987). In principle, N should be ∞ but the Working Group is of the opinion that in practice the available data for most epochs do not justify N greater than 10. This value is chosen to maintain consistency between models at different epochs. The coefficients are in units of nanotesla (nT).

The first IGRF (IGRF 1965) was adopted by the International Association of Geomagnetism and Aeronomy (IAGA) in 1968 (IAGA Commission 2 Working Group 4, 1969). Five revisions, or updates, have been made subsequent to that original adoption starting with IGRF 1975 (IAGA Division I Study Group on Geomagnetic Reference Fields, 1975) and culminating with this revision. In order to meet the need for a model usable at current and future epochs, the latest model is usually predictive, because it is based on measurements taken no later than one or two years prior to the epoch of the model. To provide a series of more accurate models for past epochs the notion of a Definitive Geomagnetic Reference Field (DGRF) was adopted. The term "definitive" is used because such models are not adopted until it has become unlikely that the data sets utilized will be significantly improved. In the second IGRF revision, DGRF models were adopted for 1965, 1970 and 1975 as was a model for epoch 1980.0, IGRF 1980, which included a secular variation model for 1980 to 1985 (IAGA Division I Working Group 1, 1981; Journal of Geomagnetism and Geoelectricity, Vol. 34, No. 6, 1982, entire issue). At the IAGA General Assembly of 1985 a third revision was made in which: (1) DGRF 1980 replaced IGRF 1980; (2) IGRF 1985, including a secular variation model for 1985 to 1990, was adopted; (3) main field IGRF models were adopted for 1945, 1950, 1955 and 1960 (IAGA Division I Working Group 1, 1985). The fourth revision replaced the models for 1945, 1950, 1955 and 1960 with DGRF's (IAGA Division I Working Group 1, 1988). For dates between the epochs of the DGRF's, linear interpolation between the coefficients with epochs bracketing the date is to be used. The linear

interpolation between the latest epoch DGRF and the subsequent IGRF is termed a provisional IGRF. Note that, when referring to these models, the designation "IGRF" refers to all of them viewed collectively. If a particular model or models is intended, the reference must be specific, i.e. IGRF 1975 or DGRF 1970 rather than simply IGRF.

Details of the derivations and characteristics of the models may be found in the references already cited and in Zmuda (1971), Peddie (1982, 1983), most of the October 1987 issue of Physics of the Earth and Planetary Interiors, Barraclough (1987), and Langel (1987).

Working Group 8 (Analysis of the main field and secular variations) of Division V of IAGA (formerly Working Group 1 of Division I) considered the latest revision if the IGRF during the 20th General Assembly of the International Union of Geodesy and Geophysics (IUGG) held in Vienna, Austria, in August 1991. It recommended that IGRF 1985 be replaced by a newly derived DGRF 1985 and the extension of the IGRF to 1995 by adoption of IGRF 1990 comprising a model of the main field at 1990.0 and a predictive model of the secular variation for use in adjusting the main field model to dates between 1990.0 and 1995.0.

The IGRF now consists of nine DGRF models spanning the interval 1945.0 to 1985.0; an IGRF for the interval 1990.0 to 1995.0 (IGRF 1990); and a provisional IGRF (PGRF) defined by linear interpolation between the coefficients of DGRF 1985 and IGRF 1990 (main field). The present PGRF 1985 will be superseded when a definitive model of the main field at 1990.0, different from IGRF 1990, is adopted. Present plans are that this will take place at the 21st General Assembly of the IUGG in 1995.

The spherical harmonic coefficients for all DGRF models and for IGRF 1990 are given in Table 1. The ten main field models each have 120 coefficients and extend to degree and order 10. The secular variation model has 80 coefficients and extends only to degree and order 8. When converting between geodetic and geocentric coordinates, use of the IAU ellipsoid (International Astronomical Union, 1966) is recommended; it has an equatorial radius of 6378.160 km and a flattening of 1/298.25.

The coefficients of the IGRF models and computer programs for synthesizing field component values are available from the following sources:

World Data Centre C1 for Geomagnetism
British Geological Survey
Murchison House, West Mains Road
Edinburgh EH9 3LA, United Kingdom

World Data Center A for Solid Earth Geophysics
National Geophysical Data Center
NOAA, Code E/GCI
325 Broadway
Boulder, CO 80303 USA

World Data Center A for Rockets and Satellites
National Space Science Data Center (Code 930.2)
NASA Goddard Space Flight Center
Greenbelt, MD 20771 USA

The membership of Working Group V-8 was R.A. Langel (chairman), W. Mundt (vice-chairman), D.R. Barraclough, C.E. Barton, V.P. Golovkov, P.J. Hood, F.J. Lowes, N.W. Peddie, Qi Gui-zhong, J.M. Quinn, M.A. Shea, S.P. Srivastava, D.E. Winch, T. Yukutake and D.P. Zidarov. Valuable assistance was received from P.B. Kotze, A. DeSantis, B.P. Singh, G. Haines, and L. Newitt. R. Coles was chairman of Division V.

References

Barraclough, D.R., International geomagnetic reference field: The fourth generation, Phys. Earth Planet. Int., 48, 279-292, 1987.

IAGA Commission 2 Working Group 4, International geomagnetic reference field 1965.0, J. Geophys. Res., 74, 4407-4408, 1969.

IAGA Division I Study Group of Geomagnetic Reference Fields, 1975, J. Geomagn. Geoelectr., 27, 437-439, 1975.

IAGA Division I Working Group 1, International geomagnetic reference fields: DGRF 1965, DGRF 1970, DGRF 1975, and IGRF 1980, Eos Trans. AGU, 57, 120-121, 1981.

IAGA Division I Working Group 1, International geomagnetic reference field revision 1985, J. Geomagn. Geoelectr., 37, 1157-1163, 1985.

IAGA Division I Working Group 1, International geomagnetic reference field Revision 1987, Eos Trans. AGU, 69, 557, 1988.

International Astronomical Union, Proceedings of the 12th General Assembly, 12B, pp. 594-595, 1966.

Langel, R.A., Main Field, Chapter Four in Geomagnetism, ed. J.A. Jacobs, Adacemic Press, London, 1987.

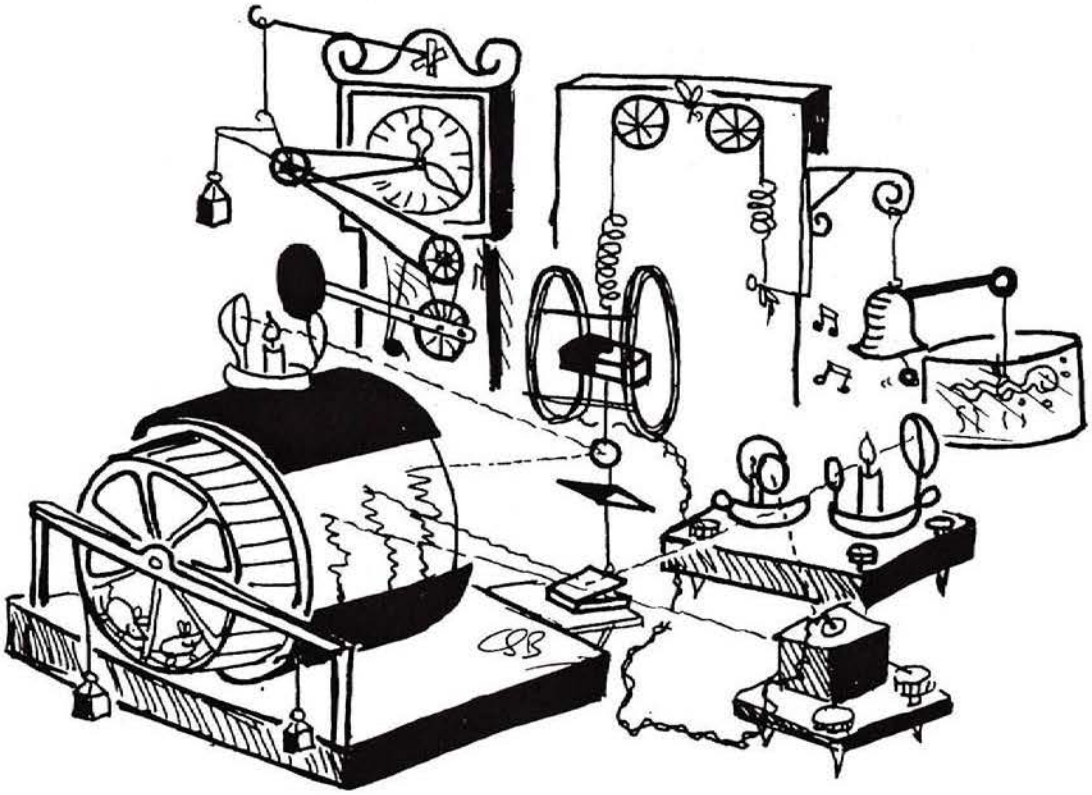
Peddie, N.W., International geomagnetic reference field: The third generation, J. Geomagn. Geoelectr., 34, 309-326, 1982.

Peddie, N.W., International geomagnetic reference field-its evolution and the difference in total field intensity between new and old models for 1965-1980, Geophysics, 48, 1691-1696, 1983.

Zmuda, A.J., The international geomagnetic reference field: Introduction, Bull. Int. Assoc. Geomagn. Aeron., 28, 148-152, 1971.

