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INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

ASSOCIATION OF GEOMAGNETISM AND AERONOMY

CONTENTS

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Secretary General, IAGA

LIST OF ACRONYMS

APP	Atmospheric Physics Program
ASHAY	Antarctic and Southern Hemisphere Aeronomy Year
CCOG	Committee for Coordination of Observations Associated with GEOS
CODATA	Committee on Data for Science and Technology
COSPAR	Committee on Space Research
COSTED	Committee on Science and Technology in Developing Countries
ELAS	Electrical Conductivity of the Asthenosphere
FAGS	Federation of Astronomical and Geophysical Services
FBS	Flare Build-up Study
GARP	Global Atmospheric Research Program
GDP	Geodynamics Project
GMP	Geomagnetic Meridian Project
IAG	International Association of Geodesy
IAGA	International Association of Geomagnetism and Aeronomy
IAGC	International Association of Geochemistry and Cosmochemistry
IAHS	International Association of Hydrological Sciences
IAMAP	International Association of Meteorology and Atmospheric Physics
IAPSO	International Association for the Physical Sciences of the Ocean
IASPEI	International Association of Seismology and Physics of the Earth's Interior
IASY	International Years of Active Sun
IAU	International Astronomical Union
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
ICG	Inter-Union Commission on Geodynamics
ICL	Inter-Union Commission on the Lithosphere
ICSU	International Council of Scientific Unions
IGC	International Geological Congress
IGCP	International Geological Correlation Programme
IGRF	International Geomagnetic Reference Field
IGY	International Geophysical Year
IMS	International Magnetospheric Study
IMSCIEO	IMS Information Exchange Office
INAG	Ionospheric Network Advisory Group
IQSY	International Years of the Quiet Sun
IRI	International Reference Ionosphere
ISEA	International Symposium on Equatorial Aeronomy
ISGI	International Service of Geomagnetic Indices
ISSP	International Solar System Programme
ITU	International Telecommunication Union
IUCRM	Inter-Union Commission on Radio Meteorology
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUPAP	International Union of Pure and Applied Physics
IUWDS	International URSIGRAM and World Days Service
MAP	Middle Atmosphere Programme
MONSEE	Monitoring or the Sun-Earth Environment
PEDAS	Potentially Environmentally Detrimental Activities in Space
SBARMO	Scientific Ballooning and Radiations Monitoring Organization
SCAR	Scientific Committee on Antarctic Research
SCOPE	Scientific Committee on Problems of the Environment
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SERF	Study of Energy Release in Flares
SESAME	Structure and Energetics of the Stratosphere and Mesosphere
SHISG	Southern Hemisphere Ionospheric Studies Group
SIP	Study of Interplanetary Phenomena
SMY	Solar Maximum Year
SSC	Satellite Situation Center
STIP	Study of Travelling Interplanetary Phenomena
STP	Solar-Terrestrial Physics
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISIST	ICSU-UNESCO Joint Project to Study the Feasibility of a World Information System
UNO	United Nations Organization
URSI	Union Radio Scientifique Internationale (International Union of Radio Science)
WDC	World Data Centre
WDDC	World Digital Data Centre
WMO	World Meteorological Organization
WMS	World Magnetic Survey

IN MEMORIAM

Professor Dr.-Eng. Georg PFOTZER

Prof. Dr.-Eng. Georg Pfotzer, former Director of the Max Planck Institut für Aeronomie, died unexpectedly on the 24 July 1981.

George Pfotzer was born in Willstatt (Kreis Kehl) on 29 November 1909. He studied physics at the Technische Hochschule Stuttgart where, for his Dr.-Eng. dissertation, he carried out for the first time measurements of the directional dependence of cosmic rays in the atmosphere using a balloon-borne automatic counting coincidence apparatus. As a result of his measurements he discovered the "Pfotzer maximum" of radiation intensity caused by secondary production at high altitudes in the atmosphere. His studies were followed during the period 1936 to 1945 by employment in the research laboratories of the firm Siemens & Halske in Berlin. There he contributed significantly to the development and improvement of the first generation of semiconductors used in technical applications. After the war, he accepted a position in a research institute, dealing with physics of the stratosphere which his former teacher, Prof. E. Regener, had founded in Weissenau (near Ravensburg). During this period he published numerous articles on cosmic rays and also developed a neutron monitor for use during the International Geophysical Year. In 1952 the Institute became a Max Planck Institute, and was later united with the Max Planck Institute for Ionospheric Research in Lindau/Harz to finally become the Max Planck Institute for Aeronomy. After a period as guest professor at the University of California in Berkeley, USA, Georg Pfotzer was elected to scientific membership of the Max Planck Society in 1960. He became Director at the Max Planck Institute for Aeronomy in 1965 and "Honorarprofessor" at the Technische Universität Braunschweig in 1967. Between 1975 and his retirement in 1977 he acted as Managing Director of the Max Planck Institute for Aeronomy.

While in Lindau, Georg Pfotzer became engaged in space research. He formed a group to investigate solar cosmic rays and was first in Europe to exploit Bremsstrahlung-X-ray measurements in the auroral zone as a tool for investigating magnetospheric phenomena. Later his group carried out the first rocket campaigns in Europe and also made significant contributions to the first German research satellite AZUR. Georg Pfotzer and his group also took part in many of the subsequent national and international satellite and space probe missions aimed at the investigations of the Earth's magnetosphere and its interaction with the solar wind. These included the very successful space projects HELIOS and GEOS.

His diligence, competence and impartiality led to invitations to Georg Pfotzer to serve as a member of advisory groups to the Federal Government, but also to the European Space Research Organization. In spite of these numerous tasks he remained scientifically active even after his formal retirement.

Georg Pfotzer had many friends in many countries. They will retain memory of him as an outstanding colleague who combined auspicious talents and remarkable efficiency with humanity and modesty.

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Professor J.S. SHIRKE

With great sorrow we note the sudden death of Professor J.S. Shirke at San Juan, Argentina on the night of May 21, 1981. He died in his sleep of cerebral haemorrhage.

Professor Shirke joined PRL on January 24, 1956 as a research assistant and rose to be Associate Professor. His scientific career spanning nearly 25 years contained many and varied contributions to the field of aeronomy. Starting with the study of radiowave absorption in the ionosphere, he was responsible for the initiation of a number of experimental programmes at PRL. Indeed he was one of the pioneers in the group which initiated a wide range of research techniques and programmes in ionospheric physics at PRL, and his contributions to the world wide fame of this Laboratory were substantial and crucial. He worked on both ground-based as well as rocket-borne projects, and his latest results on coupling of the lower (D-region) ionosphere to the processes in the highest (F-region) layers of the ionosphere were outstanding contributions to the subject. He developed mass-spectroscopes to be carried on rockets for studies of ionic constituents of the upper atmosphere for the first time in India. He was also responsible for the initiation and conduct of a number of important experimental programmes in USA where he spent a couple of years as a post-doctoral fellow. Dr. Shirke served on various national committees devoted to Radio Sciences and Aeronomy, and was involved in a number of international programmes as well.

Professor Shirke had gone to Argentina only on March 28, 1981 to take over the Directorship of Centro de fisica de la Alta Atmospera(Centre for Upper Atmosphere Physics) in San Juan. His last letters to colleagues here were full of high hopes and plans to initiate and develop many different programmes of research at that institute. Unfortunately his life was cut short at a young and promising age.

S.P. Pandya
Deputy Director
Physical Research Laboratory
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Dr. A.P. DE VUYST

Dr. A.P. de Vuyst, who worked for a long time at the Centre de Physique du Globe Dourbes (Nismes-Prov. de Namur, Belgium), passed away recently. He served as Chairman of IAGA Commission I, Observatories and Instruments, during 1967-1973. In 1960-63, he was a member of two IAGA Committees, i.e. No.8 Magnetic Instruments and No.9 Characterization of Magnetic Activity. A memorial notice for him will be given in the next issue.

Rev. Father Antonio ROMAÑÁ, S.I.

Father Romañá passed away suddenly on 13 October 1981 at the age of 81 (he was born on 21 March 1900). He was the Director of the Observatorio del Ebro from 1939 to 1970. His scientific work comprised of not only the task of rebuilding the Observatory after the war, and accommodating it to the new needs of solar-terrestrial research, but also of an active international co-operation through ICSU, IAU, URSI, IUGG and other scientific bodies. Specially well known is his work in the frame of IAGA scientific committees, meetings, and services. He served on the

- Committee to Promote Daily Observations of Horizontal Force between and near the Geographic and Magnetic Equators (as a member, 1948-51),
- Committee to Promote Observations of Daily Magnetic Variations in Low Latitudes (as a member, 1951-54),
- Committee on Lunar Variations (as a member, 1954-60),
- Committee on Rapid Variations and Earth Currents (as chairman, 1954-63; He arranged the symposia in Copenhagen in April 1957, and in Utrecht in September 1959),
- Commission IV on Magnetic Activity and Disturbances (as Reporter of Working Group on Morphology of Rapid Variations, 1963-67).

In addition, he served as the Director of the Service on Rapid Magnetic Variations (a part of the International Service of Geomagnetic Indices) since IGY, and he prepared the Provisional Atlas on Rapid Magnetic Variations.

He was asked to serve as a member of the IUGG Finance Committee during 1957-67. Father Romañá was a member of several learned societies throught the world. The staff of the Observatorio del Ebro who had the privilege of living and working with this deep religious man for many years, feel the lost not only of a scientific colleague, but above all, of a good personal friend.

J.O. Cardús
Observatorio del Ebro
Roquetas (Tarragona)
Spain

THE FOURTH SCIENTIFIC ASSEMBLY OF IAGA
Edinburgh, Scotland, 3 - 15 August 1981

BRIEF SUMMARY

The Local Organizing Committee (chairman: B.R. Leaton; secretary: S.R.C. Malin; social programme manager: V.R.S. Hutton) made excellent arrangements supported by the City of Edinburgh District Council, Institute of Geological Sciences, National Environment Research Council, Royal Society of Edinburgh, Royal Society of London, and University of Edinburgh. All the scientific meetings were held in the Appleton Tower of the University of Edinburgh, except for the Opening Ceremony and the Special Symposium on Saturn on the first day. The facilities in the Appleton Tower were ideal for the scientific meetings including the poster sessions.

733 participants attended from 42 IUGG/IAGA member countries and 5 other locations. The total number of scientific papers submitted was 1013 written by 1564 authors. This is the highest number recorded in the history of IAGA Assemblies regarding the total number of participants and scientific papers.

The scientific sessions and other meetings for the IAGA Edinburgh Assembly are listed in pages 17-18, along with the number of papers submitted to each session. The Programme-Abstracts Booklet of 614 pages was published as the IAGA Bulletin No.45.

Since this Assembly was a Scientific Assembly, the conference was devoted to the enjoyment of mutual exchange of information on the recent scientific progress in the field of geomagnetism and aeronomy, and to the selection of topics for the IAGA sessions at the 1983 IUGG General Assembly. The Edinburgh Assembly did not deal with serious administrative matters, although the Conference of Delegates was held on the first and last days of the Assembly period to have the concurrence of the participants on the decisions of the Executive Committee and to adopt Resolutions on the last day. Some resolutions ask for the cooperation of international organizations other than IAGA, in order to promote important research subjects. These resolutions have already been conveyed to the organizations concerned.

A special Workshop on "Strengthening IAGA Sciences in Developing Countries" was held twice, on the evenings of 10 and 14 August. A summary of this Workshop is included in this IAGA News.

IAGA created Honorary Members to show appreciation of those persons who have given outstanding service to IAGA. The previous Honorary Members of the Executive Committee (i.e. Drs. J. Coulomb, V. Laursen, M. Nicolet and T. Nagata) were automatically designated Honorary Members of IAGA. In addition to those four past Presidents, Drs. L.R. Alldredge and J.O. Cardús (past General Secretaries) were newly designated.

The details of the IAGA Edinburgh Assembly will be compiled as the "Transactions of the Fourth Scientific Assembly of IAGA", and will be published in spring 1982, as IAGA Bulletin No.46.

OPENING CEREMONY

August 3, 1000 - 1110, McEwan Hall

The opening ceremony was presided over by Mr. B.R. Leaton, chairman of the Local Organizing Committee. He introduced Sir Hermann Bondi (FRS, President of the Research Council for the Natural Environment), and Sir Hermann gave the opening speech for the Fourth Scientific Assembly of IAGA in Edinburgh.

After this opening speech, Mr. Leaton introduced Mr. Russell Hunter who gave an entertaining talk about Scotland.

Dr. V.R.S. Hutton was then asked to explain the Social Programme planned during the IAGA Edinburgh Assembly.

Finally, Professor A.A. Ashour (Past President of IUGG), representing the IUGG Bureau, gave the greeting for this IAGA Assembly.

SPEECH DELIVERED by PROF. A.A. ASHOUR

Sir Herman, President Cole, and Colleagues.

It is my pleasant duty to bring to you the greetings of the President and members of the Bureau of IUGG and to wish you a very successful scientific meeting and a very pleasant stay in the beautiful city of Edinburgh.

Mr. Chairman: I believe that IUGG is unique between the Scientific Unions in the fact that it comprises seven International Associations dealing with different disciplines of the physics and chemistry of the solid and liquid Earth and its atmosphere. Despite unavoidable differences and overlapping, this federation gives the Union strength. Some of these Associations are indeed larger than several of the other Unions. This is certainly true for IAGA.

Mr. President: The Executive of IUGG recognizes this fact about the size and diversity of activities of IAGA. It views with satisfaction the leading and coordinating role which IAGA plays in the organization and activities of ICSU Scientific and Inter-Union Committees such as SCOSTEP and COSPAR and in large international programs such as the IMS and its post data analysis and MAP and the coming Lithosphere Program to mention only a few. It also views with great interest the efforts of IAGA to help the Developing Countries.

It is very natural that we are meeting in Edinburgh today. Edinburgh is one of the strongest holds for IAGA in the World. Our colleagues here have contributed so much to our science. Nor is this the first meeting IAGA is holding in Edinburgh. Those of us who attended the First Workshop on Electromagnetic Induction in the Earth (which was held here in 1972) remember the excellent organization and warm hospitality provided by our colleagues. But of course the present meeting is much larger and the Local Organizing Committee is to be congratulated and thanked for the excellent job they are doing.

Another meeting which was held here in 1936 was the General Assembly of IUGG itself. At that Assembly the total number of participants was 285 and from this IAGA's share was 65 belonging to 17 countries. Comparing these numbers with the participants of the present IAGA Assembly shows how much our Union and Association has grown since then. A copy of the group photograph of the participants of the Assembly is displayed in the Registration Hall. It includes some of the pioneers of our science including Sydney Chapman, Julius Bartels, Harold Jeffreys and Vincent Ferraro.

Ladies and Gentlemen: Again I wish you a very successful meeting.

WELCOME ADDRESS at the Reception on 5 August 1981
by Prof. W. Cochran, FRS
(Dean of Faculty of Science, University of Edinburgh)

Ladies and Gentlemen, it is my pleasant duty to welcome conference delegates, and others who are here because of the IAGA Assembly, on behalf of the University of Edinburgh. I am a great believer in the value of conferences; the direction of my own research was completely changed by a chance meeting at a conference, and it was the beginning of a collaboration between departments in different countries which is still continuing now after 20 years, although the two people who met at that conference are no longer directly involved. And I may say I met my future wife, not actually at a conference, but while I was traveling back from one. That conference was in Stockholm, and we were welcomed I remember by the King of Sweden, who was himself something of a scientist and archaeologist. With all due deference to you Lord Provost, even jointly we fall somewhat short of Royalty. Our surroundings here, however, while very different from those we enjoyed at Drottningholm, are not less interesting. You will have seen the exhibition of British contributions to geomagnetism. I noticed that Sir James Clark Ross was referred to as a great Scottish explorer, although if I am not mistaken he was born in London. It reminds me that the Duke of Wellington, an important figure in British history, was told that he was not an Englishman because he had not been born in England, to which his reply was that a man could be born in a stable, but that would not make him a horse.