THE IGRF coefficients follow on pages 75 and 76

Shown below is an entirely unauthorized layout for the new magnetic observatory at Aberdeen University. [Contributed by CEB.]



			DGRF									IGRF	
	n	m	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1990 - 95
g	1	0	-30594	-30554	-30500	-30421	-30334	-30220	-30100	-29992	-29873	-29775	18.0
g	1	1	-2285	-2250	-2215	-2169	-2119	-2068	-2013	-1956	-1905	-1851	10.6
h	1	1	5810	5815	5820	5791	5776	5737	5675	5604	5500	5411	-16.1
g	2	0	-1244	-1341	-1440	-1555	-1662	-1781	-1902	-1997	-2072	-2136	-12.9
g	2	1	2990	2998	3003	3002	2997	3000	3010	3027	3044	3058	2.4
h	2	1	-1702	-1810	-1898	-1967	-2016	-2047	-2067	-2129	-2197	-2278	-15.8
g	2	2	1578	1576	1581	1590	1594	1611	1632	1663	1687	1693	0.0
h	2	2	477	381	291	206	114	25	-68	-200	-306	-380	-13.8
g	3	0	1282	1297	1302	1302	1297	1287	1276	1281	1296	1315	3.3
g	3	1	-1834	-1889	-1944	-1992	-2038	-2091	-2144	-2180	-2208	-2240	-6.7
h	3	1	-499	-476	-462	-414	-404	-366	-333	-336	-310	-287	4.4
g	3	2	1255	1274	1288	1289	1292	1278	1260	1251	1247	1246	0.1
h	3	2	186	206	216	224	240	251	262	271	284	293	1.6
g	3	3	913	896	882	878	856	838	830	833	829	807	-5.9
h	3	3	-11	-46	-83	-130	-165	-196	-223	-252	-297	-348	-10.6
g	4	0	944	954	958	957	957	952	946	938	936	939	0.5
g	4	1	776	792	796	800	804	800	791	782	780	782	0.6
h	4	1	144	136	133	135	148	167	191	212	232	248	2.6
g	4	2	544	528	510	504	479	461	438	398	361	324	-7.0
h	4	2	-276	-278	-274	-278	-269	-266	-265	-257	-249	-240	1.8
g	4	3	-421	-408	-397	-394	-390	-395	-405	-419	-424	-423	0.5
h	4	3	-55	-37	-23	3	13	26	39	53	69	87	3.1
g	4	4	304	303	290	269	252	234	216	199	170	142	-5.5
h	4	4	-178	-210	-230	-255	-269	-279	-288	-297	-297	-299	-1.4
g	5	0	-253	-240	-229	-222	-219	-216	-218	-218	-214	-211	0.6
g	5	1	346	349	360	362	358	359	356	357	355	353	-0.1
h	5	1	-12	3	15	16	19	26	31	46	47	47	-0.1
g	5	2	194	211	230	242	254	262	264	261	253	244	-1.6
h	5	2	95	103	110	125	128	139	148	150	150	153	0.5
g	5	3	-20	-20	-23	-26	-31	-42	-59	-74	-93	-111	-3.1
h	5	3	-67	-87	-98	-117	-126	-139	-152	-151	-154	-154	0.4
g	5	4	-142	-147	-152	-156	-157	-160	-159	-162	-164	-166	-0.1
h	5	4	-119	-122	-121	-114	-97	-91	-83	-78	-75	-69	1.7
g	5	5	-82	-76	-69	-63	-62	-56	-49	-48	-46	-37	2.3
h	5	5	82	80	78	81	81	83	88	92	95	98	0.4
g	6	0	59	54	47	46	45	43	45	48	53	61	1.3
g	6	1	57	57	57	58	61	64	66	66	65	64	-0.2
h	6	1	6	-1	-9	-10	-11	-12	-13	-15	-16	-16	0.2
g	6	2	6	4	3	1	8	15	28	42	51	60	1.8
h	6	2	100	99	96	99	100	100	99	93	88	83	-1.3
g	6	3	-246	-247	-247	-237	-228	-212	-198	-192	-185	-178	1.3
h	6	3	16	33	48	60	68	72	75	71	69	68	0.0
g	6	4	-25	-16	-8	-1	4	2	1	4	4	2	-0.2
h	6	4	-9	-12	-16	-20	-32	-37	-41	-43	-48	-52	-0.9
g	6	5	21	12	7	-2	1	3	6	14	16	17	0.1
h	6	5	-16	-12	-12	-11	-8	-6	-4	-2	-1	2	0.5
g	6	6	-104	-105	-107	-113	-111	-112	-111	-108	-102	-96	1.2
h	6	6	-39	-30	-24	-17	-7	1	11	17	21	27	1.2
g	7	0	70	65	65	67	75	72	71	72	74	77	0.6
g	7	1	-40	-55	-56	-56	-57	-57	-56	-59	-62	-64	-0.5
h	7	1	-45	-35	-50	-55	-61	-70	-77	-82	-83	-81	0.6
g	7	2	0	2	2	5	4	1	1	2	3	4	-0.3
h	7	2	-18	-17	-24	-28	-27	-27	-26	-27	-27	-27	0.2
g	7	3	0	1	10	15	13	14	16	21	24	28	0.6
h	7	3	2	0	-4	-6	-2	-4	-5	-5	-2	1	0.8

h	7	4	6	10	8	7	6	8	10	16	20	20	-0.5
g	7	5	-10	-7	-11	-7	-6	-2	0	1	4	6	0.2
h	7	5	28	36	28	23	26	23	22	18	17	16	-0.2
g	7	6	15	5	9	17	13	13	12	11	10	10	0.2
h	7	6	-17	-18	-20	-18	-23	-23	-23	-23	-23	-23	0.0
g	7	7	29	19	18	8	1	-2	-5	-2	0	0	0.3
h	7	7	-22	-16	-18	-17	-12	-11	-12	-10	-7	-5	0.0
g	8	0	13	22	11	15	13	14	14	18	21	22	0.2
g	8	1	7	15	9	6	5	6	6	6	6	5	-0.7
h	8	1	12	5	10	11	7	7	6	7	8	10	0.5
g	8	2	-8	-4	-6	-4	-4	-2	-1	0	0	-1	-0.2
h	8	2	-21	-22	-15	-14	-12	-15	-16	-18	-19	-20	-0.2
g	8	3	-5	-1	-14	-11	-14	-13	-12	-11	-11	-11	0.1
h	8	3	-12	0	5	7	9	6	4	4	5	7	0.3
g	8	4	9	11	6	2	0	-3	-8	-7	-9	-12	-1.1
h	8	4	-7	-21	-23	-18	-16	-17	-19	-22	-23	-22	0.3
g	8	5	7	15	10	10	8	5	4	4	4	4	0.0
h	8	5	2	-8	3	4	4	6	6	9	11	12	0.4
g	8	6	-10	-13	-7	-5	-1	0	0	3	4	4	-0.1
h	8	6	18	17	23	23	24	21	18	16	14	11	-0.5
g	8	7	7	5	6	10	11	11	10	6	4	3	-0.5
h	8	7	3	-4	-4	1	-3	-6	-10	-13	-15	-16	-0.3
g	8	8	2	-1	9	8	4	3	1	-1	-4	-6	-0.6
h	8	8	-11	-17	-13	-20	-17	-16	-17	-15	-11	-11	0.6
g	9	0	5	3	4	4	8	8	7	5	5	4	0.0
g	9	1	-21	-7	9	6	10	10	10	10	10	10	0.0
h	9	1	-27	-24	-11	-18	-22	-21	-21	-21	-21	-21	0.0
g	9	2	1	-1	-4	0	2	2	2	1	1	1	0.0
h	9	2	17	19	12	12	15	16	16	16	15	15	0.0
g	9	3	-11	-25	-5	-9	-13	-12	-12	-12	-12	-12	0.0
h	9	3	29	12	7	2	7	6	7	9	9	10	0.0
g	9	4	3	10	2	1	10	10	10	9	9	9	0.0
h	9	4	-9	2	6	0	-4	-4	-4	-5	-6	-6	0.0
g	9	5	16	5	4	4	-1	-1	-1	-3	-3	-4	0.0
h	9	5	4	2	-2	-3	-5	-5	-5	-6	-6	-6	0.0
g	9	6	-3	-5	1	-1	-1	0	-1	-1	-1	-1	0.0
h	9	6	9	8	10	9	10	10	10	9	9	9	0.0
g	9	7	-4	-2	2	-2	5	3	4	7	7	7	0.0
h	9	7	6	8	7	8	10	11	11	10	9	9	0.0
g	9	8	-3	3	2	3	1	1	1	2	1	2	0.0
h	9	8	1	-11	-6	0	-4	-2	-3	-6	-7	-7	0.0
g	9	9	-4	8	5	-1	-2	-1	-2	-5	-5	-6	0.0
h	9	9	8	-7	5	5	1	1	1	2	2	2	0.0
g	10	0	-3	-8	-3	1	-2	-3	-3	-4	-4	-4	0.0
g	10	1	11	4	-5	-3	-3	-3	-3	-4	-4	-4	0.0
h	10	1	5	13	-4	4	2	1	1	1	1	1	0.0
g	10	2	1	-1	-1	4	2	2	2	2	3	2	0.0
h	10	2	1	-2	0	1	1	1	1	0	0	0	0.0
g	10	3	2	13	2	0	-5	-5	-5	-5	-5	-5	0.0
h	10	3	-20	-10	-8	0	2	3	3	3	3	3	0.0
g	10	4	-5	-4	-3	-1	-2	-1	-2	-2	-2	-2	0.0
h	10	4	-1	2	-2	2	6	4	4	6	6	6	0.0
g	10	5	-1	4	7	4	4	6	5	5	5	4	0.0
h	10	5	-6	-3	-4	-5	-4	-4	-4	-4	-4	-4	0.0
g	10	6	8	12	4	6	4	4	4	3	3	3	0.0
h	10	6	6	6	1	1	0	0	-1	0	0	0	0.0
g	10	7	-1	3	-2	1	0	1	1	1	1	1	0.0
h	10	7	-4	-3	-3	-1	-2	-1	-1	-1	-1	-1	0.0
g	10	8	-3	2	6	-1	2	0	0	2	2	2	0.0
h	10	8	-2	6	7	6	3	3	3	4	4	4	0.0
g	10	9	5	10	-2	2	2	3	3	3	3	3	0.0
h	10	9	0	11	-1	0	0	1	1	0	0	0	0.0
g	10	10	-2	3	0	0	0	-1	-1	0	0	0	0.0

REPORT TO IAGA EXECUTIVE COMMITTE ON

INTERMAGNET

Under the INTERMAGNET (International Real Time Geomagnetic Observatory Network) program, observatories world-wide transmit geomagnetic data via geostationary satellites to downlink points throughout the world. The data consist of 1-minute values of all 3 components of the geomagnetic field with baselines, total field values from a proton magnetometer, and in some cases, activity indices computed on site. Data are sent to the downlink sites via satellite at 12-minute or 1-hour intervals. In a few cases, observatories send their data at one hour or three hour intervals via computer data link.

At the downlink sites, (called Geomagnetic Information Nodes or GIN's), geomagnetic data are available in near real time (12 minutes to 3 hours) to users via dedicated telephone or on-line computer links, or compact disc later. It is planned that the GIN's will exchange data daily by computer link. (This is necessary because an individual GIN cannot see all of the satellites.)

Presently there are 4 GIN's - Paris, France; Ottawa, Canada; Golden, Colorado; and Hartland, UK. Four satellites are being used - Meteosat (Europe), GMS (Japan), GOES-WEST (USA), and GOES-EAST (USA). These satellites cover most of the Earth from 70 N to 70 S latitude, except for a narow strip in the middle of the USSR.

There are now 2 French, 2 Finnish, 8 Canadian, 4 US, 1 South Korean, 1 Australian and 3 UK observatories transmitting data to INTERMAGNET GIN's. The US will place 8 more observatories, and the Canadians 4 more, on line during 1992. Japan plans to put 3 observatories on line and establish a GIN. By the end of 1992 we anticipate at least 50 observatories will be active in INTERMAGNET.

INTERMAGNET has received two ICSU grants totally $12,000 US. Of this, $5700 US has been used for travel to two INTERMAGNET meetings: Edinburgh, Scotland, May, 1990 and Sopron, Hungary, August, 1991.

Arthur W Green, Jr

For the Executive Council of INTERMAGNET:

Dr R L Coles (Canada)

Dr A W Green Jr (USA)

Prof J L Le Mouel (France)

Dr W F Stuart (UK)

The proton gyromagnetic ratio

Ole Rasmussen
Chairman, Working Group V-1
Division of Geophysics
Danish Meteorological Institute
100 Lyngbyvej
DK-2100 Copenhagen
DENMARK

At the IAGA Working Group V-1 meeting on August 19th, 1991, during the IUGG General Assembly it was decided that IAGA should no longer recommend the use of the special IAGA value for the proton gyromagnetic ratio, as stated in an IAGA resolution from the General Assembly at Helsinki in 1960.

In future, the value used should be the value recommended and published by the Committee on Data for Science and Technology [CODATA] of the International Council for Scientific Unions.

The most recent value for the proton gyromagnetic ratio γ_p' (uncorrected H_2O, spherical sample) recommended by CODATA (*) is:

$$\gamma_p' = 26751.5255(81)\ 10^4\ \mathrm{sec}^{-1}\ \mathrm{T}^{-1}$$

$$\gamma_p'/2\pi = 42.576375(13)\ \mathrm{MHz\,T}^{-1}$$

The relative uncertainty of these values is 0.30 ppm

The change will be effective from January 1st, 1992.

(*) E R Cohen and B N Taylor

The 1986 adjustment of the fundamental physical constants

CODATA Bulletin No.63, Pergamon Press (Elmsford New York) 1986.

The Programmatic Panels are

Panel 1.	Long-term measurements Chairman : M. Shea (USA)
Panel 2.	Common mechanism in the Sun-Earth system Chairman : S. Bowhill (USA)
Panel 3.	Experimental techniques Chairman : S. Kato (Japan)
Panel 4.	Simulation and modeling Co-Chairmen : H. Matsumoto (Japan) and S.T. Wu (USA)

The role of the Science Working Groups is to define the scientific objectives and the practical implementation of each project in a realistic way, taking into account the existence of national or international programs on the ground or in space. The role of the Programmatic Panels is to think of and to develop the necessary tools, experimental, theoretical or numerical, which are common to all projects, both for their implementation and for the interpretation of their results.

The Coordination Office, which is chaired by J.G. Roederer (USA), has been set up to make STEP known by International communities and to strengthen the relationship between SCOSTEP and each national STEP program. The STEP coordinator will serve as an ambassador for STEP, facilitating the worldwide promotion of the program, making it visible to the public, and promoting the active participation of scientists from developing countries in STEP projects through direct interaction and cooperation with scientists in the advanced countries.

One of the most important ground based activities in STEP is the development of the magnetometer and auroral observation chains in the regions where no previous facility has been set ; the regions at the equator and the region of north part of USSR are points where corresponding countries and the WG 2 members of the STEP steering committee have interest in. The International Equatorial Electrojet Year (IEEY) also involves development of temporary stations in equatorial regions. This program is discussed within WG 3.

The International Solar Terrestrial Program (ISTP) is based upon the launch in forthcoming years of many spacecraft by the USA, USSR, Europe and Japan. The coordination of ground-based activities related with these space missions is one important part of STEP.

The IAGA/IAMAP proposal of studying the Stratosphere-Troposphere Interaction with Biosphere (STIB) has been adopted by the IGBP Committee as a "Core Project". SCOSTEP has accepted to implement this program in close connection with the other activities of WG 4.

More information about STEP can be found in document entitled "Solar Terrestrial Energy Program : Initial Research Projects", published in March 1990 and available at the Geophysical Institute of University of Alaska.

WHAT IS NEW IN SCOSTEP?

Hiroshi Oya
Geophysical Institute
Tohoku University
Sendai 980
JAPAN

SCOSTEP had its quadrennial General Assembly in Den Haag, the Netherlands, in June, 1990. Besides of the scientific sessions which for most of them were organized in close cooperation with COSPAR, a lot of business sessions were held.

A new Bureau has been elected : B. Hultquist (Sweden), President ; S. Kato (Japan), Vice-President; C. Liu (USA), Secretary General ; A. Ebel (IAMAP), S. Gezedzielski (IUPAP), A. Mitra (URSI), H. Oya (IAGA), M. Rycroft (SCAR), O. Vaisberg (COSPAR), S. Wu (IAU).

Most of the business sessions were devoted to the organization of the Solar Terrestrial Energy Program (STEP) which started in January 1990 and which will last for six years. The STEP projects are aimed at yielding quantitative information on the variable components of the solar energy, such as solar flares and coronal mass ejection, solar wind shocks and their interaction with the magnetosphere, UV variable emissions and their effects on the thermosphere, proton events and their role in the physico-chemistry of the mesosphere and stratosphere, etc... STEP will therefore contribute to the studies on global change phenomena due to the variable components of the solar energy.

The STEP steering Committee consists of : G. Rostoker, Chairman, K. Cole, M. Geller, S. Kato, K. Labitzke, M. Machado, A. Nishida, H. Oya, D. Rees, P. Simon, D. Sentman, O. Vaisberg.

To make effective the implementation of STEP, six Science Working Groups, four Panels and one Coordination Office have been set up.

The Science Working Groups are

WG 1. The sun as a source of energy and disturbance
Co-Chairmen : M. Machado (Argentina) and P. Simon (Belgium);

WG 2. Energy and mass transfer through the interplanetary medium and the magnetosphere-ionosphere system
Co-chairmen : H. Oya (Japan) and O. Vaisberg (USSR) ;

WG 3. Ionosphere-Thermosphere coupling and response to energy and momentum inputs
Chairman : K. Cole (Australia)

WG 4. Middle atmosphere response to forcing from above and below
Chairman : M. Geller (USA)

WG 5. Solar variability effects in the human environment
Co-chairmen : K. Labitzke (Germany) and D. Sentman (USA)

WG 6. Informatics
Chairman : D. Rees (UK)

ACCORD

APEX coordinated with CORONAS Discovery

ACCORD is a proposed international project to combine within IAGA the satellite programmes APEX and CORONAS [Intercosmos Council of the Commonwealth of Independent States: SNG]. The satellite programmes will need world-wide support of magnetic, ionospheric, cosmic ray and solar observations.