Geology has a long history in Edinburgh, and one thinks immediately of James Hutton, who was born in Edinburgh in 1726, and was a founder of the subject. Geophysics is a comparative young department, and Professor Creer is only the second person to have been Professor of Geophysics. There are 23 departments in the Faculty of Science, and Geophysics is one of the smaller ones. My file on it is a thin one which means that it has given me very few problems during my three years as Dean; they have been getting on with their teaching and research and we are proud to have a department which is so active in research. Some of you will have noticed that Geophysics is housed in the James Clerk Maxwell building and I would like to take a few more minutes of your time to tell the non-scientists present who JCM was. He was born in Edinburgh just 150 years ago this summer and went to school and university here.

I have just been reading a new biography of Maxwell by Ivan Tolstoy, who incidentally was a Professor of Geophysics. Maxwell's name is not well known to non-physicists, but there is an increasing realisation that his influence on physics was in the same class as that of Newton or Einstein. His work touches the interests of this Conference at three points at least, the kinetic theory of gases, the stability of Saturn's rings, and his theory of the electromagnetic field and EM waves. In his lifetime Maxwell was little honored in his native country and I regret to say that when he applied for a Professorship in this University in 1860 he was unsuccessful -- it may have been just as well on both sides as he was a poor lecturer and Edinburgh students had a reputation for noisy behaviour in lectures. As a man Maxwell was a saintly character but he had a good sense of humour and was addicted to writing humourous verse. Here are a few lines of what he wrote after a lecture by his colleague P.G. Tait at a conference of the British Association for the Advancement of Science.

> You British asses, who expect to hear
> Ever some new thing,
> I've nothing to tell, but what, I fear
> May be a true thing.
>
> For Tait comes with his plummet and his line
> Quick to detect your old stuff,
> Now dressed in what you call a fine
> Popular lecture

Like Maxwell, you will know by now that you do not expect to enjoy everything that you hear at a Conference, but I hope and expect that you will enjoy most of it, and that you will all enjoy your stay in Edinburgh.

FIRST CONFERENCE OF DELEGATES

August 3, 1120 - 1210, McEwan Hall

President Cole presided over this First Conference of Delegates. A quorum for Chief Delegates was satisfied. The meeting had the following presentations :

1. A statement regarding the International Lithosphere Programme

   R. Van der Voo (chairman of the ICL Working Group on Phanerozoic Plate Motions and Orogenesis) gave a short talk.

2. Nomination of the Resolutions Committee

   The following names were recommended and approved by the Conference of Delegates.

   D.J. Williams (chairman, U.S.A.)
   M.-L.Chanin (France)
   B.A.Hobbs (U.K.)
   A. Nishida (Japan)
   O.M. Raspopov (U.S.S.R.)

3. New Chairman and Co-Chairman of IAGA Division IV

   President Cole announced that the IAGA Executive Committee had nominated

   L.F. Burlaga (U.S.A.) as the new chairman and
   F.M. Neubauer (F.R.G.) as an additional co-chairman,

   effective 1 January 1981.

4. Invitation from Czechoslovakia for the IAGA 1985 Assembly

   President Cole announced that IAGA had received a letter from the Czechoslovakian National Committee for IUGG inviting IAGA to hold the 1985 Assembly in Prague. He asked Chief Delegates to consider this invitation until the Closing Conference of Delegates.

5. Presidential Address by K.D. Cole. (see the following pages)

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PRESIDENTIAL ADDRESS

Keith D. COLE

The Science

The sciences for which IAGA is a major international forum cover planetary magnetism and also solar-planetary physics (excluding meteorology). The scope of the programme here at Edinburgh and the attendance of over 750 (the largest ever in IAGA's history) is testimony to the great activity and high interest in this area of science.

There are essentiallly four large areas of physics involved, each of which is represented at the microscopic and macroscopic level. A fifth smaller area is beginning to show itself. The areas are: -

1. Plasma Physics - from wave-particle interactions and wave-wave interactions to gross structures, such as interplanetary shocks and magnetospheric electric fields and currents.
   The outer atmospheres of the planets and interplanetary space provide us with a range of plasma processes far greater than man is able to produce in the laboratory. These plasmas compensate for our lack of control over them by their natural reproduceability. Moreover some of the processes can be observed 'clean' and clear of 'wall effects'. Though in magnetospheric physics, some phenomena of long duration do encounter geophysical 'walls' like the ionosphere or the plasmapause or the magnetopause.
2. Aeronomical Physics - from the quantum mechanics of particle-particle interaction to large scale phenomena like ionospheric storms or changes in the mesospheric electric field following energetic particle bombardment of the atmosphere.
3. Magnetism - from the physics of single domain grains to the classical problems of the origin and maintenance of planetary magnetic fields.
4. Solar-Terrestrial and solar-planetary relationships - In this area of our science we are interested in the sequence and coupling of physical processes, starting with the emission of electromagnetic waves and particles by the sun, their transmission through interplanetary space and their interaction with the upper atmospheres of planets and their magnetic field.
5. The fifth highly exciting yet embryonic field is that of biomagnetism as for example in the relationship of the geomagnetic field to bird migration.

In reporting on our science, I shall commence with work on the solar wind and finish with that on the internal magnetic field.

Solar Wind

The large-scale characteristics of the solar wind are being investigated by Helios 1 and 2 (0.3 to 1AU), Voyager 1 and 2 (1 to >10AU), Pioneer 11 (1 to ≥25AU). Generally the magnetic field follows the pattern predicted

by Prker, but considerable variability about this pattern is observed by Voyager and in particular the nominal radial component of $\underline{B}$ is smaller than the fluctuations beyond $\sim$0.3AU. The sector structure was observed to disappear at heliographic latitude $\gtrsim 16°$ in 1976, which was interpreted in terms of a tilted solar dipole field, and Helios observations show directly that the sector boundary surface was close to the equatorial plane at that time. In 1978 the sector boundary surface as within $\pm 15°$ of the solar equatorial plane and warped such as to produce a 4-sector pattern consistent with a solar dipole aligned <u>along</u> the spin axis and a 10 percent <u>quadrupole</u> contribution; the footprints of the sector boundary surface measured by Helios and IMP spacecraft may be inferred from the maximum brightness contour of the HAO white-light coronagraph data. The variation of the electron temperature with distance between 0.45 AU and 4.8AU was determined from Mariner 10 and Voyager data showing $T \sim R^{-1.175 \pm 0.03}$. The heliomagnetic latitudinal variations of the solar wind plasma were investigated using observations made in the ecliptic plane together with the fact that the solar magnetic field resembled a tilted dipole in 1974. Discontinuities in the interplanetary magnetic field have been observed at least out to 8.5AU and in to 0.46AU. Corotating shock pairs are found to be a general feature of the solar wind in the outer solar system and the interactions which produce these shocks have been developed in 3D and MHD models. The coalescence of two shock waves between 0.8AU and 1AU was observed by Helios and IMP spacecraft. The dependence of the thickness of collisionless interplanetary shocks on the plasma β and Mach number has been investigated. The magnetic structure of solar wind shocks between 1 and 2AU has been described, for example, a quasi-parallel shock in which elliptically polarised fluctuations with an apparent period of 20-25 sec, extended 500,000 km downstream from the shock.

Notable contributions to our understanding of solar activity and its effect on the solar wind are coming from SMM (Solar Maximum Mission), the U.S. Air Force, Satellite P 78-1, the radio wave experiment on ISEE (International Sun-Earth Explorer), and the white-light coronograph data that have been collected by the HAO group during the last cycle. Numerous observations of coronal mass ejection events and related solar phenomena have stimulated such study, both theoretical and experimental, giving a body of descriptive knowledge and a list of hypotheses concerning their dynamics. Interplanetary events called magnetic clouds may be interplanetary manifestation of coronal mass ejection events. These regions with a radial extent $\gtrsim$0.25AU, a high field strength, anomalous but ordered field directions, and a low temperature; they are apparently expanding under the influence of a high internal magnetic field pressure. Another type of flow, corotating streams, has recently been shown to originate in coronal holes. The evolution of coronal holes during the last solar cycle was described recently based on white-light data. Solar flares are being intensively studied by SMM, and shock waves produced by flares can be followed almost continuously from the sun to 1AU using data from the radio wave experiment of ISEE. These data, together with <u>in situ</u> interplanetary measurements, promise to give definite knowlege of the propagation of shocks in the inner solar system.

Observations of He^+ behind an interplanetary shock have been reported indicating the presence of cool material, possibly even neutral matter, which might have been ejected by an eruptive prominence. Routine measurements of O^{+6}, O^{+7}, He_3^+, and charge states of iron are now being made on ISEE-C, opening the way to diagnose the coronal temperature as a function of time.

The interaction of the solar wind with unmagnetised bodies is being investigated primarily by the Pioneer Venus and Venera spacecraft in orbit around Venus. Some of the most recent results are summarised in a special issue of the J. Geophys. Res. (85, A13, 1980). The solar wind-Venus interaction is characterised by a bow shock, an ionosheath, an ionopause and a mantle, as in the solar wind-earth interaction. The magnetic field in the mantle plays significant role in holding off the solar wind although it is not a planetary field. The solar wind is held off primarily by the ionospheric pressure. The bow shock position was found to be independent of the ionopause position and solar wind dynamic pressure, but it does depend on solar activity. The ionopause position does respond to changes in solar wind pressure. Small-scale (15-20km diameter) magnetic flux-ropes with a quasi-force-free structure and low density are observed in the ionosphere; their source and dynamical significance are not fully understood; it has been suggested that they might be produced by the Kelvin-Helmholz instability on the magnetopause.

In the realm of solar physics of direct concern to IAGA is the question of what structures on the sun are related to geomagnetic storms. It has recently been discovered that in addition to coronal holes and solar flares, disappearing filaments create structures in interplanetary space which eventually cause geomagnetic storms on the earth, provided of course that the earth is in the 'line of fire'.

Planetary Physics

One of the most exciting events of space physics has been the exploration of the magnetospheres of the outer planets Jupiter and Saturn. The relative importance of the internal magnetic field rotation, atmospheric winds, and the solar wind and satellite action in determining gross magnetospheric properties varies from planet to planet. Comparative studies of the magnetospheres of the planets is most fundamental and earth scientists have much to learn from it. This afternoon we are to be treated to a Symposium devoted to the Saturn air system giving us up-to-the-minute results. IAGA takes special pride in providing this forum for this work.

Space probes of both USA and USSR have extended greatly our knowledge of the solar wind interactions with Venus.

Solar Wind Interaction with Venus

The pioneer Venus Mission, preliminary results from which are described in a special issue of the Journal of Geophysical Research (December 30, 1980) has greatly increased our understanding of the solar wind interaction with an unmagnetised planetary body which has an ionosphere. In particular, the Orbiter dips into the ionosphere near periapsis and travels to a distance of $\sim 2R_V$ at apoapsis, giving us the first extended data set on the boundary layer between a planetary ionosphere and the solar wind at a wide range of solar zenith angles. It has been observed that the interaction involved the transmission of incident solar wind dynamic pressure to magnetic pressure outside of the boundary layer. Inside the boundary, the ionospheric plasma pressure is approximately equal to the same value. There also appears to be a change in the interaction when the incident solar wind

dynamic pressure exceeds the maximum ionospheric plasma pressure. On these occasions the solar wind with its frozen-in magnetic field may be pushed closer to the planet surface. It has also been determined that the loss of the planetary atmosphere via the solar wind interaction proceeds via photoionisation of neutrals located outside the boundary layer, charge exchange with solar wind protons in this outer region, detachment of ionospheric plasma from the boundary by yet undetermined forces near the terminater, and possibly by a tail wind in the antisolar direction that bears some similarities to Earth's polar wind. Finally the unexpected observed phenomenon of small scale magnetic structure ('flux ropes') within the undisturbed ionosphere has an as yet uncertain origin but is a ubiquitous phenomenon in the dayside ionosphere under quiet solar wind conditions.

The Terrestrial Magnetopause

Two very important discoveries about the behaviour of the magnetopause were made using ISEE 1 and 2 just prior to the Canberra assembly. The first is that steady reconnection as envisioned in most theroretical developments does exist on occasion and that patchy reconnection in the form of flux transfer events is often found to exist. A period of quiet solar wind conditions reconnection signatures were continuously present. In fact during one traversal the spacecraft remained in the magnetopause for about an hour.

Flux transfer events were somewhat a surprise in the ISEE data because high resolution magnetic measurements across the magnetopause have been made for almost two decades. Study of these phenomena since Canberra have shown that they have heat flux anomalies, that protons stream out of them into the solar wind and that they have higher pressure than the surrounding magnetosheath plasma. These signatures all suggest that the flux transfer event is the signature of a reconnection event isolated in time and in space.

The Foreshock

It has been known for some time that the foreshock region, upstream of but connected to the earth's bow shock, is characterised by particle fluxes travelling back upstream along the IMF from the shock and by a variety of waves. Recent measurements, made primarily by the ISEE-1 and 2 spacecraft have however provided a much more detailed portrait of the region than was available previously. This began with the early recognition that upstream ion populations varies in character. They range from reflected beams with narrow energy and pitch angle ranges through intermediate populations to fully diffuse distributions which appear isotropic in the spacecraft frame and were observed over the entire energy range of their instrument.

A second important observation was reported, and found that the large amplitude low frequency (.03Hz) waves which characterise much of the foreshock are uniquely associated with diffuse distributions. Another exciting contribution made by the ISEE mission has been the identification, using the unique dual spacecraft measurements, of upstream wave modes and rest frame frequencies. A great many more observations are presented in a special upstream Waves and Particles issue of the Journal of Geophysical Research

which contains a comprehensive selection of articles representing data from most of the ISEE instruments.

Magnetospheric Physics

In recent times boundary layers of the magnetosphere have been further explored, particularly as regards the description of the low latitude boundary layer in which solar wind is found inside the magnetopause. Evidence is now being accumulated for reconnection of the interplanetary and geomagnetic field at various regions of the magnetopause. Investigations into hydromagnetic wave in space around the earth and geomagnetic pulsations at the surface of the earth are providing us with new information in several areas.

The first concerns hydromagnetic waves originating in interplanetary space which are registered at the earth's surface and the second area of increasing interest is geomagnetic pulsations on the polar caps inside the auroral oval. In the noon sector particularly, information comes from the boundary layer via hydromagnetic waves and much work remains to be done to understand the range of geomagnetic pulsations in this region.

Deeper in the magnetosphere, simultaneous observations from satellites is beginning to reveal the modal structure of hydromagnetic waves. Heavy ion effects on hydromagnetic waves in the magnetosphere are receving more attention. An area of geomagnetic pulsation research which needs further development is that in the equatorial regions.

A region of intense interest is that of the terrestrial kilometric radiation. A most exciting observation is that it can be stimulated by type-3 solar bursts. The morphology of the source regions of this radiation above auroras is being delineated.