The aim of project ACCORD is investigation of solar-terrestrial relations following a particular strategy:

1. The CORONAS satellite, together with ground observatories, monitors the Sun and the operating committee of the project determines priorities of experiments depending on whether the Sun is quiet or active.
2. When the Sun is declared to be active, APEX satellites map wave domains in near-Earth space [400km perigee to 3000km apogee] using passive probes and instruments.
3. When the Sun is declared to be quiet, the APEX satellites map the wave domains using modulated charged particle injections to model or simulate phenomena observed during the active Sun period.
4. Active plasma experiments could be proposed to initiate natural magnetosphere-ionosphere interaction processes by injection of strong ion and electron beams into the surrounding plasma.

Participation of scientists from the broad range of the IAGA community is encouraged and will be welcomed. The lifetime of the project is estimated to be four years [ie 1991-1994], covering the solar post-maximum period.

The Principal Investigator, to whom enquiries, proposals, and discussion should be directed is

Professor Victor N Oraevsky
IZMIRAN
Troitsk
Moscow region
142092 RUSSIA

IZMIRAN = Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation

APEX = Active Plasma Experiments satellites, scheduled for launch October 1991

CORONAS = Coordinated Orbital Observations of the Natural Active Sun satellite scheduled for launch September 1992

INTERNATIONAL SYMPOSIUM

ON GEOMAGNETISM

April 17-20 1990
Shanghai, CHINA

This symposium (organized by the Seismological Bureau of Shanghai, and co-sponsored by IAGA) was held in the Cypress Hotel in Shanghai, in conjunction with the 116th anniversary of ZO-SE (Sheshan) Magnetic Observatory, with 87 scientists from 5 countries and from Taiwan and Hongkong as well. The submitted 90 papers were classified into several subjects; the number of contributions from overseas and domestic scientists is shown below. The study of seismomagnetic effect is intensified in China in recent years.

1. Internal Magnetic Fields
   - 1.1 Electromagnetic induction: 5 papers (overseas 2, domestic 3)
   - 1.2 Main field and secular variations: 15 (9, 6)
   - 1.3 Magnetic anomalies: 3 (2, 1)
   - 1.4 Rock properties: 1 (0, 1)
2. Seismomagnetic Observations and Research: 26 (2, 24)
3. Geomagnetic Variations: 13 (8, 5)
4. Ground Magnetic Surveys: 4 (1, 3)
5. Observatories, Instruments, Surveys and Analysis
   - 5.1 Satellite observations: 4 (3, 1)
   - 5.2 Observatories, instruments and standards: 16 (4, 12)
6. Geomagnetic Indices: 2 (1, 1)
7. General Contribution to Geomagnetism: 1 (0, 1)

The morning of April 17 was for an opening ceremony followed by 2 commemorative talks for Zikawei/Lukiapang/Zo-Se(Sheshan) Observatory (speakers: Yan Da-hua and Chen Po-fang). In the sessions from the afternoon of April 17 to the morning of April 19 with different topics, the invited papers were presented by C. Sucksdorff, V.P. Golovkov, K.N. Abdullabekov, N. Fukushima, and V.N. Lugovenko; they were followed by contributed papers for the topics concerned. Because of shortage of time for oral presentation of all the contributed papers, some of them were shown by posters.

The afternoon of April 19 was used for a special session entitled "From Magnetogram to Space Current" to demonstrate the overhead current-arrows for some peculiar geomagnetic field variations observed in the Western Pacific region on the occasion of a severe magnetic storm of 20-21 October 1989 with an unusual low-latitude aurora in Hokkaido (the northern island of Japan). All the available magnetograms (those at Chinese magnetic observatories and those brought by the participants from U.S.S.R., Finland, Taiwan and Japan, and also those from WDC-C2 and India) were shown for mutual comparison in the conference room. Since it was practically impossible to demonstrate the world or regional current-systems during the allocated time, Fukushima proposed to prepare a summary report later for the conference participants.

A closing ceremony was held in the latter half of the afternoon session on April 19, and the participants agreed that the symposium was an excellent opportunity to promote future international collaborations in the study of geomagnetism. In the evening a banquet was held in Hongqiao Hotel.

In addition to the program and abstracts booklet for this symposium, an offset publication of 30 papers was later issued as the proceedings of this International Symposium on Geomagnetism.

WORKING Group I-2

A special report

S E Hjelt
Wien. Austria
17/8/91

The Working group I-2 on Electromagnetic Induction in the Earth held its 10th Workshop in Ensenada, Baja California, MEXICO from August 22 to 29, 1990. A brief report of this well-attended meeting [171 participants, 166 papers] has been published in the IUGG Chronicle No.204 [pages 59-63].
A tradition from the first Workshops was reactivated with two songs: one memorialised the happy feelings of the participants, the other was to honour three eminent induction scientists who had either just retired or were about to do so. It is believed that the following was sung by the composer, a certain B H Obbs:

South of the Workshop
(down Mexico way)

South of the Border, down Mexico way
The Ensenada Workshop invited all of us Gringos to play.
It's only one week here, and we'd sure like to stay -
South of the Border, down Mexico way.
Chorus: Aye aye aye aye - Aye aye aye aye

Rosemary Hutton's retirement is due
She's taken photographs of all of us since seventy two
So she needn't worry when her salary ends -
She'll send out some pictures to blackmail her friends
Aye aye aye aye, Oh Rosemary

Ian Gough's ready for his pension too
He's been IAGA Presidente so he knows just what to do
He'll come to the meetings and set up a stall
Selling Rosemary's pictures to hang on our wall
Aye aye aye aye, Oh Ian Gough

There's cuddly Dudley, he's been through this before
He lost his salary but started up a sporting store
He sold bows and arrows, but when the business went slow
He renamed them vectors, now he's making more dough
Aye aye aye aye, Oh Parkinson

South of the Border, they gathered this crowd
We know that Mario and his amigos has done us proud
We'd love to return here, it's so sunny and gay
South of the Border, down Mexico way
Aye aye aye aye, Oh Ci Cese

What follows are some of the verses sung by the world-famous vocal trio, the "Irrestible Irreversibles" (H Poll, with some help from A Duba and A Jones):

Rosemary Hutton was lamenting
O-oh dear, it's such a crime
That nobody is composing
So we offer her these rhymes

Took a bus to Ensenada
For IAGA one plus nine
Looking forward to a week there
Sure I'd have a real good time

Oh my darling, oh my darling
Oh my darling serpentine
Thou art lost, replaced by fluids
And the theory of graphine

Is it fluids, is it graphite
Is it some weird kind of brine?
And if Alan doesn't like it
Will we have to change our minds?

EMAP, Niblett, Bostick transforms -
It's so easy. it makes you pant.
But it wipes out any structure
And you're left without a grant

Oh my darling, oh my darling
What's that arrow with no sign?
Or should we call that thing a vector
Or perhaps a parkin' sign?

Good resistors, bad conductors
Are they red or are they blue?
If we don't get all these words straight
Pretty soon we'll all be through!

Oh my Brucey, oh my Hobbsey
Oh please would you be so kind
To explain all these semantics
So we can end this bloody rhyme?

Getting late on Friday morning
Static shifting in the room
Shifting stilled when down the aisle
Came the lovely Bahr & Groom

Oh he's got it, Booker's got it
Yes, he's got an isotropy
Alas for him it's only noise
As any fool can plainly see

[That's enough obscure references. "Parkin' sign", forsooth! **Editor**]

NOTICES

OF THE ASSOCIATION

National Awards to Distinguished IAGA scientists

It is always pleasant to learn of our colleagues' recognition by learned societies and the following have come to the Editor's notice:

S W H Cowley has been awarded the Chapman medal of the Royal Astronomical Society (London) for his significant contribution to theoretical and experimental studies in solar-terrestrial physics.

Kenneth M Creer has received the 1990 Fleming Medal of the American Geophysical Union for introducing the concept of representing palaeomagnetic data by plotting apparent polar wander curves and for his recent work on geomagnetic and palaeoclimatic applications fo geomagnetism.

Naoshi Fukushima has received the 1990 Waldo E Smith medal of the American Geophysical Union for his public service to international geophysics and, in particular, for his contributions to our Association of which (as we all recall with gratitude) he was Secretary-General from 1975 to 1983.