The SCOSTEP programme on the International Magnetospheric Study provided great impetus to magnetospheric research recently. At present the post-IMS Data Analysis Phase is being developed and we can expect our understanding of the magnetosphere to be improved over the next few years as a result of this effort. SCOSTEP is organising a sequence of co-ordinated data analysis workshops in this regard and there will be a major symposium in 1984 on results of the IMS. For this symposium SCOSTEP will approach COSPAR with the view of having it in association with COSPAR's 1984 meeting.

IONOSPHERIC PHYSICS

Incoherent scatter radar continues to prove its worth as a major tool for studying upper atmosphere dynamics. Optical interferometry has also been used to good effect to study the complicated night-time dynamics over Arecibo, to study winds associated with polar cap convection. The thermosphere over Arecibo turns out to be surprisingly complicated, perhaps because it seems the midlatitude and equatorial regimes meet in this vicinity; but there may be a lesson that nowhere is the ionosphere simple if probed in sufficient detail. The observational and theroretical progress on equatorial ionospheric irregularities of various scales is a highlight of present-day aeronomy. Also in the euqatorial field, the counter-electrojet is receiving considerable attention.

Another promising topic is the role of ring current protons in depositing energy into the low latitude thermosphere.

At high latitudes the MPI heating experiment at Tromsö is entering service as a major new instrument for doing plasma physics; EISCAT transmissions were expected to start in late May 1981; the STARE and other radars are useful synoptic instruments for auroral work; whereas GEOS has continued to provide valuable data for studies of ionospheric-magnetospheric coupling. All this work exploits the ionosphere as a plasma physics laboratory, for both passive and active experiments. An example is the finding of evidence that plasma waves are generated in the auroral oval and play a role in the dissipation of energy there. The subject of the formation of irregularities in the ionosphere by the passage of hydromagnetic waves is now being advanced by using high resolution studies of the ionosphere employing phase path techniques and observations of geomagnetic pulsations.

The chemical modification of the ionosphere, particularly by space vehicle emissions, remains a field of interest and not without practical importance. It is interesting that the present solar cycle has given new results concerning the relationships between solar and thermospheric parameters, and between geomagnetic/interplanetary parameters and the ionosphere; to a large extent, these relationships are empirical or statistical but they pave the way to physical understanding.

The great advances in exploring the planets are now being followed up with interpretative and theroretical studies, that build on knowlege of the earth's thermosphere in order to investigate planetary aeronomy.

The Middle Atmosphere

The altitude distribution of some minor constituents of the atmosphere are being determined from satellite measurements of spectral radiance and the application of inversion techniqus.

IAGA scientists are very much involved in the Middle Atmosphere Programme of SCOSTEP. This programme comes into existance officially in 1982 and will last until 1985. Here in Edinburgh an important assembly of scientists interested in MAP will take place.

Internal Magnetic Field

Analysis of the main field and secular variations

The Magsat mission has provided data of unprecedented completeness which are being analysed by investigators in numerous countries. Secondly, three proposed models have been prepared for the update of the IGRF planned for the Edinburgh Assembly. Thirdly, efforts continue towards inversion of the main field and secular variation fields, to current distributions in the core. Two symposia in Edinburgh will be sponsored by WG I-1.

Electromagnetic induction and electrical conductivity (Earth and Moon)

The fifth Workshop of this WG was held at the University of Istanbul in August 1980, and was attended by 95 scientists from 17 countries. Papers covered a wide range of topics, many of which dealt with the

problem of inversion of observed field to conductive structure.

Magentic anomalies (Land and Sea)

There is good progress in the project to produce a Magnetic Anomaly Map of North America by 1988. An IGRF must be removed to eliminate the core field, so that the work on new IGRF's is vital to the Anomaly Map project.

Paleomagnetism

There are major advances in three areas. The first is the study of secular variation through lake sediments. The second is work on metamorphic paleomagnetism by the combination of accurate geothermometry and thermal blocking theory with remanent magnetism. The third area is that of studies of continental accretion, in some cases involving numerous small blocks now incorporated in one continent, notably in western North America.

Rock Magnetism

There are interesting developments in this subject in several directions. Several groups are active in biomagnetism in honey bees, butterflies and dolphins' heads. Multiple magnetisation in many rocks continues to attract much study, and limestones are becoming significant for paleomagnetism. (Single-domain grains of pyrrohotite show interesting metastable effects.) Finally, interesting results are emerging on the dependence of thermoremanent magnetisations on cooling rate. This last development may be important for work on paleointensity of the geomagnetic field.

Lithosphere Programme

IAGA is keen to take a very active role in the proposed lithosphere programme and is glad that Professor Van der Voo will address this conference of delegates on this important new initiative.

History

The history division in IAGA is flourishing and the papers in this area presented at Edinburgh are of great interest not only historically but scientifically. There appears to be a strong development of interest in this field manifesting itself not only in the writing of articles but also production of books and films and scripts for radio broadcasts. This signifies a great public interest in the contribution that IAGA is making to an understanding of our total environment.

World Data Centres

IAGA scientists depend heavily upon the services provided by World Data Centres in their field and I wish to acknowledge on their behalf, not only their gratitude for these services but also to thank all those countries and scientists involved who participate in supplying data to the World Data Centres. Our science depends in some areas on the availability

of long time series of data and for data sets of many parameters measured simultaneously in different regions of space or in the earth. IAGA is most interested in the problem of data management.

IAGA and the Developing Countries

IAGA continues to take an interest in the problem of strengthening its sciences in the developing countries and following initiatives taken at earlier IAGA meetings, the Workshop on Strengthening IAGA Sciences in the Developing Countries will be held here at Edinburgh on the evenings of August 10 and 14 with the view to producing a working document to help a committee of IAGA (to be established) to take further steps in this area.

IAGA's Relation to other ICSU bodies

The spheres of interest of IAGA and IAMAP are more and more overlapping, especially as concerns the stratosphere and mesosphere of the earth and the atmospheres of other planets. These sister organisations within IUGG are collaborating closely on symposia and projects of mutual interest. IAGA scientists contribute very heavily to the programmes within the Scientific Committee on Solar-Terrestrial Physics such as the Solar Maximum Year, the Middle Atmosphere Programme, the Data Analysis Phase of the IMS, solar and interplanetary Programmes and the relationship of solar variability and meteorology. In addition IAGA is collaborating with COSPAR in terms of the contents of their scientific meetings which are held in the odd years, 1981, 1983 etc. by IAGA and even years, 1982, 1984 etc. by COSPAR.

In recent times URSI has stated its objective of not running scientific meetings of straight geophysical nature and this has resulted in significant rationalisation of scientific meetings on the international scene. However many scientists continue to have joint interests in URSI and IAGA and IAGA for its part has been intent on avoiding clashes of meeting dates.

Conclusion

The IAGA scientific meetings and the opportunities of interaction which these create are continuing to fulfil important functions of communication in science beyond that achieved by publication. As emhasised by Sir Hermann Bondi in his opening address here at Edinburgh, these are perhaps the most important when all is said and done.

Acknowledgement: I am indebted to many colleagues within IAGA for help in the preparation of this report, expecially L. Burlaga, R.L. Dowden, H.B. Garrett, D.I. Gough, H. Rishbeth and C.T. Russell.

ORDINARY SCIENTIFIC SESSIONS

Code	Session Title	No. of Papers
I1	Scientific results from MAGSAT	25
I2	Mathematical modelling of the main geomagnetic field	24
I3	The magnetohydrodynamics of planetary interiors	15
I4	Electromagnetic induction studies in the oceans and their implications for suboceanic layers	9
I5	Audiofrequency magnetotellurics and crustal studies using ELF wave propagation	18
I6	Regional electromagnetic induction studies	39
I7	Physical parameters related to geomagnetic anomalies	18
I8	Time scales of geomagnetic secular variation	22
I9	Paleomagnetic aspects of the evolution of the Mediterranean and North Atlantic region	24
I10	Magnetic reversal stratigraphy, including studies of polarity transitions	44
I11	Properties of natural and synthetic titanomagnetites	24
I12	Physical and chemical processes of magnetic overprinting in relation to geological events	31
I13	Effects of stress on the magnetic properties of rocks and minerals	17
GI	General contributions to IAGA Division I	15
2S	High latitude ionospheric irregularities and small-scale structures	23
2C	Atmospheric phenomena linked with polar cusps	10
2D	Dynamics of thermospheres and exospheres of the earth and planets	42
2A	Auroral emissions: X ray, ultraviolet, visible and infrared	34
2M	Middle atmosphere scientific symposia I	83
G2	General contributions to IAGA Division II	19
3S	Special symposium on Saturn	17
3T	Theory of planetary magnetospheres	15
3A	Acceleration processes	19
3AP	HM wave particle interactions	30
3I	Role of ion composition in understanding magnetospheric processes	21
3L	Characteristics and large-scale structure of Pi2 pulsations	26
3P	The physics of pulsation resonance regions	40
3Q	Quantitative comparisons of magnetospheric event data and models	28
3M	Polar cusp and magnetosphere boundary layers	42
3C	Polar cap phenomena	14
G3	General contributions to IAGA Division III	51
4L	Large-scale structure and evolution of the solar wind	16
4K	Kinetic physics and plasma turbulence in the solar wind	24
4S	Solar wind during solar-maximum period	6
4O	Origin and composition of the solar wind	8
G4	General contributions to IAGA Division IV	6

VW	Workshop on observatory and repeat station practice ...	10
VC	Comparisons of analytical techniques for national and regional magnetic charts	6
VM	Production of regional magnetic charts using recent satellite data	6
GV	General contributions to IAGA Division V	3
AR	Recent results from magnetic and aeronomic research in Antarctic	15
HI	Geomagnetism and aeronomy - the historical perspective ..	11
ER	Representation of magnetospheric and ionospheric source fields and their induction effects	14
ES	Effects of source characteristics on electromagnetic induction	8
EI	Induction risk	15
EM	Solar and lunar external and internal magnetic variations, and related phenomena	26

Total: 1,013

REPORTER REVIEWS, BUSINESS MEETINGS, AND WORKING GROUP MEETINGS

Code	Session Titles
RI	Reporter Review Session of IAGA Division I
BI	Business Meeting of IAGA Division I
R2	Reporter Review Session of IAGA Division II
B2	Business Meeting of IAGA Division II
R3	Reporter Review Session of IAGA Division III
B3	Business Meeting of IAGA Division III
R4	Reporter Review Session of IAGA Division IV
B4	Business Meeting of IAGA Division IV
RV	Reporter Review Session of IAGA Division V
BV	Business Meeting of IAGA Division V
AR	Interdivisional Commission on Antarctic Research
HI	Interdivisional Commission on History
MA	Interdivisional Commission on the Middle Atmosphere
EI	Interdivisional WG on Relations between External and Internal Magnetic Variations
I-1	WG I-1. Analysis of the Main Field and Secular Variations
I-2	WG I-2. Theory of Planetary Magnetic Fields and Secular Variations
I-3	WG I-3. Electromagnetic Induction and Electrical Conductivity
I-4	WG I-4. Magnetic Anomalies
I-5	WG I-5. Palaeomagnetism
I-6	WG I-6. Rock Magnetism
III-1	WG III-1. ULF Pulsations
III-2	WG III-2. Composition of Hot Magnetospheric Plasma
III-3	WG III-3. Quantitative Magnetospheric Models
V-1	WG V-1. Geomagnetic Observatories, Instruments and Standards
V-2	WG V-2. Meteor Observatories
V-4	WG V-4. Optical Calibration Standards
V-5	WG V-5. Magnetic Surveys and Charts
V-6	WG V-6. Geophysical Indices
V-7	WG V-7. Collection and Dissemination of Data
V-10	WG V-10. Ground-based Measurements for Satellite Geomagnetic Surveys
SDC	Workshop on Strengthening IAGA Sciences in Developing Countries

CLOSING CONFERENCE OF DELEGATES

August 15, 0900 - 1100, Appleton Tower Lecture Theatre 1

President Cole presided over the Closing Conference of Delegates. The quorum was satisfied for the Conference of Delegates. The agenda was circulated in advance through the Daily News, and the draft of the Resolutions was available the day before. The items on the agenda and the results of reports and discussions are summarized below.

1. Opening Remarks and Fixing of Agenda

After fixing the agenda, President Cole pointed out the following.
(1) National Reports : In order to publicize the availability of special publications summarizing the national activities in the field of IAGA science (including the addresses of the organizations and personnel involved in the work, and bibliography of recent work), it was recommended that such useful information be sent to the Secretary General for inclusion in the IAGA News and if possible also in the IUGG Chronicle.
(2) IAGA Statutes : The present IAGA statutes may need some polishing to clarify some expressions and therefore avoid future ambiguity. All member countries are asked to pay attention to this matter, in order to discuss any amendments which may arise at the next General Assembly in Hamburg in August 1983.
(3) Cooperation of IAGA with Other international organizations : President Cole mentioned the good cooperative relationship of IAGA with IAMAP, IASEI within IUGG, and with URSI, COSPAR, SCOSTEP, SCAR etc. in the ICSU family.

2. Report of the Resolution Committee and Adoption of Resolutions

Vice President Dessler (in place of the chairman of the Resolutions Committee, D.J. Williams) reported on the work of the Resolutions Committee during the Edinburgh Assembly and presented the draft of 15 Resolutions. They were discussed one by one, and all of them were adopted; some were modified after the open discussion. [The Resolutions with final wording are shown elsewhere in this IAGA News.] The last Resolution of Thanks was deferred to Item 8 later.

3. Reports from the Executive Committee

(1) Approval of Honorary Members : President Cole reported on the creation of "Honorary Members of IAGA" for those who have given outstanding service to IAGA (see IAGA News No. 19, Page 12, issued in December 1980). Drs. L.R. Alldredge and J.O. Cardus (past General Secretaries) were recommended by the IAGA Executive Committee to be the new Honorary Members, in addition to the four past Presidents (Drs. J. Coulomb, V. Laursen, M. Nicolet and T. Nagata). This was approved by all Delegates with their acclamation.

(2) Appreciation of Special Services : President Cole referred to the excellent service given by Miss J.V. Lincoln for many years as the director of World Data Center A for Solar-Terrestrial Physics. On the occasion of her retirement, the participants expressed their thanks to her by warm applause.

(3) Logo Competition Results : President Cole explained that he had

been given the power to select the winner for the new IAGA logo competition, but that it was impossible to reach a conclusion during this Edinburgh Assembly. Hence he proposed postponement of the final decision until the 1983 Hamburg Assembly, allowing modifications to the submitted entries and also new entries. [Remark: President Cole did not mention the reason behind his difficulty in selecting "one only" from the contributions of 10 designers. He heard a lot of opinions regarding the designs but they did not correspond. Some designs were very good and liked but even these had some points to be remedied to symbolize *geomagnetism* and *aeronomy* more explicitly.]

4. Celebration of the First and Second International Polar Years and International Geophysical Year

There are a number of plans in 1982-83 in IAGA/IUGG member countries for the celebration of the 100-year anniversary of the First Polar Year 1882-83, the 50-year anniversary of the Second Polar Year 1932-33, and the 25-year from the International Geophysical Year 1957-58. It was recommended that such information be compiled for the IAGA News, and the cooperation of member countries in providing information was solicited. Troitskaya (USSR) introduced a Soviet plan to make a 1 hour film, including the contributions of other countries. Dooley (Australia) drew attention to the Fourth International Symposium on Antarctic Earth Scienced (16-20 August 1982, at the University of Adelaide, South Australia, sponsored by SCAR, IUGS, etc.). Barsczuz (France) pointed out that the Hamburg Assembly in 1983 will be a good chance to celebrate the ∿150 year of the "Magnetischer Verein" of C.F. Gauss as well as the ∿100 year of the first "World Magnetic Survey", organized by the French "Bureau de Longitudes" through the "Service Hydrographique de la Marine", which had sent out parties to South America, Africa and the Pacific, and even established temporaty magnetic observatories.

5. Results of Workshop on Strengthening IAGA Sciences in Developing Countries.

President Cole summarized the results from the successful meetings of this Workshop on the evenings of 10 and 14 August. The four major topics (education, research, institutional networks and individual initiatives) were discussed extensively in four groups, and the reports will be summarized later in the proceedings. It was announced that an Ad Hoc Committee (consisting of 2 representatives each from Africa, Central and South America, Asia; 1 each from USSR, UK, USA; 2 ex-officio members) was formed, and this committee would work out the outline of terms of reference as early as possible by correspondence.

6. Positive Steps from IAGA Scientists in Relation to WDC's

Since WDC's are very important and useful to all the IAGA community, Prsident Cole urged IAGA colleagues to justify our need for WDC's and to help WDC's to maintain their activities.

7. Future Assemblies in 1983 and 1985

The next IAGA Assembly is the XVIII General Assembly in connection with the General Assembly of IUGG, scheduled during 15-27 August 1983 in Hamburgh in the Federal Republic of Germany. As to the Fifth

Scientific Assembly of IAGA in 1985, the invitation from Czechoslovakia was accepted by this Conference of Delegates with Acclamation. The date for the 1985 Assembly is to be discussed in the near future.

8. Thanks to the Local Organizing Committee

President Cole expressed his sincere thanks, on behalf of all the participants of this Assembly, to the Local Organizing Committee, for the excellent preparations and arrangements (including entertaiment) made for this successful Fourth Scientific Assembly of IAGA in Edinburgh, Scotland. His speech was followed by long acclamation from all the attendants of the Final Conference of Delegates.

RESOLUTIONS OF THE IAGA EDINBURGH ASSEMBLY

(adopted on 15 August 1981)

Resolution of Thanks

IAGA expresses its appreciation to The Royal Societies of London and Edinburgh and its sincere gratitude to the Local Organizing Committee for the excellent hospitality, scientific meeting arrangements, the social programme and the weather which have produced a very enjoyable and fruitful assembly.

Resolutions

1. IAGA, noting that a proposal is to be made to URSI that a feasibility study should be made for a containerised Southern Hemisphere Incoherent Scatter Facility (SHISCAT) and noting that the scientific results obtainable with such a facility would be of great interest recommends that such a feasibility study be made and requests URSI to keep IAGA informed of progress in this project.

2. IAGA, noting that the World Data Centers for Solar-Terrestrial Physics have, in the past, played a vital role in helping to provide IAGA scientists with primary and support data necessary for them to carry out their research effectively and noting that the success of the data analysis phases of the International Magnetospheric Study and the upcoming Middle Atmosphere Program are strongly dependent on the continued availability of the large data archives handled by the World Data Centers, strongly recommends that national agencies which house and support the World Data Centers do all in their power to ensure that the high standards of data archiving and dissemination achieved by these organizations in recent years are maintained and, if possible, upgraded over the coning decade.

3. IAGA, noting that Reporter Reviews of the divisions of IAGA are considered to be an integral part of the process of alerting IAGA scientists to recent developments in their areas of research and further noting that the non-attendance of reporters in certain topic areas which they are assigned to cover leads to a gap in reporting results which extend over two years of development in the areas concerned, strongly urges that organizations at which the reporters are based do all in their power to ensure that reporters are given the resources which will permit them to prepare their reviews and to deliver them orally at the IAGA and IUGG General Assemblies.

4. IAGA, noting the new and unexpected results from the HELIOS-mission as solar activity evolves and noting the excellent technical status of the payload and the spacecraft and recognizing the unique capabilities of HELIOS-1 to study the interplanetary medium between 0.3AU and 1.0AU during the declining phase of the solar cycle urges the appropriate agencies in the FRG to ensure the continued support of mission operations and data analysis.

5. IAGA, recognizing the need for geomagnetic data in the equatorial region of South America, requests that the Surinam authorities support the continuation of the Geomagnetic Observatory Paramaribo.

6. IAGA, recognizing the importance of Nairobi Geomagnetic Observatory as part of the East African contribution to international geophysical science, and noting the need for improving the quality of operation, urges the Kenyan authorities to provide the necessary funds to rehabilitate and continue to maintain the observatory operation, with due regard to unified standards established for East African observatory and field survey needs.

7. IAGA, recognizing with thanks the efforts of Mozambique authorities in maintaining the high standard of the Maputo Geomagnetic Observatory, and noting the improvement that the Nampula Geomagnetic Observatory will provide in filling a gap in the network of magnetic observatories, recommends the continuous operation of the Nampula Observatory.

8. IAGA, recognizing the immense value to the scientific community of the derivation and publication of auroral electrojet (AE) indices, thanks WDC-C2 (Kyoto, Japan) for producing AE in published form for the first half of 1978, and urges that WDC-C2 continue to produce AE indices; understanding that 6 of the 12 observatories whose records are used in deriving AE are now recording digitally, strongly urges that the remaining stations (Cape Wellen, Tixie Bay, Cape Chelyuskin, Dixon Island, Abisko, and Leirvogur) rapidly convert to digital recording magnetometers to facilitate the prompt production and publication of AE indices.

9. IAGA, noting that most radar meteor systems are now automated, considering the need for a more effective geographical distribution of radar meteor stations and recognizing high degree of coordination necessary to undertake simultaneous world-wide observations recommends that

   (1) IAGA member countries be encouraged to support and extend the radio meteor network

   (2) international coordination be undertaken through a Global Meteor Observation System (GLOBMET) and that this coordination be effected in the immediate future through the Middle Atmosphere Program in SCOSTEP

   (3) a committee be formed within SCOSTEP with representatives from IAGA, IAMAP, IAU and URSI to produce a GLOBMET planning document.

10. IAGA, recognizing the need for magnetic repeat surveys in developing countries which lack the equipment and expertise in these operations, suggests that consideration be given by these countries to obtaining assistance from agencies who have these facilities or from individuals who have the expertise.

11. IAGA recognizes the need for workshops in magnetic operations in the regions of developing countries to provide training of technicians for these operations and urges that countries in need of such training and appropriate international agencies join in support of these workshops.

12. IAGA, recognizing the usefulness of Magsat satellite vector magnetic data in defining IGRF 1980, and noting the complexity of secular variation, urges that another such satellite survey be made; recognizing the value of such data in mapping intermediate-wavelength anomalies attaches great importance to the acquisition of such data at an altitude less than 200 km.

13. IAGA, recognizing the continuing need for an International Geomagnetic Reference Field, recommends that:

    1. IGRF 1980 be used for the interval 1980 to 1985
    2. DGRF 1965, DGRF 1970, and DGRF 1975 be used, with linear interpolation, for applications requiring definitive values for the interval 1965 to 1975
    3. PGRF 1975 (ie DGRF 1975 and IGRF 1980 interpolated linearly) be used for the interval 1975 to 1980 until DGRF 1980 is produced.
    4. This pattern be maintained in future updates.

In the above text, DGRF denotes a Definitive International Geomagnetic Reference Field, and PGRF a Provisional International Geomagnetic Reference Field. The values of spherical harmonic coefficients for DGRF 1965, DGRF 1970, DGRF 1975, and IGRF 1980 with secular variation terms for 1980-1985 are shown in this publication on page 101.

14. IAGA, noting the need to extend our knowledge of the geomagnetic secular variation beyond the limited range of historical and observatory records, and recognizing the large increase during the past decade in secular variation records from a world-wide network of sites obtained from archaeomagnetic studies and palaeomagnetic studies of sedimentary sequences, urges that a data bank be established, and subsequently transferred to a World Data Centre to enable all workers to gain ready access to the available data.

15. IAGA, recognizing the great contributions that detailed aeromagnetic surveys would make in understanding the structure and geological history of Antarctica and its surrounding oceanic areas, strongly urges member countries of SCAR to acquire such data from those regions.

RESOLUTIONS AIGA DE L'ASSEMBLEE DE EDIMBOURG

RESOLUTION DE REMERCIEMENTS

L'AIGA exprime sa reconnaissance aux Sociétés royales de Londres et d'Edimbourg et ses sincères remerciements au Comité d'organisation local pour l'excellente hospitalité, pour la bonne organisation des rencontres scientifiques, pour le programme de détente et le beau temps qui ont rendu ces réunions agréables et fécondes.

RESOLUTIONS

1. L'AIGA, notant qu'une proposition doit être faite à l'URSI demandant qu'une étude de faisabilité soit faite pour une facilité mobile de Radar Incohérent dans l'hémisphère Sud (SHISCAT) et notant que les résultats scientifiques que l'on pourrait obtenir avec cet instrument seraient d'un grand intérêt, recommande qu'une telle étude de faisabilité soit réalisée et demande à l'URSI de tenir l'AIGA informée des progrès de ce projet.

2. L'AIGA, notant que le Centre Mondial de données de physique Soleil-Terre (S.T.P.) a dans le passé joué un rôle vital en procurant aux scientifiques de la Communauté des données de base et périphériques, nécessaires pour mener à bien leurs recherches, et notant que les succès de l'analyse des données du programme international de la magnétosphère (IMS) et du futur programme de la moyenne atmosphère (MAP) dépendent fortement de la disponibilité permanente des archives des données traitées par le Centre Mondial de Données, recommande instamment que les agences nationales qui hébergent et soutiennent le Centre fassent tout ce qui est en leur pouvoir pour assurer que la haute qualité de l'archivage et la dispersion des données effectuée par ces organisations pendant ces dernières années soient maintenues et si possible améliorées au cours des dix prochaines années.

3. L'AIGA, notant que les synthèses des rapporteurs des divisions de l'AIGA sont considérées comme une partie intégrale du processus d'information des scientifiques de l'AIGA, concernant des récents développements dans leurs domaines de recherches, notant ensuite que l'absence de rapporteur dans certains domaines qu'ils ont accepté de prendre en charge conduit à une lacune dans la présentation des résultats qui s'étend sur la période de deux années, encourage vivement que les organisations auxquelles les rapporteurs appartiennent fassent tout ce qui est en leur pouvoir pour assurer qu'il leur soit donné les moyens qui leur permettront de préparer leur synthèse et de les communiquer oralement aux assemblées générales de l'AIGA et de l'IUGG.

4. L'AIGA, notant les résultats nouveaux et inattendus de la mission Hélios alors que l'activité solaire évolue, notant la qualité technique excellente de l'expérience et du véhicule, et reconnaissant les possibilités uniques d'Hélios I à étudier le milieu interplanétaire entre 0.3 UA et 1 UA pendant la phase de déclin du cycle solaire, recommande aux agences appropriées de la RFA d'assurer le soutien des opérations de mission et de l'analyse des données.

5. L'AIGA reconnaissant le besoin des données géomagnétiques dans la région équatoriale de l'Amérique du Sud, demande que les autorités du Surinam soutiennent la poursuite de l'Observatoire géomagnétique de Paramaribo.

6. L'AIGA reconnaissant l'importance de l'Observatoire géomagnétique de Nairobi, comme une partie de la contribution Est-Africaine à la science géophysique internationale et notant la nécessité de faire progresser la qualité de l'opération recommande aux autorités du Kenya de mettre en place les fonds nécessaires pour réhabiliter et continuer à maintenir l'Observatoire opérationnel, avec tous les soins requis pour unifier les standards établis par l'Observatoire Est-Africain et les besoins des études sur le terrain.

7. L'AIGA reconnaissant avec gratitude les efforts des autorités de la Mozambique qui ont maintenu le haut niveau de l'Observatoire géomagnétique de Maputo et notant les améliorations apportées par l'Observatoire géomagnétique de Nampula en complétant le réseau des observatoires magnétiques, recommande le suivi des opérations à cet observatoire.

8. L'AIGA reconnaissant l'importance pour la communauté scientifique d'évaluer et de publier les indices de l'electrojet auroral (AE), remercie WDC-C2 (Kyoto - Japon) pour la publication de l'indice AE au cours de la première partie de l'année 1978 et recommande que WDC-C2 continue à produire ces indices, comprenant que six des douze observatoires dont les enregistrements sont utilisés pour déduire l'indice AE sont maintenant enregistrés sous forme digitale, recommande fortement que les autres stations (Cape Wellen, Tixie Bay. Cape Chelyuskin, Dixon Island, Abisko et Leirvogur) convertissent rapidement les magnétomètres à un enregistrement digital pour faciliter la rapide production et publication des indices AE.

9. L'AIGA notant que la plupart des radars météoriques sont maintenant automatisés, considérant la nécessité d'obtenir une plus efficace distribution géomagnétique des stations météoriques et reconnaissant le haut niveau de coordination nécessaire pour assurer simultanément des observations à l'échelle mondiale recommande

   (1) que les pays membres de l'AIGA soient encouragés à soutenir et étendre le réseau de radars météoriques ;

   (2) que la coordination internationale soit organisée pour un système global d'observation météorique (GLOBMET) et que cette coordination soit effective dans un futur immédiat à travers le Programme d'Atmosphère Moyenne (au sein du SCOSTEP) ;

   (3) qu'un Comité soit formé à l'intérieur de SCOSTEP avec des représentants de l'AIGA, de l'AIMPA, de l'UAI et de l'UISR pour réaliser un plan de travail concernant GLOBMET.

10. L'AIGA reconnaissant le besoin de station de répétition magnétique dans les pays en voie de développement qui, pour ces opérations, manquent d'équipements et d'expertises, suggère que soit apportée à ces pays une assistance de la part des agences qui ont ces facilités ou de la part des scientifiques experts.

11. L'AIGA reconnait le besoin des ateliers spécialisés dans le domaine des opérations magnétiques dans les régions en voie de développement pour faciliter la formation des techniciens pour ces opérations et recommande aux pays qui ont un tel besoin de s'adresser aux agences internationales pour l'organisation de ces ateliers.

12. L'AIGA reconnaissant l'utilité des données géomagnétiques du satellite Magsat dans la définition de YGRF 1980 et notant la complexité des variations séculaires, recommande de renouveler une telle expérience satellite, reconnaissant la valeur de telles données pour dresser la carte des anomalies de longueur d'ondes intermédiaires, attache une grande importance à l'acquisition de telles données à une altitude de moins de 200 km.

13. L'AIGA reconnaissant le basoin permanent pour un Champ International Géomagnétique de Référence, recommande que :

    1. L'IGRF 1980 soit utilisé pour la période 1980 à 1985 ;
    2. DGRF 1980, DGRF 1970 et DGRF 1975 soient utilisés avec une interpolation linéaire pour les applications qui nécessitent des valeurs définitives (pour la période des années 1965 à 1975) ;
    3. PGRF 1975 (i-e DGRF 1975 et IGRF 1980 interpolé linéairement) soit utilisé pendant la période 1975 à 1980 jusqu'à ce que DGRF 1980 soit réalisé ;
    4. Le schéma soit maintenu dans le futur.

"Dans le texte précédent, le sigle DGRF signifie Champ International géomagnétique de référence Définitif et PGRF correspond au champ Provisoire. Les valeurs des coefficients des développements en harmoniques sphériques pour DGRF 1965, DGRF 1970, DGRF 1977 et IGRF 1980 en fonction des termes de variation séculaire pour la période 1980-1985 sont données dans cette publication en page 101."