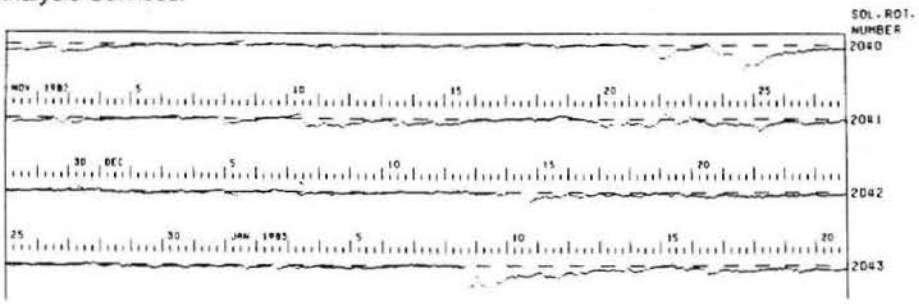
Noctilucent Clouds [NLCs]

An appeal for more observers of noctilucent clouds has been received. These clouds, best seen from latitudes of 56-57 degrees, seem to be moving (or have moved) the median latitude of their equatorward edge by several degrees towards lower latitudes. As a result, regions that have hitherto been regarded as unlikely observing areas have come within the "worth looking out for NLCs" category. The coordinator for the British Astronomical Association, who in fact receives and collates observations from both hemispheres and all longitudes, will welcome and encourage observations - particularly from Western Europe which is singularly ill-represented at present. Please contact:

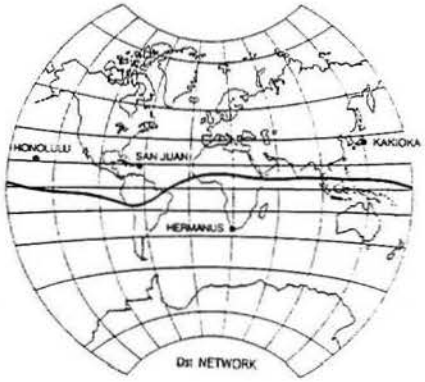
David Gavine
29 Coillesdene Crescent
Joppa
Edinburgh EH15 2JJ
Scotland (UK)
Telephone: 44 31 657 2338

JUST PUBLISHED : *IAGA BULLETIN N°40*

Equatorial Dst Indices for the 30 years 1957-1986 are now gathered in the ***IAGA Bulletin n°40***, which has just been published by the *International Service of Geomagnetic Indices* under the auspices of the *Federation of Astronomical and Geophysical Data Analysis Services.*



IAGA Bulletin n°40 contains :



1. The description of the derivation scheme used by M. Sugiura and T. Kamei for calculating this homogeneous series of Dst Indices, together with relevant references.

2. Hourly values of Dst, from 1957 to 1986 in the form of monthly tables and of graphs arranged following Bartels solar rotations.

3. Annual tables of daily, monthly and yearly mean values.

Price of one Bulletin : $20 *(plus postage expenses)*

Orders should be sent to :

Bureau des Publications SIIG - ISGI Publications Office
CRPE, 4 Avenue de Neptune - 94107 Saint-Maur-des-Fossés Cédex (France)
Téléphone : 33 (1) 45 11 42 40 - Télex : 264 498 - Télécopie : 33 (1) 48 89 44 33
E Mail : EARN::"ABERTHEL@FRCRPE51.BITNET" - SPAN : "CRPEIS::ABERTHELIER"

ALSO AVAILABLE AT ISGI PUBLICATIONS OFFICE :

IAGA Bulletin n°32 : *Yearly compilation of aa, Am, Km, Kp, AE, Dst indices and rapid magnetic variations; 1970 to 1985 :* ***Each issue*** ***$ 8***
Package of years 1970-1985 ***$ 80***
(plus postage expenses)

Other former IAGA Publications from our remaining stock will be sent FREE
(list on request - postage expenses are extra)

Optical Calibrations

H Lauche writes to say that after the Vienna workshop, Working Group II-C plans to implement a new small fluorescent lamp with white phosphor as a standard low brightness source. Eventually, there will be working drawings for distribution to scientists who are willing to copy the design. The aim is to achieve, at the next workshop, similar sources from many different parts of the world. The next calibration workshop is planned for the General Assembly in Boulder, August 1995, but there will probably be smaller meetings associated with the European Optical Meetings

---

IEEY Campaign Schedule

A timetable of the IEEY observations has been received from B R Arora, Indian national coordinator of the IEEY programme. Periods of intensive observations are scheduled for January 7-22, 1992; July 3-18, 1992; September 15-30, 1992; January 13-30, 1993; and March 20-April 7, 1993. Further details are obtainable from:

B R Arora
Indian Institute of Geomagnetism
Dr Nanabhai Moos Marg
Colaba, Bombay 400 005
INDIA

Compilation of Magnetic Data in the Arctic & North Atlantic Oceans

The November 1991 progress report (Ron Macnab, Jacob Verhoef, Shiri Srivastava and members of the Project Team) of this project is now published from the Atlantic Geoscience Centre, Dartmouth, Canada. The sixth semiannual report, it has a cover map illustrating the magnetic anomaly over the area, summary reports of the status of the data base, lists of laboratories and institutions contributing data, a bibliography and an invitation "We'd like to hear from you: if you need more information ... or want to discuss possibilities for participation, please contact":

Ron Macnab
Geological Survey of Canada
PO Box 1006
Dartmouth NS, Canada B2Y 4A2

National repeat station network descriptions

A scheme has been developed by IAGA Working Group V-4, Magnetic Surveys and Charts, to set standards for reporting and classifying magnetic repeat station data. This document [BMR Record 1991/72] lists the descriptions currently held by the Working Group. A description of the reporting scheme is included. For further information and perhaps copies of the report, contact:

C E Barton
Division of Geophysics
Bureau of Mineral Resources
GPO Box 378
Canberra ACT 2601, AUSTRALIA

Geomagnetic Sudden Storm Commencements 1868-1990

The US National Geophysical Data Center has published these data on IBM-compatible discette. The data include Mayaud's listing from IAGA Bulletin No.33 and data from IAGA Bulletin No.39, and the more-recent ISGI updates.

Type II solar radio bursts recorded at Weissenau 1966-1987

The centre has also published report no.UAG-98 which updates and modifies data published in the Weissenau Observatory Bulletin. Enquiries/orders to:

NOAA/NGDC
325 Broadway E/GC2
Boulder Co 80303
USA
Phone: 1 303 497-6346

Executive Committee[EC]

The next meeting of the Executive Committee is scheduled for 29 June -1 July, at Johns Hopkins University. If you wish there to be a particular item discussed at this meeting, by all means get in touch either with the Secretary-General or any other member of the EC and ask for it to be placed on the agenda. The agenda must be settled no later than one month before the meeting, and usually each member of the EC is provided with background documentation on each agenda item.

IAGA News No.31

The next issue of IAGA News will be sent to the printers in August or September of 1992 for distribution (if all goes well) at the end of September or sometime early in October. As always, the Editor [otherwise recognisable as your Secretary-General] is always happy to receive items for inclusion.

IAGA '93

7th SCIENTIFIC ASSEMBLY

Buenos Aires, ARGENTINA
8-20 August 1993

An important message from the Local Organizing Committee: "[We] wish to inform you that we have decided to change the city where the 7th Scientific Assembly will be held. The meeting will be held in Buenos Aires, at the San Martin Cultural Center. Logistic and organizing troubles were the main reasons for moving it."

To receive the First Circular, you should send your name and postal address to the Local Organizing Committee at the following address:

Asociación Argentina de Geofisicos y Geodestas
7th Scientific Assembly IAGA
CC 106 Suc 28
(1428) Buenos Aires
ARGENTINA
Phone: 54 1 781 1253
Fax: 54 1 791 2658
Telex: 18052/CICYT AR

The Executive Committee, in accord with its opposite number in the IAMAP, [see Minutes on page 42] has agreed to the 'middle atmosphere' element of the Division II programme to be held jointly with the Assembly in Yokohama [IAMAP/IAHS/IAGA Assembly; July 12 - 23, 1993]. Apart from this arrangement, a full programme of sessions is planned for the Buenos Aires Assembly and the current listing of topics is given below.

DIVISION I

INTERNAL MAGNETIC FIELDS

Models of the geodynamo and core-mantle coupling

Geomagnetic secular variation

Large-scale magnetic and electromagnetic anomalies in the continental lower crust

Electrojet studies

EM studies of modern and ancient subduction zones

Ocean bottom EM studies

Crustal conductivity studies with borehole control

Interpretation of conductivity models of the continental lower crust: fluids or carbon; can we tell the difference?

Andean and circumPacific palaeomagnetism and tectonics

[continued ->]

Gondwana palaeomagnetism

Palaeosecular variation - direction and intensity

Nature of geomagnetic reversals

Palaeomagnetism, rock magnetism and climatic change

Rock magnetic tests for reliability of palaeomagnetic data

Diagenetic processes and their importance in palaeomagnetism

Magnetic properties of deformed rocks

Phase changes and domain states in magnetic minerals

General Contributions to Division I

DIVISION II

AERONOMIC PHENOMENA

Sessions to be held in Buenos Aires:

Ionospheric electrodynamics and coupling to other atmospheric regions

Thermosphere-ionosphere structure and dynamics and coupling to other atmospheric regions

Equatorial ionosphere-thermosphere coupling and dynamics

Ionosphere irregularities and instabilities

Aeronomy of aurora and airglow emissions, and laboratory measurements

General Contributions to Division II

Magnetopause and boundary layers and their coupling to the ionosphere

Magnetotail processes and their ionospheric effects

Large-scale fields, flows and currents in the magnetosphere-ionosphere system: dependence on interplanetary and geomagnetic conditions

The solar wind, magnetosheath and ionosphere as sources of magnetospheric plasma, its transport and sinks

Magnetospheric models, their uses and quantitative tests

Correspondences and contrasts in geophysical phenomena in the southern and northern polar regions

Planetary atmospheres and magnetospheres

Developments in instrumentation for aeronomical research

Equatorial electrojet studies

Sessions to be held in Yokohama:

Atmospheric electricity

[continued ->

Current topics in the middle atmosphere

Middle atmosphere dynamics

Middle atmosphere chemistry and radiation

Solar-terrestrial processes in the middle atmosphere

Stratosphere-troposphere interactions with the biosphere and climate

Middle atmosphere aerosols and the Mt Pinatubo eruption

Workshop on intercomparison of 3-D models of the middle atmosphere

Workshop on middle atmospheric effects of extraordinary strong solar particle events of 1989-92