14. L'AIGA notant le besoin d'étendre notre connaissance des variations géomagnétiques séculaires au delà de la période limitée des données historiques et des enregistrements d'observatoires et reconnaissant l'important accroissement pendant la dernière décade des enregistrements des variations séculaires provenant d'un réseau mondial de stations obtenues grâce aux études archéomagnétiques et paléomagnétiques des séries sédimentaires, recommande qu'une banque des données soit mise en place et dans un second temps rattachée à un centre mondial de données de manière à permettre à tous chercheurs d'avoir accès aux données disponibles.

15. L'AIGA reconnaissant les grandes contributions que les campagnes aéromagnétiques peuvent apporter dans la compréhension de la structure et de l'histoire géologique de l'Antarctique et des zones océaniques qui l'entourent, recommande instamment aux pays membres du SLAR de se procurer de telles données.

WORKSHOP ON STRENGTHENING IAGA SCIENCES IN DEVELOPING COUNTRIES

During the Fourth Scientific Assembly of IAGA in Edinburgh, the Workshop on Strengthening IAGA Sciences in Developing Countries was held in the evenings of 10 and 14 August 1981. The Proceedings and Recommendations from this Workshop were compiled by the President of IAGA, K.D. Cole, and this report is now available on request from him. The following is an extract from the Proceedings to introduce the successful meetings held in Edinburgh.

FOREWORD (by K.D. Cole, Convener)

A workshop on 'Strengthening IAGA Sciences in the Developing Countries' was held at the Fourth Scientific Assembly of IAGA at Edinburgh on the evenings of 10th and 14th August 1981. This was a sequel to the Symposium on 'Opportunities in Geomagnetism and Aeronomy in Developing Countries' held at the IAGA/IAMAP Joint Scientific Assembly at Seattle, August 1977, which was convened by A.A. Ashour and co-convened by J.G. Roederer.

The aim of the workshop was to evolve a plan of action for Strengthening IAGA Sciences in Developing Countries, following a discussion of,

(1) The present status of education and research in Geomagnetism and Aeronomy in the Developing Countries;
(2) The role of education and research in Geomagnetism and Aeronomy in the technological progress of a developing country;
(3) Entrepreneurial steps which must be taken at the personal, institutional, governmental and/or international level to strengthen IAGA sciences;
(4) Identification of institutions interested in this problem;
(5) Identification of persons prepared to devote considerable time to do entrepreneurial work involved in implementing this plan.

The workshop was attended by about 80 persons who formed four groups to discuss topics which the meeting considered significant. These were:

Group 1: Education
Group 2: Research and Geomagnetic Observatories
Group 3: Institutional networks; Government agreements
Group 4: Individual initiatives.

Reports of each group were produced and have been collated together with some individual comments received at the workshop and since then. No editing has been done on this material in the interest of fast dissemination..

On the final evening of the workshop, an ad hoc committee of IAGA was formed to take the next steps in promoting the aims of the workshop, drawing upon the reports of the working groups and any other sources, e.g., the proceedings of the previous Seattle symposium. The committee should define its terms of reference which can be confirmed in due course by the Executive Committee of IAGA.

MAIN POINTS IN THE REPORTS FROM WORKING GROUP PARTIES

No.1 EDUCATION (by G. Rajaram)

Educational requirements were discussed in detail for (1) High School and Pre-University (A-level) stage, (2) University Undergraduate, (3) University Postgraduate, and (4) Advanced Level Research and Training. Then the urgent needs and immediately appreciable plans were summarized as follows.

1. Setting up of a central IAGA organization to act as a liaison and clearing house for audiovisual aids, apparatus, equipment, books, journals, posters and documentary movies. This organization could keep itself informed about material required by developing countries, as well as material which can be spared by developed countries, and then arrange for interchange.
2. IAGA News could possibly reserve a page for exchange of information on the above, so as to keep scientists all over the world informed.
3. IAGA could recommend to governments, scientific ogranizations, research and educational institutions of various countries, certain points that are relevant to enhancing the standard of education, research and experimentation in developing countries. A typical example is the necessity of treating the pure and applied aspects of the sciences in an integrated manner. This will ensure better exchange of vital information, and active encouragement of local governments towards these sciences, once they realise that material prosperity can ensue from such studies.
4. IAGA could nominate local people in developing countries and developed countries, who can act as liaison between IAGA and the respective countries, as regards various necessities of COGADEC.
5. IAGA could set about establishing international centres for Geomagnetism and Aeronomy. This aspect will be dealt with in some detail as it was recommended by many scientists at the Edinburgh workshop. A typical example would be a Centre for Geomagnetism with facilities for advanced level and training, including a data-bank with say magnetic survey data (ground, ocean, air and satellite surveys). Scientists from developed countries would stay at this centre for suitable periods of time, and in addition to being exposed to various aspects of Geomagnetism, would be trained to use survey data for pure (Geophysical Science) and applied (say, location of natural resources) purposes. These scientists on returning to their native lands, could remain in contact with this Centre, while developing Geomagnetism in their respective countries.
   Such a project will need large-scale funds for which the UN would be a potential source. Some contribution could come from the developing countries themselves, following the principle that it is best for these countries to join hands in lifting up their own science and technology.
6. IAGA could recommend that personnel from developing countries who come developed countries for training, should build their own equipment or data base, take it back home, and actively work on it to improve it and innovate on it.
7. IAGA could recommend to developing countries quick action in selecting qualified people to write good, lucid text books in Geomagnetism and Aeronomy for various levels. Such text books published within the respective countries would be low-priced and rather effective in disseminating knowledge on these subjects. IAGA could help towards scrutiny of the written matter, and funds for publishing.
8. IAGA could actively contribute towards the twin tasks of (a) motivating young students, (b) spreading the scientific temperament amongst the public in developing countries. These aspects have a high priority in developing countries.

Medium and Long-term plans

IAGA probably does not have to worry too much about this, except to raise the level of communication in pace with rise in scientific ability. Certainly some of these short-term plans, e.g. (a) treating Pure and Applied Geophysics in an integrated manner, (b) establishing centres for training personnel in Geomagnetism and Aeronomy, (c) encouraging availability of low-priced text books written by qualified scientists of developing countries, (d) motivating young students, and taking science to the common man in developing countries, are in themselves re-generative. These schemes will automatically lead Geomagnetism and Aeronomy into newer and better avenues, and there may even be major breakthroughs in these sciences, as a consequence.

No.2 RESEARCH AND MAGNETIC OBSERVATORY PROGRAMS (by K.L. Svendsen)

It is the belief of this working group that research in pure and applied geophysics is contributory and important to the development of countries. In as much as local magnetic observatories are a major source of data supply for local research, operation of magnetic observatories is an important factor in this reasearch and the health of their operation should be assured.

At the present time, the institutions in developing countries which are engaged in this research and are operating magnetic observatories are experiencing a variety of serious problems, some as serious as to threaten cessation of operation. In a poll of geophysical representatives from more than a dozen developing countries, the following problems were considered to be the most serious:

(1) Lack of trained scientists and technicians
(2) Lack of financial support or understanding by management
(3) Lack of research tradition (and low production of papers)
(4) Lack of opportunities for personal contact with foreign colleagues (including attendance at international meetings)
(5) Few graduate students (now lured away by higher paying positions)
(6) Lack of exchangeable currency for purchase of instruments and supplies
(7) Lack of opportunities for experiments

In general it was felt that those actions should be favoured which are designed to get at the core of the problems (not those which provide only temporary relief) and develop independence of the countries, although it was recognized that for some important scientific programs such as IMS and Magsat, some temporary action might be indicated. It was also recognized that most of the developing countries are in the equatorial and low latitude regions, and that therefore, programs including phenomena of those regions should receive special consideration.

It was the consensus that these problems are not easily solved and will, therefore, require some years of effort at correction. Accordingly, the working group urges IAGA to create a permanent committee to work on these problems. This committee would operate not only at the biennial meetings of IAGA, but on a continuing basis. It was noted that the present Working Group on Magnetic Observatories, Instruments, and Standards has been operating as a clearing house for solutions of urgent instrumental problems.

The following specific items are recommended for immediate action by IAGA:

(1) Creation of an IAGA Committee on Assistance to Developing Countries (CADC)

(2) Agreement of IAGA to send letters urging support of magnetic programs to those institutions requesting such assistance (currently, Kenya and Nigeria)
(3) Approach by IAGA to certain international bodies for establishment of regional training centres in geophysics: For Africa, to ECA for an International Center for Pure and Applied Geophysics in Africa (ECA is already supporting such a centre for geodesy); For Asia, to ASEAN; For Latin America, to OAS. Alternatively, one could consider one international center such as the one for physics in Trieste.
(4) Expression of intent by IAGA to consider endorsement of future proposals to UNESCO, UNDP, COSTED, AGID or other international bodies for grants for study abroad and other items mentioned above.
(5) Application by IAGA for funds from UNESCO to support travel of a specialist in magnetic operations through the regions of developing countries for upgrading magnetic observatory and field programs.

The following items are to be studied by the CADC for possible future action:
(1) How to promote visits of foreign scientists and technicians
(2) How to effect the donation of instruments
(3) The formation of regional workshops.
(4) The promotion of bilateral agreements for training technicians and for cooperative research projects (It is noted that India already has a national program of assistance to other developing countries in training of technicians)
(5) Justification for magnetic programs
(6) Preparation of a periodic newsletter giving information on activities of the CADC
(7) The promotion of the teaching of geophysics in the universities of the developing countries
(8) How to improve libraries of geophysics

No.3 INSTITUTIONAL NETWORKS (by H.G. Barsczus)

Meeting of this group was attended by few participants having immediate interest in that field. This low attendance was probably caused by a bad definition of the goal of that group which failed to identify a significant list of institutions able to become active in contributing to the advancement of geomagnetism and aeronomy in developing countries - if this was the assignment of the group. Such institutions are, for example, ORSTOM and CRG Garchy, both of France (having long experience with working in developing countries and/or training of scientists and technicians from and for developing countries), and WDC-A from Boulder/USA. A short report was also given on INAG activities.

However an immediate agreement was obtained concerning the need for appointing a special IAGA Committee for Developing Countries, and the group agreed to submit to SDC the following proposal essentially written by C.A. Onwumechili, followed by a list of suggestions for solutions relative to each specific field.

Committee on Geomagnetism and Aeronomy in Developing Countries (COGADEC)

Realising that the cheapest and most efficient approach to geophysics is through a global effort in which, as far as possible, each country studies its own environment and contributes to the world data bank and the steady growth of geophysical knowledge.

The objective of the exercise is the stengthening of the endogeneous capability of the developing countries in the areas of geophysics, and more particularly in geomagnetism and aeronomy.

To focus attention and effort on this objective, it is proposed that a standing committee on Geomagnetism and Aeronomy in Developing Countries (COGADEC) be formed. Such a committee should be a vehicle for launching some of the recommendations that may come from the ad hoc groups formed on August 10, 1981, discussing:

a. educational and training programmes;
b. research and technical programmes;
c. institutional and international arrangements; and
d. individual initiative

Membership of the Committee should reflect as many areas of geomagnetism and aeronomy as possible as well as ensure a large geographical distribution, comprising both developed and developing countries. (Refer to existing IAGA discussions and working groups). If it becomes necessary, appropriate recommendations could be made in due time to IUGG to ensure that other areas of geophysics are covered and that a similar Committee of the Union might be set up.

While reporting periodically to its parent body, in order to ensure fast and unbureaucratic action, this Committee should enjoy a large measure of freedom of action, depending on its ability to find funds for its activities. Among these activities, the Committee may possibly through action of some of its proper ad-hoc working groups to be formed:

FUNDING: Attract funds from funding agencies and elsewhere in order to ensure its action capability;

EDUCATION: Organize workshops, study, scientific and technical training groups, symposia, seminars etc in liaison with existing national or international organizations on various aspects of geomagnetism and aeronomy in developing countries, and as far as possible with the venues in developing countries;

RESEARCH: Organize cooperative studies of geomagnetic and aeronomical phenomena of particular interest to developing countries and encourage the active participation of developing countries;

ADVICE: Encourage permanent observations of important geomagnetic and aeronomical phenomena in appropriate developing countries;

INFORMATION AND EXCHANGE: Serve as a clearing-house on information and linkages between scientists and institutions in developed and developing countries;

INDIVIDUAL INITIATIVES: Encourage participation of scientists from developing countries in international activities as well as visits of scientists and technicians from developed countries to developing countries and vice-versa, on an individual basis, and other individual initiatives with regard to collection and of donation and transport of spare equipment, other supplies, technical information (such as blueprints of instrumentation), books, journals etc for and to developing countries.

Experience has shown that such committees have been able to find funds and have contributed significantly to the achievement of the objective for which they were formed, for example - Committee on Space Research (COSPAR), Scientific Committee on Antarctic Research (SCAR), International Scientific Committee on Equatorial Aeronomy, INAG, and so on.

No.4 INDIVIDUAL INITIATIVES (by N.J. Skinner)

It was felt that there were a number of areas in which immediate progress could be made in strengthening IAGA sciences in developing countries for the expenditure of relatively small sums of money. The group considered the following three topics, and the recommended actions are also mentioned in the original report.

1. Visiting Scientists

(a) Short-term visits: Scientists in developing countries have relatively little opportunity for personal communication with other scientists. On the other hand, scientists travelling to conferences or on sabbatical leave could frequently make short stopovers in developing countries if the necessary contacts could be made in advance. The group recommends the establishment of a visitors' registry (along the lines originally suggested by Dr. M.J. Moravcsik at the Seattle Assembly). One scientist would act as coordinator. He would receive travel details from scientists who over the next few months would be travelling through or near some developing area, and would fill in an information card. Xerox copies of this card would then be sent to institutions who have indicated a general interest in receiving visiting scientists working in the fields of IAGA interest. If the host institution is interested in receiving a particular visitor it would make direct contact with the visitor and arrange all the necessary details. The cost to IAGA of implementing this scheme would be quite small and would consist mainly of postage costs.

(b) Longer-term visits: Longer working visits of scientists to or from developing countries could also be arranged through the coordinator of the visitors' registry.

2. Strengthening of Library Material in IAGA Disciplines

(a) Back sets of journals: Many newly established libraries in universities in developing countries cannot afford to buy back sets of scientific journals necessary for effective research in IAGA based fields, especially as payment would normally have to be in hard currency. At the same time many older scientists can no longer afford the shelf space required to accommodate long runs or journals which are now seldom consulted by them. Again it would seem that a coordinator is required to collect information from both donor scientists and potential receptor libraries (in consultation with local scientists) in order to facilitate the appropriate 'match'. The receptor library should be prepared to pay the transport costs of the material although it is sometimes possible to make special transport arrangements through, for example, the embassies of the donor's country, or through UNESCO (who have paid transport costs for this type of operation in the past).

Another method which should be considered is to supply back files of journals in micro-film form.

Gifts of books and book collections could also be handled through the coordinator.

(b) Current journals: The shortage of hard currency frequently restricts the range of current science journals subscribed to in developing countries. Many of these journals are published by learned societies operated by the scientists themselves, who thereby are in a position to influence the policy of the societies.

(c) Access to computer 'on-line' bibliographic databases in the geosciences: Scientists in developing countries with limited library facilities have difficulty in doing the necessary bibliographic research for their projects. Many libraries in Europe, North America and elsewhere have access to one-line bibliographic databases in the geosciences. Many scientists in developing countries are not even aware of the scope of this type of information system.