DIVISION III

MAGNETOSPHERIC PHENOMENA

Reporter reviews

Magnetopause and boundary layers and their coupling to the ionosphere

Magnetotail processes and their ionospheric effects

The inner magnetosphere: ring current, radiation belts and plasmasphere

Large-scale fields, flows and currents in the magnetosphere-ionosphere system: dependence on interplanetary and geomagnetic conditions

The solar wind, magnetosheath and ionosphere as sources of magnetospheric plasma, its transport and its sinks

Magnetospheric models, their uses and quantitative tests

ULF Waves: excitation, propagation and decay

Active experiments in space plasmas

Planetary atmosphere and magnetospheres

Plasma interactions of planetary satellites and tori

General Contributions from Division III

Correspondences and contrasts in geophysical phenomena in the southern and northern polar regions

Heliospheric and magnetospheric current sheet structures

Modelling for geomagnetic disturbance forecasts

New results on observations of rapid geomagnetic variations

DIVISION IV

SOLAR WIND AND INTERPLANETARY FIELD

General Contributions to Division IV

Reporter Reviews

Solar wind interaction with Venus and Mars

The 3-D heliosphere

Plasma interactions of planetary satellites and tori

Acceleration of mass-loading particles in the solar system

Long-term variations in the solar wind

Coronal heating and solar wind acceleration; coronal diagnostics

Shock and foreshock processes

Weak and strong comets in the solar wind

The solar wind, magnetosheath and ionosphere as sources of magnetospheric plasma, its transport and its sinks

Heliospheric and magnetospheric current sheet structures

DIVISION V

OBSERVATORIES, INSTRUMENTS, SURVEYS AND ANALYSES

Modern geomagnetic observatory instruments and practice

Data acquisition and handling for geomagnetic observatories

External/internal relations and spatial variations of geomagnetic disturbances at the surface of the Earth

Effects of geomagnetic disturbances on technological systems

Modelling for geomagnetic disturbance forecasting

New results from observations of rapid geomagnetic variations

External/internal relations for continental and planetary-scale investigations

Studies of quiet-day field variations as applied to main field analysis, crustal magnetics, storm analysis and satellite surveys

The quality of magnetic observatory and survey data required to meet user demands

Uses of geomagnetic indices in characterising the magnetospheric state

New geomagnetic indices from digital data

Solar-terrestrial information systems and quality control

[continued ->

Magnetic results using data from POGS and other satellites

Development and use of models of the internal and external geomagnetic field

Geomagnetic secular variation: analysis, interpretation and origin

Magnetic anomaly signatures of rifts and continent-ocean boundaries, including their role in elucidating Gondwana disruption

Quantitative analysis of magnetic anomalies; robustness in inversion

Interpretational synergy between magnetic anomaly and other geodata: presentation using GIS and qualitative interpretation maps

The role of reference field models in the compilation and interpretation of magnetic anomaly maps

Magnetic anomaly maps of the polar regions

Intermediate magnetic anomalies of the lithosphere

HISTORY COMMISSION

History of geomagnetism and aeronomy

DEVELOPING COUNTRIES COMMISSION

Reports on IEEY activities and preliminary results on the equatorial electrojet

Priorities in geomagnetism and aeronomy in developing countries

---

Full details of sessions, convenors, registration, travel etc. will be given in the next issue of IAGA News. Intending participants should make early enquiry of their local travel agents for financially advantageous deals on air line fares.

Advance notice for applying for travel support from IAGA funds: As is the usual practice, the Executive Committee (scheduled to meet this year 29 June through 1 July) will determine the overall sum that is to be allocated from IAGA funds. This will be shared out among the Divisions and Commissions and the responsibility for subdividng within each "Body" of IAGA is that of the Division or Commission Leader [whose name and address can be found under "IAGA Structure" on pages 50-62 of this IAGA News].

Middle Atmosphere Science

Kyoto, JAPAN

23-27 March 1992

Discussion of recent progress and future perspectives on a wide range of issues concerning the middle atmosphere - dynamics and chemistry, transport, environmental systems, coupling between hemispheres and with the upper and lower atmosphere, etc

Contact:

S Fukao
Radio Atmospheric Science Center
Kyoto University
Uji, Kyoto 611
JAPAN
Phone: 81 774 33 5343
Fax: 81 774 31 8463
Telex: 5453665/RASCKU J
email: fukao%kurasc.kyoto-u.ac.jp@cunyvm.cuny.edu

Substorms

Kiruna, SWEDEN

23-27 March 1992

The first in a planned biennial series of international conferences on magnetospheric substorms will include topics:

- Timing of substorm phases
- The ground state of the magnetosphere
- Loading phase and relation of dayside activity to substorms
- Substorm expansion phase
- Substorm recovery phase
- Substorm-related phenomena at other bodies in the Solar system
- New methods (simulation and chaos)
- Synthesis: substorm models

Please contact:

ICS-1
Swedish Institute of Space Physics
Box 812
S-981 28 Kiruna
SWEDEN
Phone: 46 980 790 00
Fax: 46 980 790 50
Telex: 8754/IRF S

New Trends in Geomagnetism

IIIrd Biennial Meeting

Castle of Smolenice, West Slovakia

CZECHOSLOVAKIA

22-28 June 1992

This is in the successful series of meetings (Liblice, 1988; Bechnye, 1990) promoting the exchange of information on fresh results in palaeomagnetism and the physical principles of rock magnetism. Contributions on the following topics are welcome:

- Palaeomagnetism along the Europrobe profile
- Quality of palaeomagnetic and rock-magnetic data
- Palaeomagnetic and rock-magnetic data bases
- Palaeomagnetism and global changes
- General rock-magnetism and magnetostratigraphy

Contacts:

Igor Tunyi
Institute of Geophysics
Dúbravská cesta
842 28 Bratislava
CZECHOSLOVAKIA
Phone: 42 7 378 2552

Eduard Petrovsky
Institute of Geophysics CAV
Bocni II
141 31 Praha 4
CZECHOSLOVAKIA
Phone: 42 2 767 104
Fax: 42 2 761 549

11th Workshop on Electromagnetic Induction

Victoria University

Wellington, NEW ZEALAND

26 August - 2 September 1992

This is the 11th in the successful series arranged by Working Group I-2 [see pages 83 and 84]. Papers will be accepted on all aspects of EM induction in the Earth; during the weekend of 29/30 August, there will be an excursion to the central volcanic region of the North Island to visit volcanic and geothermal features in the region. (Accommodation will be in Taupo.) More detail, call for papers, registration, etc from

A G Jones
Geological Survey of Canada
1 Observatory Crescent
Ottawa Ontario
CANADA K1A 0Y3
Tel: 1 613 992 4968
Fax: 1 613 992 8836
e-mail: jones@cg.emr.ca

29th COSPAR Meeting
and associated activities

Washington DC

USA

28 August - 5 September 1992

IAGA cosponsors many of the sessions of COSPAR [see pages 42 and 43] and information about the COSPAR meeting can be had from:

Z Niemirowicz
COSPAR Secretariat
51 Boulevard de Montmorency
75016 Paris
FRANCE

Associated with the principal COSPAR meeting, there are a number of "associated activities" and some of those, perhaps of special interest to IAGA scientists, are given below:

Critical Problems in the Plasma Environments of Comets and Other Non-Magnetized and Weakly Magnetized Bodies

Ann Arbor, Michigan: 24-27 August

Contact: T I Gombosi
Space Physics Research Laboratory
University of Michigan
Ann Arbor MI 48109-2143
Phone: 1 313 764 7222
Fax: 1 313 747 3083
Telex: 9102407554/ ??? ??
Internet: gombosi@um.cc.umich.edu

Initial Results from STEP facilities and Theory Campaigns

Laurel, Maryland: 24-28 August

Contact: Michael Teague
US STEP Coordination Office
USRA Code 610.3
NASA Goddard Space Flight Center
Greenbelt MD 20771
Phone: 1 301 286 4232
Fax: 1 301 286 9803
e-mail NSI(DECnet): NSSDCSA::TEAGUE

International Workshop on Data Organization and Analyses for the IEEY

Sao Paulo

BRAZIL

2-6 November 1992

The workshop is to evaluate the status of the IEEY observations and data collection, defining aspects of data analysis to focus on studies needed for achievement of the IEEY objectives. Please contact:

M A Abdu or N B Trivedi
INPE, CP 515
12201 São José dos Campos
SP BRAZIL
Fax: 55 123 218 743
Telex: 1233530/INPE BR
Bitnet: INPEDGE@BRFAPESP.BITNET

The footnote, below, refers to the **International Geophysical Calendar**, shown overleaf [page 98].

NOTES on other dates and programs of interest:

1. Days with unusual meteor shower activity are: Northern Hemisphere Jan 3-4; Apr 21-23; May 3-6; Jun 5-11; Jul 27-29; Aug 10-14; Oct 21-22; Nov 17-18; Dec 12-14, 22-23, 1992; Jan 3-4, 1993. Southern Hemisphere Apr 23; May 3-6; Jun 5-11; Jul 27-29; Oct 21-22; Nov 17-18; Dec 12-14, 1992.

2. SOLTIP (Solar connection with Transient Interplanetary Processes). Observing Program 1990-1995: solar-generated phenomena and their propagation throughout the heliosphere. (See Explanations.)

3. FLARES22 (FLAre RESearch at solar cycle 22 max). Observing Program 1990-1995: basic physical processes of transient solar activity and its coupling with solar-terrestrial environment. (See Explanations.)

4. Day intervals that IMP 8 satellite is in the solar wind (begin and end days are generally partial days): 29 Dec 1991-6 Jan 1992; 10-19 Jan; 23-31 Jan; 4-12 Feb; 16-25 Feb; 29 Feb-8 Mar; 13-21 Mar; 26 Mar-3 Apr; 7-15 Apr; 20-28 Apr; 3-10 May; 15-22 May; 28 May-3 Jun; 9-16 Jun; 22-29 Jun; 5-12 Jul; 17-24 Jul; 30 Jul-6 Aug; 12-19 Aug; 25-31 Aug; 7-12 Sep; 19-25 Sep; 1-8 Oct; 14-21 Oct; 26 Oct-2 Nov; 8-15 Nov; 21-28 Nov; 3-11 Dec; 16-24 Dec; 28 Dec 1992-5 Jan 1993. Note that there will not necessarily be total IMP 8 data monitoring coverage during these intervals. (Information kindly provided by the WDC-A for Rockets and Satellites, NASA GSFC, Greenbelt, MD 20771 U.S.A.).

5. + Incoherent Scatter Coordinated Observations Days (see Explanations) starting at 1600 UT on the first day of the intervals indicated, and ending at 1600 UT on the last day of the intervals: 27-29 Jan 1992; 30 Mar-3 Apr CADITS/MLTCS; 5-6 May; 23-24 Jun; 30 Jul-5 Aug CADITS/MLTCS; 22-23 Sep SUNDIAL; 27-28 Oct; 23-26 Nov GISMOS; 26-27 Jan 1993.

where CADITS= Coupling and Dynamics of the Ionosphere-Thermosphere System;
GISMOS= Global Ionospheric Simultaneous Measurements of Substorms;
MLTCS= Mesosphere, Lower-Thermosphere Coupling Study;
SUNDIAL= Coordinated study of the ionosphere/magnetosphere;

OPERATIONAL EDITION, September 1991

International Geophysical Calendar 1992

(See other side for information on use of this Calendar)

	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7•	8•	9	10	11
JANUARY	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27+	28+	29+	30	31	1
	2	3	4•	5•	6	7	8
FEBRUARY	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	1	2	3	4•	5•	6	7
MARCH	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30 +	31 +	1• +	2• +	3 +	4
	5	6	7	8	9	10	11
APRIL	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29•	30•	1	2
	3	4	5 +	6 +	7	8	9
MAY	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27•	28•	29	30
	31	1	2	3	4	5	6
JUNE	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23 +	24• +	25•	26	27
	28	29	30				
	S	M	T	W	T	F	S

	S	M	T	W	T	F	S
				1	2	3	4
JULY	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22•	23•	24	25
	26	27	28	29	30 +	31 +	1 +
AUGUST	2 +	3 +	4 +	5 +	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26•	27•	28	29
	30	31	1	2	3	4	5
SEPTEMBER	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22 +	23 +	24•	25	26
	27	28	29	30	1	2	3
OCTOBER	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21•	22•	23	24
	25	26	27 +	28 +	29	30	31
NOVEMBER	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18•	19•	20	21
	22	23 +	24 +	25 +	26 +	27	28
	29	30	1	2	3	4	5
DECEMBER	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24•	25	26
	27	28	29	30	31	1	2
1993							
JANUARY	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20•	21•	22	23
	24	25	26 +	27 +	28	29	30
	31						
	S	M	T	W	T	F	S

14 Regular World Day (RWD)

15 Priority Regular World Day (PRWD)

18 Quarterly World Day (QWD) also a PRWD and RWD

1 Regular Geophysical Day (RGD)

9 10 World Geophysical Interval (WGI)

27+ Incoherent Scatter Coordinated Observation Day

4 Day of Solar Eclipse

1 2 Airglow and Aurora Period

7 • Dark Moon Geophysical Day (DMGD)

See the foot of the preceeding page [97] for the "NOTES on other dates and programs of interest"

OLEV AVASTE

(1933-1991)

The news that Olev Avaste had succumbed to cancer came with shocking suddenness to his many friends and colleagues who had gone to the Assembly in Vienna expecting to hear him give a paper on noctilucent clouds. Earlier in the year, he had spent six weeks at Aberdeen, working up the new "Observers' Manual" for NLCs and had returned early in March to classroom teaching at Tartu University in Estonia.

Born in Tallinn, he graduated from Tartu in 1956 and was successively a postgraduate student, a research associate, and scientific secretary, at the Institute of Physics and Astronomy. He received a Doctorate of Science in 1975 and in 1982 took the initiative in reopening the famous department of geophysics at Tartu University. In the early stages, Avaste taught most of the courses himself - atmospheric and marine optics, climatology, and random functions. He was planning to introduce two more courses (geophysics; contemporary problems in geophysics) in the autumn of 1991.

Author or coauthor of well over a hundred papers, his range of interests was broad: atmospheric radiation and radiation transfer, cloudiness, remote sensing of aerosols (especially from orbiting platforms), radiance of the sea surface, and (his longlasting love) noctilucent clouds. Active in arranging the international Tallinn workshops on noctilucent cloud studies, member of the IAMAP Executive Committee, vigorous member of the NLC panel of ICMUA, he twice (1977 and 1985) received the state prize of the Estonian SSR.

Head of the board of the Tartu Yachting Union, referee at many regattas (including the water olympics at Tallinn in 1980), he headed his local gardening cooperative, published frequently in the local newspaper, and appeared on television.

He is survived by his wife, children and grandchildren; his work remains in the scientific literature as a fitting memorial to an exceedingly fine scientist, a charming and affable companion, a respected figure in the life of his country. The geophysical community is a duller place with his passing.

HO & MG

LYDIA NICKOLAEVNA IVANOVA

(1937-1990)

Lydia Ivanova was born in 1937 in a small settlement in the Urals. In 1961, she graduated from the Sverdlovsk State Pedagogical Institute where she studied physics. After that, she worked as a physics teacher at a secondary school. In 1967, she began her work at the Institute of Geophysics, Urals Department of the USSR Academy of Sciences. Her arrival corresponded in time with the creation of the experimental geophysical laboratory in Arti - a small town 150 km WSW from Sverdlovsk. With a group of colleagues from the geomagnetic laboratory, she participated in constructing and equipping the new magnetic observatory. She was then head of it for nearly 20 years.

The formation and modernization of the observatory, its standard and nonstandard equipment, its introduction into the world magnetic observatory network, and its role in numerous international experiments on magnetospheric research, in a word, everything that happened in the observatory was Lydia's job, and she performed it excellently.

The observatory staff has done everything possible so that the unique geomagnetic data obtained since 1836 would be continued without breaks or distortion. The two Urals observatories (Vysokaya Dubrava and Arti) were operated simultaneously until the older one (V. Dubrava) ended its observations due to the high level of industrial interference, the result principally of electrification of a nearby railway.

Scientists of different countries can make use of the valuable uninterrupted measurements from Ekaterinburg/Vysokaya Dubrava/Arti magnetic observatory within the 154-year period. Thanks to Lydia Ivanova's leadership, the observatory team has continued the traditions of the Ural magnetologists started by the famous geophysicists Herman and Robert Abelses, Timofey Panov, Alexander Rytsk, and others.

Lydia Ivanova died on Ocytober 6, 1990. We will all remember her as an outstanding and agreeable colleague and best friend who combined being a talented scientist with an amiable personality. She is survived by two children, Zina and Kolya.

VS

BERNT NEEB MAEHLUM

1929 - 1991

On 5 August 1991, Bernt Maehlum passed away. His untimely death came as a great shock to his friends and colleagues. We have lost one of the pioneers and a most active scientist of modern Norwegian space physics.

Bernt Maehlum was born in Oslo and in 1955 took his master's degree in meteorology at the University of Oslo. After a year, he left the field of meteorology, joining in 1956 the research staff of the Norwegian Defence Research Establishment [NRDE]. Here he studied auroral and ionospheric physics, taking his doctorate in this at the University of Oslo in 1961. Soon after, he spent some time with James van Allen at the University of Iowa and took part in the new and exciting satellite work of this group. In 1966, he again left NRDE to spend two years at Rice University (USA).

From 1968, Maehlum concentrated his efforts on building up a group in auroral and plasma physics at NRDE and he designed a number of pioneering sounding rocket experiments. In collaboration with Norwegian, American and British colleagues, he directed the construction of complex rocket payloads which were successfully flown from Andoya. Of particular interest and importance were the mother-daughter experiments in which Maehlum used electron accelerators to produce a controlled source of excitation of the plasma in the auroral ionosphere. As a natural follow-up of this, he turned his interest to problems associated with the charging of space vehicles moving through the ionosphere. Maehlum had experiments placed on board Spacelab 1 and at the time of his death was busy planning an experimental package, COPEM, for a space shuttle precursor flight for the Columbus space station. His group was concurrently preparing instruments for the CLUSTER and CASSINI missions.

Maehlum played an important role in the planning and implementation of the Norwegian space programme, before and after Norway had joined the European Space Agency. With his professional skills, his personal force, and his integrity, he was much in demand as a scientist and as a project manager in Norway and abroad. A very fruitful and active career has come to a sudden end, much too early. Those who knew him will miss his personal qualities and his warm friendship. He is survived by his wife, Ellen, and their daughter Guri, and two grandchildren. The sympathy of the geophysical community goes out them in their untimely loss.