3. The Transfer of 'Idle" Equipment: Most scientists in developing countries suffer from the shortage of both specialised equipment for undertaking particular types of research investigation and more basic equipment in the test and monitoring categories (e.g., oscilloscopies, power supply units, etc.). In developed countries a considerable quantity of such equipment is becoming surplus to requirements. For example, many networks are currently shifting to digital magnetometers and sophisticated ionosonde models, and older machines (often with a useful lifetime) are being discarded. This is another case where IAGA could play a valuable 'broker's' role. Conditions of transfer whether by gift, indefinite loan or token payment, and transport costs, would have to be arranged directly by negotiation between donor and receiver groups. Hopefully scientific collaboration would also take place to their mutual advantage.

The ad hoc Committee for Geomagnetism and Aeronomy in Developing Countries

This committee (consisting of the following members) was formed on 14 August 1981 to take next steps in strengthening IAGA sciences in the developing vountries. It should also generate a set of terms of reference for confirmation as soon as possible by the Executive Committee of IAGA.

E. Oni (Nigeria) Chairman	J.P. Patel (Kenya)
I. Galindo (Mexico)	I. Pacca (Brazil)
Q.-L. Liu (China)	G. Rajaram (India)
K.L. Svendsen (North America)	S.R.C. Malin (Europe)
V.A. Troitskaya (U.S.S.R.)	N. Fukushima (ex officio)

K.D. Cole (ex officio, Added by the President of IAGA subsequent to the meeting.)

MINUTES OF THE IAGA EXECUTIVE COMMITTEE MEETINGS

Edinburgh, Scotland, U.K.

August 1981

The IAGA Executive Committee (hereafter abbreviated to EC) Meetings were held before and during the Fourth Scientific Assembly in Edinburgh, Scotland, U.K. The meetings were held in a room in the Appleton Tower of the University of Edinburgh in the afternoon (14 - 18h) of 2 August and the lunch hours of 3, 4, 5, 6, 19, 11, 12 and 14 August. The Meetings on 3 and 10 August were with the Leaders of IAGA Divisions and Interdivisional Bodies, and the meeting on 14 August was with IAMAP representatives. All EC members were present but C.-G. Fälthammar had to miss the second week. The meetings were arranged with great efficiency by M. Gadsden with the support of the Local Organizing Committee. The following is a summary of discussions and conclusions reached during the EC meetings, without keeping to chronological order. The minutes of the meetings with the leaders of IAGA Divisions and Interdivisional Bodies and the IAMAP representatives are given separately.

I. Approval of the Agenda

It was agreed to follow the agenda proposed by Secretary General Fukushima, and some additional material for discussion was distributed at the meeting.

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

The minutes of the previous EC meeting (in Galveston, Texas, U.S.A., 22 - 24 October 1980) have been published in the IAGA News No. 19, pp. 10-22 (issued in December 1980). These minutes were approved. Some matters arising from the minutes were discussed under the appropriate items in the following minutes.

III. Reports on the IUGG Executive Committee Meeting, Including Information on the XVIII General Assembly of IUGG, Hamburg, August 1983.

President Cole and Secretary General Fukushima attended the IUGG Executive Committee Meeting held on 25 - 26 July 1981, in the University of Western Ontario, London, Canada, during the IASPEI Assembly. They presented a summary report of the activity of IAGA since the XVII IUGG Assembly (Canberra, December 1979) along with IAGA's wish for the IUGG Interdisciplinary Symposia at the XVIII General Assembly in Hamburg in August 1983.

The report covered the following items: IAGA publications, IAGA Finance in 1979 and 1980, Workshop on Electromagnetic Induction in the Earth and Moon, IAGA's attitude on IAGA/URSI Joint Working Groups, IAGA representation to the SCAR Working Group on Upper Atmosphere Physics, preparations for the Fifth International Symposium on Solar-Terrestrial Physics, IAGA cosponsorship to COSPAR symposia in 1982, and an outline of the IAGA Edinburgh Assembly.

Plans for the IUGG Interdisciplinary Symposia for the 1983 IUGG General Assembly were introduced and it was decided that they should be shown to the leaders of IAGA Divisions and Interdivisional Bodies in order for account to be taken during the discussion of the IAGA sessions of the next Hamburg Assembly.

The conclusions reached by the IUGG Finance Committee on the possible reduction to Association allocations in the coming two years were also reported. President Cole was authorized to write a letter to the IUGG President regarding the financial situation.

IV. Preparations for the IAGA Edinburgh Assembly and the Conference of Delegates

Secretary General Fukushima reported first on the admirable preparatory arrangements made by the Local Organizing Committee, including the publication of the Program-Abstracts booklet (614 pages, containing more than 1000 abstracts). He also mentioned that the IUGG Bureau representative at the IAGA Edinburgh Assembly was Prof. A.A. Ashour.

President Cole reported that Prof. M. Nicolet was unable to attend the Edinburgh Assembly, therefore his celebratory lecture on International Polar and Geophysical Years scheduled for the First Conference of Delegates had to be cancelled. However, Professor Nicolet will give such a talk as one of the IUGG Lectures at the 1983 IUGG General Assembly.

President Cole reported on his efforts since the last EC meeting for the Workshop on "Strengthening IAGA Sciences in Developing Countries", meetings are scheduled for the evenings of 10 and 14 August during the Edinburgh Assembly.

President Cole explained that the U.K. National Committee for IAGA agreed to postpone its proposal on the amendment of the present IAGA Statutes until the next General Assembly. He mentioned however the need to clarify some expressions in the Statutes to avoid possible ambiguity. Since only member countries are entitled to propose any change in the Statutes, it was agreed to ask the National Committees of IAGA member countries to pay attention to this problem.

It was agreed to report to the First Conference of Delegates the names of the Resolutions Committee (chairman: D.J. Williams; members: M.L. Chanin, B.A. Hobbs, A. Nishida and O.M. Raspopov) and the new Chairman of IAGA Division IV, L.F. Burlaga, and a new co-chairman F.M. Neubauer. A Preliminary invitation from the Czechoslovak National Committee for the IAGA 1985 Scientific Assembly was also to be presented to the First Conference of Delegates.

V. Review of the Activities of IAGA Internal Bodies

The EC noted with satisfaction the activities of all IAGA Divisions and Interdivisional Bodies under the new leaders elected at the Canberra Assembly. Detailed discussions were deferred until the meetings with these leaders (on 4 and 10 August).

VI. Liaison with IAGA National Bodies of Member Countries

Secretary General Fukushima reported that he contacts the IAGA National Correspondents (and Local Correspondents also) usually on a quarter-yearly basis, and he is very grateful to them for their cooperation in disseminating and collecting important information and also in updating the list of IAGA News recipients. The list of IAGA National Correspondents is revised every year and published in the IAGA News.

VII. Cooperation of IAGA with Other Associations or Inter-Association Bodies within IUGG

It was agreed to ask the Joint IAGA/IAMAP Advisory Board to continue their efforts towards future cooperation between IAGA and IAMAP. The approach of the Division I chairman to IASPEI regarding their participation in the study of electrical properties of the asthenosphere by means of input from seismologists and others working on physics of the upper mentle, heat flow etc. was noted with approval.

It was noted that IAGA had very effective joint assemblies with IASPEI in 1969 and with IAMAP in 1977. It was agreed that such joint assemblies could possibly occur again in the future. In the meantime, IAGA will use the opprtunity of the IUGG General Assembly to strengthen the close cooperation with sister associations of IUGG.

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

URSI: There is a proposal for fusion of Commissions G (Ionospheric Radio and Propagation) and H (Waves in Plasmas) in the agenda of the URSI Council Meeting during the XX General Assembly of URSI. IAGA's attitude has been to support the Joint URSI/IAGA Working Groups (Structure and Dynamics of the Thermosphere, Ionosphere and Exosphere; Neutral and Ion Chemistry and Solar Fluxes; Passive Electromagnetic Probing of the Magnetosphere; Wave Instabilities in Space Plasmas) for as long as URSI wishes. The EC noted some strong support of JWG members for continuation for some JWG's, and now awaits the recommendation from URSI*. If URSI is going to

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* It was later known that the General Assembly of URSI recommended the continuation of URSI/IAGA Joint Working Groups on "Wave Instabilities in Space Plasmas" (with URSI Commissions G and H) and "Passive Electromagnetic Probing of the Magnetosphere" (with URSI Commission H).

entrust "geophysical research" to IAGA, IAGA would take over the work of the above JWGs in some way in the IAGA internal structure. It was recommended that the President write a letter to URSI to avoid the future clash of meetings, even though the next possible one will not be until 1987 (IUGG) or 1993 (IAGA).

COSPAR: Fukushima reported that IAGA failed to obtain the official cosponsorship of COSPAR to two sessions of the IAGA Edinburgh Assembly (i.e. the Special Symposium on Saturn and the session on Dynamics of the Thermosphere and Exospheres of the Earth and Planets), due to the lack of time needed for advance negotiation. The meetings were nevertheless organized satisfactorily.
As to the COSPAR's wish for IAGA cosponsorship of the Workshop on Comparison of Data with CIRA and Proposed Revisions, the EC decided to ask for the advice of the Division II chairman for the nomination of the IAGA representative (see also item IX).

SCOSTEP: President Cole explained some recent affairs of SCOSTEP (i.e., the change in the SCOSTEP Secretariat, the adoption of a new constitution, MAP activity, etc.). He explained the need for a change in IAGA representation in the SCOSTEP Bureau. It was agreed to recommend T. Obayashi (Japan) to replace J.G. Roederer (U.S.A.) at the end of the coming SCOSTEP General Meeting in Ottawa in May 1982. Roederer reported that the program of the Fifth International Symposium on Solar-Terrestrial Physics (scheduled for 17 - 22 May 1982, Ottawa) is ready for announcement, and he appreciated the cooperation of the IAGA representatives on the Program Committee.

ICL: It was reported that the IAGA Division I is trying to contribute as much as possible to the new international project "Dynamics and Evolution of the Lithosphere" which is now being conducted by the IUGG-IUGS Inter-Union Commission on the Lithosphere.

SCAR: Prof. T. Nagata (IUGG representative to SCAR) brought up the need for nomination of an IAGA representative to the SCAR Working Group on Upper Atmosphere Physics; the EC agreed to the nomination of Prof. T. Hirasawa (National Institute of Polar Research, Tokyo, Japan). The importance of IAGA's active participation in the SCAR Upper Atmosphere Physics Working Group was discussed, including ways of setting up more communication between SCAR and IAGA. It was suggested that perhaps a number of nominations for an IAGA representative to this group should be made and then the person considered to be the most active chosen. It was felt that a review of the science and planning should be initiated by IAGA and liaison set up with SCAR. Troitskaya volunteered to look into this problem, including means of getting money for support. Cole stated he would contact Prof. G.A. Knox in New Zealand on this matter. He felt that some progress toward organization and activities of the SCARUP should be made by the time of the Hamburg Assembly and asked everyone to give it some thought; in the meantime IAGA will give full support to Prof. T. Hirasawa .

IX. IAGA Cosponsorship of International Conferences

It was reported that the following meetings were held during January 1980 - July 1981, with IAGA cosponsorship.

COSPAR Symposium on Progress in Planetary Exploration
(Budapest, 2 - 4 June 1980)

COSPAR Symposium on Cosmic Rays in the Heliosphere
(Budapest, 3 - 4 June 1980)
COSPAR Symposium on Active Experiments in Space Plasmas
(Budapest, 11 - 13 June 1980)
Sixth International Symposium on Equatorial Aeronomy
(Puerto Rico, 17 - 24 July 1980)
International Symposium on Middle Atmosphere Dynamics and Transport
(Urbana, Illinois, U.S.A., 24 July - 1 August 1980)
Fifth Workshop on Electromagnetic Induction in the Earth and Moon
(Istanbul, 17 - 24 August 1980)

The proceedings of the above three COSPAR symposia were recently published by the Pergamon Press. Brief reports of the last three meetings have already been published in the IAGA News No. 19 (issued in December 1980).

Although the Workshop on Latin American Geomagnetic Observatory and Survey Practice was scheduled on 20 - 26 July 1980, in Rio de Janeiro (to which IAGA had given cosponsorship at the Canberra Assembly), this was cancelled due to financial difficulties.

The IAGA Working Group I-3 plans to hold its Sixth Workshop on Electromagnetic Induction in the Earth and Moon in Livermore, California, U.S.A., during 15 - 22 August 1982. It was agreed to ask IUGG for cosponsorship and financial support as in the previous meetings of this series.

According to the proposal from COSPAR, the EC agreed with cosponsorship of the Workshop on Comparison of Data with CIRA and Proposed Revisions (24 - 26 May 1982 during XXIV COSPAR Meeting), and it was decided to ask Prof. K. Hirao (Institute of Space and Astronautical Science, Tokyo, Japan) to be the IAGA representative on the Program Committee of this workshop, on the advice of IAGA Division II chairman Rishbeth.

X. IAGA Publications

IAGA Bulletin: No. 44 "Transactions of the XVII IAGA General Assembly in Canberra, Australia, December 1979" appeared in December 1980. No. 45 is the "Programme and Abstracts of the Fourth Scientific Assembly of IAGA, Edinburgh, Scotland, August 1981". No. 46 will be the "Transactions of the Fourth Scientific Assembly of IAGA, Edinburgh, Scotland, August, 1981". The IAGA Bulletin No. 32j "Geomagnetic Data 1979" appeared recently. It was also reported that the Bulletin 32-series will be published in the future despite the possible retirement of Dr. D. van Sabben as the Director of the International Service of Geomagnetic Indices in De Bilt, Netherlands.

IAGA News: No. 19 was published in December 1980. No. 20 will be published at the end of 1981, and this issue will contain a quick report on the IAGA Edinburgh Assembly and advance information on the 1983 IUGG/IAGA Hamburg Assembly.

XI. IAGA Finance

Fukushima reported that the Financial Report for 1980 (March-December 1980, shown in Appendix I, because the previous report was January 1979-February 1980) was sent to the IUGG Treasurer with the remarks concerning the great difference between the 1979 and 1980 reports. He explained that

all sales of publications had been reported in 1979; that only one entry of interest had been reported in 1980, whereas three appeared in 1979; that there were two IAGA News publications in 1980 as well as the Transactions of the Canberra Assembly, whereas no expenditure for publications in 1979; and so forth.

It was reported that the allocation from IUGG would be reduced by $5,000 for each of the next two years and ways to compensate for this loss were discussed. It was noted that IAGA's reserves should not fall below the level of one year's operation, that an equitable way for IUGG to make allocations to the various Associations would be to take into account their reserves. The President was asked to write to the Chairman of the IUGG Finance Committee to explain that IAGA had built up its reserves over the past years in anticipation of the Canberra Assembly but that now the reserves are at the proper one-year level.

Discussion was held on how to cut the costs of publications. One suggestion was to have smaller issues of IAGA News by discontinuing the short scientific articles and restrict the contents to results of Working Groups and general information of interest to the IAGA community.

XII. Resolutions of the Edinburgh Assembly

D.J. Williams (chairman of the Resolutions Committee) presented 16 resolutions received from the IAGA Divisions and Interdivisional Bodies and polished by the Resolutions Committee. All of these were approved, with some wording changes, with the exception that dealing with the overlapping of IAGA and URSI conference dates. It was decided that instead of a resolution the President should write an open letter to URSI expressing IAGA's concern over this unfortunate circumstance. This action is to be mentioned at the final Conference of Delegates. Vice President Dessler was asked to present the Resolutions to the final Conference of Delegates because of Williams' absence on that day. Williams was asked to prepare a note of appreciation to the Royal Societies of London and Edinburgh and the Local Organizing Committee for hosting this Fourth Scientific Assembly of IAGA.

XIII. Other Items

Logo of IAGA: Fukushima reported that 10 designers contributed to the contest for a new IAGA logo. The EC agreed to give the President the power to select the winner. [The result is described in the minutes of the Conference of Delegates: the final decision is to be postponed to the 1983 Hamburg Assembly for possible modification of the proposed ones and new entries].

Honorary Members of IAGA: Drs. L.R. Alldredge and J.O. Cardus were unanimously recommended to be the new Honorary Members, in addition to the four past Presidents (Drs. J. Coulomb, V. Laursen, M. Nicolet and T. Nagata). This designation was to be reported to the Final Conference of Delegates.

Next Meeting of the IAGA EC: It was agreed to hold the next EC meeting in connection with the 1982 COSPAR Meeting in Ottawa, Canada, i.e. on 16 May 1982 (Sunday, all day) and the evening of some following days.

Appendix I.

INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY

Financial Report for the Year 1980 (Mar. 1 - Dec. 31, 1980)

FORM 2

Amounts in USA dollars Exchange rate .....

RECEIPTS	IUGG	GRANTS & CONTRACTS
15. IUGG ALLOCATION	24,700.00	x
2. UNESCO GRANTS	x	0
3. OTHER GRANTS	x	0
4. CONTRACTS WITH UNESCO, etc.	x	0
5. SALES OF PUBLICATIONS	0	x
6. MISCELLANEOUS	283.43	x
7. TOTAL RECEIPTS	24,983.43	0
8. CASH ON HAND AND IN BANKS Mar. 1, 1980	25,190.19	0
9. INVESTMENTS & RESERVES Mar. 1, 1980	0	0
10. TOTAL	50,173.62	0

EXPENDITURE	IUGG	GRANTS & CONTRACTS
11. ADMINISTRATION	3,583.22	x
12. PUBLICATIONS	15,166.02	0
13. ASSEMBLIES	2,595.00	0
14. SYMPOSIA & SCIENTIFIC MEETINGS .	9,680.55	0
16. GRANTS (Permanent Services, etc.)	0	0
17. CONTRACTS WITH UNESCO, etc.	0	0
18. MISCELLANEOUS	82.23	0
19. TOTAL EXPENDITURE	31,107.02	0
20. CASH ON HAND AND IN BANKS Dec. 31, 1980	19,066.60	0
21. INVESTMENTS & RESERVES Dec. 31, 1980	0	0
22. TOTAL	50,173.62	0

	Mar. 1, 1980		Dec. 31, 1980	
23. ACCOUNTS RECEIVABLE	0	0	0	0
24. ACCOUNTS PAYABLE	0	0	0	0

Breakdown of Item 6

Interest	283.43

Breakdown of Item 11

11.1 Personnel	1,200.00
11.2 Quarters	0
11.3 Supplies & Equipment ...	457.07
11.4 Communications	1,834.43
11.5 Travel (admin. only) ...	0
11.6 Miscellaneous	91.72
	3,583.22

Breakdown of Item 12

12.1 Transactions of the Canberra Assembly	6,774.78
12.2 Proceedings of Symposia	0
12.3 Periodicals: IAGA News No.18	3,233.54
IAGA News No.19	5,157.70
	15,166.02

Breakdown of Item 13

13.1 Organization	0	
13.2 Travel	2,595.00	

Breakdown of Item 14

14.1 Organization	3,912.68	
14.2 Travel	5,767.87	
		9,680.55

Date: 24 February 1981

N. Fukushima

N. Fukushima
Secretary General, IAGA

MINUTES OF THE MEETINGS OF IAGA EXECUTIVE COMMITTEE AND CHAIRMEN OF IAGA DIVISIONS AND INTERDIVISIONAL BODIES

3 August 1981 (1200 - 1400h)

Present: H. Rishbeth, G. Rostoker, C.G. Sucksdorff, H.B. Garrett, S.R.C. Malin and all EC members

A provisional list of proposed IUGG Interdisciplinary Symposia for the 1983 Hamburg Assembly was distributed and explained by Cole. Chairmen of IAGA Divisions and Interdivisional Bodies were asked to discuss this list at their Business Meetings and to suggest names of conveners or co-conveners for these IUGG Interdisciplinary Symposia which are the concern of IAGA. Troitskaya recommended approaching the co-sponsoring Associations with the suggested names of co-conveners. It was also requested that the IAGA convener names be reported to the Secretary General immediately after the Business Meeting, possibly with a short description defining their ideas concerning the symposia so that guidelines can be set up. Fukushima promised to distribute by noon of 4 August more detailed information on the availability of time slots during the 1983 IUGG Assembly. It was recommended not to plan too many sessions for Hamburg, in order to avoid clash between IUGG symposia and IAGA sessions.

As to the Resolutions, it was decided that the draft must be in the hands of D.J. Williams by Friday (7 August).

It was remarked that good geographical coverage as well as good scientists should be considered when selecting officers at the next General Assembly in 1983. Any ideas on the IAGA internal structure modifications, long-term goals, and what IAGA must do, should be turned in to the President.

10 August 1981 (1200 - 1400h)

Present: D.I. Gough, H. Rishbeth, M.H. Rees, A. Nishida, C.G. Sucksdorff, H.B. Garrett, T. Hirasawa, L.R. Megill, J. Taubenheim, S.R.C. Malin and all EC members except C.-G. Fälthammar

This meeting was devoted to exchange information on the outcome of the Business Meetings of IAGA Divisions and Interdivisional Bodies. Each Chairman reported on the draft of Resolutions, discussion and outcome regarding the sessions for the IAGA part of the 1983 IUGG Hamburg Assembly, and other important discussions. The Resolutions are shown elsewhere in this publication and the proposed IAGA sessions are listed later. Based on the comments and questions on the thrust of some IUGG Interdisciplinary Symposia, the Secretary General stated that he would write a summary of these comments and questions for the IUGG Executive Committee in order to avoid any ambiguities. Apart from the Resolutions and the 1983 scientific topics, the following information was introduced.

Two recommendations were presented from Division I: 1) that IAGA take appropriate action, in consultation with IASPEI, to replace the existing Ad Hoc Committee on the ELAS Project with an ELAS Committee, with a membership determined jointly by IAGA and IASPEI, and the support of IUGG be sought for the establishment of that Committee at the IUGG General Assembly in 1983 (Gough recommends U. Schmucker to be the chairman of this Committee); 2) that an informal Working Group be formed, consisting of no more than 3 representatives each from the IAGA Working Groups I-1, III-3 and V-5, to explore the possibility of providing a unified Geomagnetic Reference Field Model that would combine the fields due to the sources both inside the earth (excluding the lithosphere) and outside the earth (including the ionosphere and magnetosphere). Cole stated that there was already an Interdivisional Working Group on "Relations between External and Internal Magnetic Variations" and that it might be possible to expand the charter of that group to include the activity in the second recommendation. Gough said the suggestion had been made that Division I be subdivided because of the varied interests within the Division; however, no action was taken. As to the input from Division I for the Lithosphere Program, it would be handled by correspondence.

Division II feels there is no longer a need for the IAGA/URSI Joint Working Groups on "Structure and Dynamics of the Thermosphere, Ionosphere and Exosphere" and "Neutral and Ion Chemistry and Solar Fluxes"; however recommendations from URSI will be considered before any further action is taken. They feel the need to continue the Joint Working Group on Instabilities in Space Plasma.

Division V noted that it would be advantageous to have Working Group Meetings prior to Division Business Meetings (a similar comment was received by the Secretary General from Division III), and wondered if it would be possible to schedule a day for Working Group Meetings. It was felt that although it was a good idea, probably attendance would not be good enough to make it worthwhile. Cole suggested that business could be conducted partly by correspondence before meetings.

The Interdivisional Commission on History had been approached by the International Union of the History and the Philosophy of Science (IUHPS), Division of History of Science (DHS), to join them. It is felt that IAGA's group would provide input on "History of Space Physics" etc. Garrett asked for approval to do this and guidance in going about it etc. It was later recommended by the EC that the History Commission should go ahead and negotiate the possibility of forming a working group with IUHPS.

The Interdivisional Commission on the Middle Atmosphere questioned the separation of the "electrodynamics of the middle atmosphere" group within MAP from the group on the "electrodynamics of the upper atmosphere" within IAGA. The IAGA Working Group on UV Radiation in the Atmosphere should maintain close contact with the corresponding group in IAMAP. It was reaffirmed that the Interdivisional Commission on the Middle Atmosphere is IAGA's liaison with SCOSTEP/MAP.

MINUTES OF THE IAGA EXECUTIVE COMMITTEE

WITH IAMAP REPRESENTATIVES

Date: August 14, 1981. 1230 - 1400

Present: S.A. Bowhill, J. London, L.R. Megill, J. Taubenheim, P.C. Simon, K.D. Cole, N. Fukushima, A.J. Dessler, M. Gadsden, J.G. Roederer, V. Bucha, V.A. Troitskaya, D.A. Valencio, D.J. Williams.

After a short welcome message, President Cole explained the status of the Interdivisional IUGG Symposia for the 1983 Hamburg Assembly, including the recommended titles, scope and conveners, which resulted from the business meetings of IAGA internal bodies. He also noted that IAGA wished to hold a symposium on "Cosmic Dust in Interplanetary Atmospheres" (which was proposed by IAGA but not adopted by an IUGG symposium) with IAMAP cosponsorship and input from COSPAR and IAU. London stated that IAMAP would be willing to support.

Cole noted that the principal interaction between IAMAP and IAGA concerned MAP and asked Bowhill to comment. Bowhill noted the differences between meteorologists and aeronomers and stated that a Workshop on Troposphere-Stratosphere coupling has been suggested; final plans will be discussed next week in Hamburg.

Megill spoke of IAGA/IAMAP relationship and noted that an IAGA Working Group on Electrodynamics of the Middle Atmosphere had been formed with H. Volland as co-chairman. Cole explained IAGA's strong feeling for the need of this Working Group and mentioned the possible cooperation of IAMAP on this topic to be arranged sometime in the future. Bowhill noted that there is a MAP Study Group on Electrodynamics of the Middle Atmosphere with H. Volland as Chairman and that they are concerned with the problems of the global electric circuits and indicated that this would be an area for IAGA/IAMAP coordination. The ground-based measurements of electric fields would also need the cooperation of IAGA and IAMAP. Bowhill also spoke of another subject of interest to both IAGA and IAMAP, i.e. circumpolar balloon flights in the Northern Hemisphere. He hoped that IAGA would take the initial steps to investigate this possibility and discover what scientific dividends might be gained.

Bucha noted that another STP Symposium would be an opportunity for coordination between some IAGA and IAMAP groups. It was mentioned that the SCOSTEP Committee on STP-Meteorology chaired by J.W. King, plans to meet next week and perhaps formulate plans for a symposium in 1982 in the U.S.S.R. Cole noted the desirability of joint IAGA/IAMAP Assembly in the future. Simon spoke of the UV Working Group and the difficulties of organizing two meetings on the same subject without overlapping material.

President Cole thanked IAMAP for its invitation to the IAMAP Assembly during the next two weeks in Hamburg but because of his inability to attend he asked P.C. Simon to represent IAGA at the IAMAP Hamburg Assembly. J. London kindly offered to convey the results of the discussion of this meeting to the IAMAP leaders next week.

IUGG INTERDISCIPLINARY SYMPOSIA AND IAGA SESSIONS FOR THE 1983 HAMBURG ASSEMBLY

There will be 5 Union Lectures and 21 Interdisciplinary symposia during the XVIII General Assembly of IUGG in Hamburg in August 1983. One lecture is already fixed: "Commemoration of the International Polar Years and IGY". Prof. M. Nicolet has been approached as speaker and he has accepted. The IUGG Interdisciplinary Symposia concerned with IAGA are as follows.

IUGG Symposia with IAGA Leadership

Data Management [IAGA, ICL, all other Associations, (+CODATA?); Chief convener: R.L. McPherron, see p.117]

Scientific Discoveries from MAGSAT Investigations [IAGA, IASPEI, IAVCEI, IAPSO; Chief convener: R.A. Langel, Additional IAGA Representative: T.A. Potemra]

Interim Results from the Middle Atmosphere Program [IAGA, IAMAP, SCOSTEP; Chief convener: L.R. Megill]

IUGG Symposia with IAGA Cosponsorship

Geophysics of the Polar Regions [IUGG Bureau, all Associations, (+SCAR?); IAGA Representative: M.H. Rees]

Lithospheric Deformations: Geomagnetic and Geodetic Approaches [IAG, IAGA, IASPEI, ICL; IAGA Representative: M.W. McElhinny]

IAGA Sessions during the 1983 General Assembly

The following is a provisional list of IAGA sessions proposed for the Hamburg Assembly, so that some slight modification is possible before the announcement is written in the next issue of IAGA News. In addition to the proposed topical sessions, "General Contribution" sessions are to be held for each Division.

Proposed from	Provisional Session Title with Proposed Conveners
WG I-1	Mathematical Modeling of the Geomagnetic Main Field and Secular Variation, and Its Applications [D.R. Barraclough, W. Mundt]
WG I-2	Origin of Main Fields and Secular Changes of the Earth and Planets [E.R. Benton]
WG I-3	Electromagnetic Studies of the Earth [V. Haak, O. Praus]
WG I-4	The Origin and Significance of Regional Geomagnetic Anomalies [A.G. Hahn, P.J. Hood]
WG I-5	Megaplates and Microplates [D. Stone, A.N. Khramov]
WG I-5, 2	Paleomagnetism and Dynamo Theory [R. Merrill, D.J. Stevenson]
WG I-5, 6	Basic Theory and Experiments on the Magnetic Properties of Oxides [S.K. Banerjee, V.S. Shcherbakov]
Div. II and V	Cosmic Dust in Planetary Atmospheres (possibly with IAMAP, COSPAR, IAU; needs further negotiation) [if held, W.G. Elford and some others will form the Program Committee]
Div. II	Ionospheric (and Atmospheric) Modification [P. Stubbe]
Div. II	Equatorial Ionospheric Irregularities [R. Raghavarao]

Div. II/III	Electrodynamics of Polar Atmosphere and Magnetosphere [M.H. Rees, R.A. Greenwald
Div. II/III	Comparative Aspects of Magnetospheric Structure and Dynamics [D.M. Hunten, T.W. Hill]
Div. II/III	Role of Ionospheric Plasma in Physics of the Plasmasphere and Trough Regions [C.R. Chappel]
Div. III	Theory and Modeling of Hydromagnetic Waves [A.D.M. Walker]
Div. IV	Large-Scale Solar-Interplanetary Relations [R. Schwenn, N. Sheeley]
Div. IV	Turbulence and Kinetic Physics of the Solar Wind [W. Feldman, E. Marsch]
Div. IV	Solar Maximum Transition [F.M. Neubauer, D. Rust]
Div. IV	Problems Related to Solar-Wind Composition [K. Ogilvie, O. Vaisberg]
Div. V	Workshop on Geomagnetic Observatory and Survey Practice [W.F. Stuart, G. Fischer]
History	Historical Events or People [H.B. Garrett]
History	The Use of Historical Records in the Study of Geomagnetism and History [H.B. Garrett]
WG E/I	Origin and Comparison of Sq and L Variations [S. Matsushita, D.E. Winch, J.C. Gupta]
WG E/I	Separation of the Observed Magnetic Field into Main, Ionospheric and Magnetospheric Contributions [W.P. Olson, S. Matsushita, B.P. Singh]
WG E/I	The External and Internal Magnetic Field Separation during IMS [W.H. Campbell, K.K. Tschu]
WG E/I	Equatorial Electrojet and Counter Electrojet [R.G. Rasogi, E. Oni]
WG E/I	General Contributions on Internal/External Effects [S.R.C. Malin]

OPTICAL CALIBRATION WORKSHOP

(17-19 August 1981, in Aberdeen, Scotland)

As the result of a suggestion made by M. Gadsden at the Canberra meeting in 1979, IAGA Working Group V-4 on Optical Calibration Standards, held an 'Optical Calibration Workshop' in Aberdeen, Scotland, in conjunction with the IAGA Scientific Assembly. The aim was to continue the programme of intercalibration of low luminance standards used in airglow and auroral studies, which is described in detail in "Intercalibration of Instrumentation used in the Observation of Atmospheric Emissions: A Progress Report 1976-79" by R. Torr. This report, as well as the second one to be issued in the December 1981 time frame, are available from M.R. Torr.