EVT

TAKESI NAGATA

1913 - 1991

On June 3, 1991, Professor Takesi Nagata passed away in Tokyo at the age of 77. He was Professor Emeritus of the University of Tokyo (from 1974) and of the National Institute of Polar Research (from 1985). In 1983, he was elected a member of the Japan Academy, from which he had received in 1951 the Academy Prize for his studies of the magnetic properties of rocks. He received in 1974 the Order of Culture, the highest honour for cultural or scientific achievement in Japan.

Nagata was born in Okazaki City in the Aichi Prefecture. After graduating in 1936 from the Imperial University of Tokyo, he joined the Earthquake Research Institute in Tokyo to begin his experimental studies of rock magnetism. In 1941, he was appointed to the newly-formed Geophysical Institute of the University of Tokyo as associate professor to teach terrestrial magnetism and electricity. He obtained his DSc in July 1944 with pioneering work on the acquisition mechanism of thermo-remanent magnetization of volcanic rocks. He widened his research interests at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington (US) where he spent a few months in 1951-1952. Upon his return to Japan, he was promoted to full professorship at Tokyo University.

In June 1952, he was appointed Secretary of the newly-formed IGY National Committee for Japan. At that time, he was writing his textbook "Rock Magnetism" which was published in 1953. For the IGY, he strove to promote rocket launching from Japan and an expedition to the Antarctic. He was asked to assume the leadership of the first three Japanese Antarctic expeditions which established Syowa station. After the IGY, he became a member of the Comité International de Géophysique, which succeeded the CSAGI in 1959, on which he represented the field of palaeo-geophysics.

His contributions to IAGA were many and of the utmost importance. From 1954 to 1963, he was chairman of the Committee on Secular Variation and Palaeomagnetism. From 1963 to 1967, he was chairman of the Commission on the Magnetism of the Earth's Interior. He was a member of the Executive Committee, 1957 to 1960, Vice President, 1963 to 1967, and President, 1967 to 1971. His Presidential Addresses reflected the scope of his wide scientific interests; the titles of his talks were "Tectonomagnetism" for the joint IAGA-IASPEI Assembly in Madrid in 1969, and "Austral Substorms" for the General Assembly in Moscow in 1971. From 1971 to 1979, he was Chairman of the InterDivisional Commission on Antarctic Research, and he was elected to Honorary Membership of IAGA in 1981.

On the wider platform of the IUGG, he served as a member of the Bureau from 1960 to 1963 and was on the Union Executive Committee (ex officio) from 1967 to 1971. He was the Union

representative to SCAR until 1987, having been a member of SCAR since it was established in 1957; he was chairman of the SCAR Working Group on Upper Atmosphere Physics until 1986. He was Vice President of SCAR from 1972 to 1976 and became an Honorary Member of SCAR.

His research into rock magnetism was carried out in both Tokyo and Pittsburgh (USA). He contributed to studies of the magnetic properties of rock samples from the lunar surface. He remarked that "it was enjoyable pleasure to deal with the various kinds of remanent magnetizations in earth and moon rocks with acronymic names TRM, BRM, CRM, DRM, ITRM, PRM, SRM, and VRM !" [see footnote]

In 1973, just six months before Nagata was to retire, the National Institute of Polar Research was established in Tokyo and he was appointed its first Director. By then, Syowa Station had been greatly expanded from the original IGY base and was equipped with modern facilities, which included a rocket launcher and satellite telemetry receivers. This realized Nagata's early dreams of studying the upper atmosphere over the Antarctic using space technology, including rocket probes launched from the continent. He, and his co-workers at the Institute, were also to make studies of the magnetic properties of the large numbers of meteorites discovered and collected by the Japanese Traverse Team on the Yamato snow field in Antarctica.

Nagata's publications include more than 400 papers in solid Earth science (principally in rock magnetism and the secular variation of the geomagnetic field), outer atmosphere studies, solar-terrestrial relations, lunar rocks, and meteorites. He was single or first author on more than 80 percent of these papers.

In addition to high recognition and honours from Japan, Nagata received awards from the international community. And there are two mountains named Nagata: one on Antactica [71 21'S, 162 47'E] and one under the Pacific Ocean [12 34'N, 167 01'W].

NF

[Thermo-remanent magnetism, biological remanent magnetism, chemical remanent magnetism, depositional remanent magnetism, inverse thermo-remanent magnetism, piezo-remanent magnetism, shock remanent magnetism, and viscous remanent magnetism]

A photograph of Nagata, wearing the insignia of the Order of Culture, is given inside the rear cover of this issue of IAGA News.

PAMELA ROTHWELL

(1926-1991)

Born in southeast England, Rothwell went to Malvern Girl's College and gained an open scholarship to go up to Oxford University. After graduating from St Hugh's College in 1947, she went with a year's Sir John Dill fellowship from the English-Speaking Union to Smith College in Massachusetts where she gained an MS degree for work on the absorption of cosmic ray mesons. Her first publication in 1950 describes the work on proportional counters in a magnetic field carried out at the Atomic Energy Research Establishment in Harwell (UK). A British Council fellowship at Pisa returned her to an academic career and in 1953 she went to Imperial College, London, as a member of Patrick Blackett's cosmic ray group. Her first individual research took her (and a neutron monitor) on the RMS Roxburgh Castle to Mombasa via the Cape of Good Hope and back again, an experiment arranged through the goodwill of the Union Castle shipping line. It was a simple and direct experiment carried out with the minimum of fuss and this was to be the characteristic of Rothwell's research in the years that follow.

In her subsequent career, during which she spent twenty years at Southampton University, she developed the use of very sensitive television cameras for observing airglow and aurora with an ever-improving range of instrumentation, from gigantic image-orthicon systems ("acquired" from obsolete naval surveillance installations at the Straits of Gibraltar) to the latest in computer-interfaced solid state cameras with Peltier cooling.

In 1990, shortly before being abruptly struck down by what was to prove a fatal disease, Rothwell was planning new observations of the twilight sky and the night sky to push forward her studies of waves in the high atmosphere and the accumulation of dust and aerosols at heights of 60-90 kilometres in the atmosphere. For this, instruments were to be placed across the world, in northern Norway, in her loved Italian countryside, on Ascension Island, and in New Zealand.

Her service to the interests of geophysical research is shown by her wide membership of professional boards and committees, including the Council (and Vice Presidency) of the Royal Astronomical Society.

Rothwell was a frequent participant at IAGA Assemblies, always providing a sharp cutting edge for fanciful theorizing, always able to bring a speaker back to basics with a question which, politely put, had significance which was ignored at one's peril. She is survived by her husband, Giuseppe Martelli, and her daughter Susanna, to whom the sympathy of the IAGA community must surely be extended in their, and our, loss.

MG

Two late items of news about meetings:

XXIV General Assembly

of the International Union of Radio Science [URSI]

Kyoto, JAPAN

25 August - 2 September 1993

Areas covered by the programme include fields and waves, electromagnetic noise and interference, wave propagation and remote sensing, ionospheric radio and propagation, waves in plasmas, radio astronomy, electromagnetics in biology and medicine. Contact address:

I Kimura
c/o Osaka Office, Business Center for Academic Societies Jpana
10th Tabuchi Bldg
6-3 Matsugae-cho, Kita-ku
Osaka 530
JAPAN

SCOSTEP

8th Quadrennial Symposium of Solar-Terrestrial Physics

Sendai, JAPAN

6-10 June 1994

Cosponsored by IAGA, the organizer is

Hiroshi Oya
Geophysical Institute
Tohoku University
Sendai 980
JAPAN

In Memoriam

Takesi Nagata
(1913 - 1991)

President of IAGA 1967-1971

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (IAGA)

IAGA is one of the seven Associations in the International Union of Geodesy and Geophysics (IUGG). The objectives of IAGA are:

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

IAGA holds an Ordinary General Assembly every four years in conjunction with each Ordinary General Assembly of IUGG. Between the Ordinary General Assemblies, IAGA holds a Scientific General Assembly, often meeting with one of the other Associations of IUGG. IAGA therefore meets every other year. The next Assembly is the 7th Scientific Assembly, scheduled for Buenos Aires (Argentina) in August 1993.

IAGA has two types of publications:

(i) **IAGA Bulletins**, which include the Programme and Abstracts and the Transactions of the Assemblies; Geomagnetic Data and Indices, published annually; and special Data Summaries or Information Booklets, published occasionally.
(ii) **IAGA News**, which contains items and announcements of general interest to the IAGA community and which is published annually.

The IAGA Bulletins are available at low cost from the Secretary-General of IAGA. The IAGA News is sent free of charge to all addresses on the IAGA Mailing List (which at present contains nearly 2500 addresses of individual scientists in some 72 countries) and is available on request from the Secretary-General.

IAGA welcomes all scientists throughout the world to join in research in "Geomagnetism and Aeronomy". IAGA is subdivided into a number of Divisions and Commissions, many of which have working groups for the study of particular subjects in their general areas of interest. On occasion, these internal IAGA groups issue their own newsletters or circulars. At the IAGA Assemblies, the groups organize specialist symposia, invite scholarly reviews and receive contributed papers which present up-to-the-minute results of currrent research.

Published by the Secretary General of IAGA, Fraser Noble Building, Aberdeen University, Aberdeen AB9 2UE, Scotland (UK). Printed by the Langstane Press, Aberdeen.