The workshop was attended by 28 scientists, who brought 30 sources for comparison. Of these roughly two-thirds were radioactivity excited phosphors, and one-third tungsten filament based sources. The main business of the workshop was the actual measurement and comparison of sources. The C_{14} transfer source is now in the process of being calibrated against a recently purchased NBS calibrated lamp. Following the calibration, intercalibrated intensities will be mailed out to the owners of the 30 sources involved in the workshop.

In addition there were three sessions of lectures and discussion in the mornings; on Monday August 17 the workshop was introduced, with a history of the intercalibration project by M. Gadsden, and an outline of procedures by P.C. Wraight; on Tuesday Aug 18, F.A. Garforth gave a talk on calibration procedures for low luminance sources at the N.P.L.; R.H. Eather discussed practical procedures for use of reference sources in airglow and auroral research; K.C. Clark presented a design for a low light level diffuser and attenuator based on Lambertian scattering; and H. Tanabe described optical calibration procedures in Japanese research.

A discussion was held on Wednesday Aug. 19, to review the workshop and make recommendations for future calibration, chaired by P.C. Wraight in the absence of WG V-4 chairman M.R. Torr. The use of the transfer photometer was reviewed, and points where it could be improved noted; these included a better knowledge of filter transmission, and better facilities for automatic recording of data.

It was felt that the meeting had been extremely valuable. It was very much hoped that arrangements might be made for calibrations to be done in conjunction with the Hamburg meeting in 1983, and that a session be devoted to calibration at that meeting.

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Paul C. Wraight
Natural Philosophy Department
Aberdeen University
Aberdeen AB9 2UE
Scotland, U.K.

IAGA INTERNAL STRUCTURE AND LEADERS (until 1983)

EXECUTIVE COMMITTEE

President:	Keith D. COLE,	School of Physical Sciences, La Trobe University, Bundoora, Victoria 3083, Australia.
Vice-Presidents:	Alexander J. DESSLER,	Space Physics Department, Rice University, Houston, Texas 77001, U.S.A.
	Michael GADSDEN,	Natural Philosophy Department, Aberdeen University, Aberdeen AB9 2UE, Scotland, U.K.
Secretary General:	Naoshi FUKUSHIMA,	Geophysics Research Laboratory, University of Tokyo, Tokyo 113, Japan.
Members:	Václav BUCHA,	Geophysical Institute, Czechoslovak. Acad. Sci., Bočni II, 141 31 Praha 4-Sporilov, Czechoslovakia.
	Carl-Gunne FÄLTHAMMAR,	Department of Plasma Physics, Royal Institute of Technology, S-100 44 Stockholm 70, Sweden.
(Past President)	Juan G. ROEDERER,	Geophysical Institute, University of Alaska, Fairbanks, Alaska 99701, U.S.A.
	Valeria A. TROITSKAYA,	Soviet Geophysical Committee, Academy of Sciences of the USSR, Molodezhnaya 3, Moscow 117296, U.S.S.R.
	Daniel A. VALENCIO,	Departmento de Geológia, Ciudad Universitaria, Pabellon 2, 1428 Buenos Aires, Argentina.
	Donald J. WILLIAMS,	Space Environment Laboratory, NOAA/ERL R43 Boulder, Colorado 80303, U.S.A.

Honorary Members: J. Coulomb (France), V. Laursen (Denmark), M. Nicolet (Belgium), T. Nagata (Japan), L.R. Alldredge (U.S.A.), and J.O. Cardús (Spain).

DIVISION I. INTERNAL MAGNETIC FIELDS

Chairman: D.I. GOUGH, Department of Physics, University of Alberta, Edmonton, Alberta T6G 2J1, Canada.

Vice-Chairmen: G.N. PETROVA, Institute of Physics of the Earth, Bolshaya Gruzinskaya 10, Moscow 123242, U.S.S.R.

D.E. WINCH, Department of Applied Mathematics, University of Sydney, Sydney, N.S.W., Australia 2006.

V.R.S. HUTTON, Department of Geophysics, University of Edinburgh, JCMB King's Bldgs., Mayfield Road, Edinburgh EH9 3JZ, U.K.

Working Group I-1. Analysis of the Main Field and Secular Variations

Chairman: N.W. PEDDIE, U.S. Geological Survey, Denver Federal Center, MS 964, Box 25046, Denver, CO 80225, U.S.A.

Vice-Chairman: D.R. BARRACLUGH, Geomagnetism Unit, Institute of Geological Sciences, Murchison House, West Mains Road, Edinburgh EH9 3LA, U.K.

Working Group I-2. Theory of Planetary Magnetic Fields and Geomagnetic Secular Variation

Chairman: I.A. ELTAYEB, School of Mathematical Sciences, University of Khartoum, Khartoum, Sudan.

Vice-Chairman: D.E. LOPER, Geophysical Fluid Dynamics Institute, Florida State University, Tallahassee, FL 32306, U.S.A.

Working Group I-3. Electromagnetic Induction and Electrical Conductivity (earth and moon)

Chairman: A. ÁDÁM, Geodetical and Geophysical Research Institute, Hungarian Academy of Sciences, P.O.Box 5, H-9401 Sopron, Hungary.

Vice-Chairman: B.A. HOBBS, Department of Geophysics, University of Edinburgh, JCMB King's Bldgs., Mayfield Road, Edinburgh EH9 3JZ, U.K.

Working Group I-4. Magnetic Anomalies (land and sea)

Chairman: C.C. WEBER, Bureau Recherches Géologique et Minieres, B.P. 6009, 45018 Orleans Cedex, France.

Vice-Chairman: P.J. HOOD, Rm. 599, Geological Survey of Canada, 601 Booth Street, Ottawa K1A 0E8, Canada.

Working Group I-5. Paleomagnetism

Chairman: D.A. VALENCIO, Departamento de Geológia, Ciudad Universitaria, Pabellon 2, 1428 Buenos Aires, Argentina.

Vice-Chairman: C.E. BARTON, Graduate School of Oceanography, Narragansett Bay Campus, University of Rhode Island, Kingston, RI 02881, U.S.A.

Working Group I-6. Rock Magnetism

Chairman: D.J. DUNLOP, Geophysics Laboratory, University of Toronto, Toronto MS5 1A7, Canada.
Vice-Chairman: H. SOFFEL, Institut für Allgemeine und Angewandte Geophysik, Universität München, Theresienstrasse 41/IV, D-8000 München 2, Fed. Rep. Germany.

Ad-Hoc Committee on ELAS (Electric Conductivity of the Asthenosphere)

Chairman: V. SCHMUCKER, Institut für Geophysik, Postfach 876, D-34 Göttingen, Fed. Rep. Germany.
Vice-Chairman: L.L. VANYAN, Soviet Geophysical Committee, Molodezhnaya 3, Moscow 117296, U.S.S.R.

DIVISION II. AERONOMIC PHENOMENA

Chairman: H. RISHBETH, Rutherford & Appleton Laboratories, Chilton, Didcot, Oxon, OX11 0QX, U.k.
Co-Chairmen: P. BAUER, CNET/CRPE, Av. de la République, 92131 Issy-les-Moulineaux, France.
A.D. DANILOV, Institute of Applied Physics, Hydrometeorological Service, Pavlika Morozova 12, Moscow, U.S.S.R.
M.H. REES, Geophysical Institute, University of Alaska, Fairbanks, Alaska 99701, U.S.A.

Topic II-1. Structure and Dynamics of the Thermosphere

Reporters: A.D. RICHMOND, Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, Colorado 80309, U.S.A.
C.A. REDDY, Space Physics Division, Vikram Sarabhai Space Centre, Trivandrum, India 695022.
N. MATUURA, Hiraiso Branch, Radio Research Laboratories, Nakaminato, Ibaraki-Pref. 311-12, Japan.

Topic II-2. Neutral and Ion Chemistry and Solar Fluxes

Reporters: J.H. CARVER, Research School of Physical Sciences, Australian National University, P.O.Box 4, Canberra, A.C.T. 2600, Australia.
P.C. SIMON, Aeronomy Institute, 3 Avenue Circulaire, B-1180 Brussels, Belgium.
M.T. TORR, Center for Atmospheric and Space Sciences, UMC 34, Utah State University, Logan, Utah 84322, U.S.A.

Topic II-3. Atmospheric Quantal Emissions

Reporters: R.R. MEIER, Code 4141, Naval Research Laboratory, Washington, D.C. 20375, U.S.A.
A. VALLANCE-JONES, Herzberg Astrophysical Institute, National Research Council, Ottawa K1A 0R6, Canada.
N.N. SHEFOV, Institute of Physics of the Atmosphere, Pyshevsky 3, Moscow ZH-17, U.S.S.R.

Topic II-4. Ionospheric Small Scale Structures

Reporters: R. RAGHAVARAO, Physical Research Laboratory, Ahmedabad, 380009, India.
A.V. SHIROCHKOV, Arctic and Antarctic Research Institute, Fontanka 34, Leningrad, 191104, U.S.S.R.
S.L. OSSAKOW, Code 4780, Naval Research Laboratory, Washington, D.C. 20375, U.S.A.

Topic II-5. Ionosphere-Magnetosphere Interactions

Reporters: M. BLANC, CNET/CRPE, 3 Av. de la République, 92131 Issy-les-Moulineaux, France.
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STATUS REPORT IN AUGUST 1981 ON THE PROJECT ELAS
- Electrical Conductivity of the Asthenosphere

U. Schmucker (Chairman of the Ad Hoc Committee on ELAS)

The Third General Scientific Assembly of IAGA in Seattle in 1977 adopted the following resolution No. 6:

IAGA, noting that the asthenosphere plays an important role in geo-dynamics and in the study of electrical conductivity of the Earth and that it is interesting to Working Group 3 of Division I,
recommends to National Adherents, support for the creation of an ad hoc Committee to prepare a Programme for a project for "Electrical Conductivity of the Asthenosphere" (ELAS), to concentrate efforts during 1978-1985 on magnetic and magnetotelluric measurements and their comparison with heat flow and seismic measurements.

In response to this resolution, Working Group 3 of Division I (Electromagnetic induction in the Earth and Moon) has held special meetings on the ELAS project during its Workshops at Murnau (1978) and Istanbul (1980) and during the IUGG conference in Canberra (1979). As a result a Committee on ELAS was set up with the intent that each participating country in the ELAS project is represented. Currently the Committee has the following members:

U. Schmucker (Fed.Rep. Germany) Chairman
L.L. Vanyan (U.S.S.R.) Vice-Chairman
A. Ádám (Hungary), A. Duba (U.S.A.), J. Febrer (Argentina), J. Filloux (U.S.A.),
H. Fournier (France), D.I. Gough (Canada), G.P. Gregori (Italy),
S.E. Hjelt (Finland), Y. Honkura (Japan), V.R.S. Hutton (U.K.),
A.M. Isikara (Turkey), J. Janowski (Poland), G.V. Keller (U.S.A.),
D. Loewenthal (Israel), E. Oni (Nigeria), W.D. Parkinson (Australia),
G. Porstendorfer (Dem. Rep. Germany) O. Praus (Czechoslovakia),
A. Soare (Rumania), B.J. Srivastava (India), N.B. Trivedi (Brazil)

Part I of the report summarizes the scientific background of the project which emphasizes international cooperation by
extending field surveys across boundaries,
sharing instruments and methods of data reduction and interpretation,
exchanging data relevant to the objectives of ELAS.
In addition agreement was reached to work jointly on a number of topics important to all participants as outlined in part II. So far nineteen participating countries have submitted to the Committee plans for their activity within the ELAS project. They form part III of the report.

Part I: Concept and Goals of the ELAS project

Since the work of SCHUSTER, CHAPMAN and PRICE, it is known that geomagnetic variations, as observed at the Earth's surface, allow estimates of the electrical conductivity of material within the Earth. Their global studies of diurnal Sq and smoothed stormtime Dst variations showed with certainty that the Earth's outer layers to considerable depth, are poor conductors with a steep rise in conductivity further down within the Earth's mantle. Their data were inconclusive, however, about details of this rise and about details of crustal and subcrustal conductivity.

The magnetotelluric method of CAGNIARD and TIKHONOV, which also uses natural variation field but in quite a different way by including their subsurface electric or telluric field, has found wide applications in shallow soundings of the Earth's crust and its cover by geological formations. Its major contribution was the discovery of a deep crustal or subcrustal zone of high conductivity, but the extension to greater depth so far has been problematic because at almost any site the telluric field of longperiod variations with a sufficiently great depth of penetration is distorted by local surface inhomogeneities. Thus, without consideration for such surface effects, magnetotelluric data are inconclusive for conductivities at upper mantle depth.

It is the purpose of the ELAS project to bridge the existing gap between alternative methods of electromagnetic soundings. It will concentrate on the depth range within the upper mantle which has so far been too deep for local magnetotelluric studies and too shallow for global studies of long-period geomagnetic variations. Since this depth range contains the GUTENBERG layer and the proposed asthenosphere, the basic question arises, whether or not the mantle zone of reduced S-wave velocity and presumably increased seismic absorption is also a zone of anomalous electrical conductivity.

If so a complementary geophysical method would exist to map regional characteristics of the asthenosphere which is thought to have a key role in dynamic processes connected with continental drift and plate motion.

As seen from the list of national ELAS programs, land-based observations are planned for quite different geological settings, i.e. stable shields, rift and subduction zones and zones of proposed continental collision. Similarly, seafloor observations are proposed for ocean basins, island arcs and mid-oceanic ridges.

Knowing the poor depth resolution of electromagnetic data, response estimates of great accuracy and of a wide range in period will be necessary, including Sq and Dst. This requires continuous observations over extended periods of time (weeks, months) with instruments of high base-line stability. It will be noted that the ELAS program pays particular attention to such instrumental aspects, both for the work on land and at sea.

Another major concern will be caused by surface effects, masking the response from conducting layers at the depth of the asthenosphere. Several proposed studies within the ELAS project will concentrate on those effects and their possible removal by corrections.

Even though the telluric field is affected most by such surface effects, this applies also to geomagnetic variations, when extreme surface conductors such as oceans or deep sedimentary basins are present. A number of field programs and theoretical studies will be concerned with such "ocean" effects which in view of the inductive coupling between surface and mantle conductors offer themselves a method of deep electromagnetic sounding.

Magnetic observatory data will be of outstanding importance for those programs within the ELAS project which study the response of global fields like Sq and Dst. Prompt and easy access to standard magnetograms or tabulated hourly means via the World Data Center will be greatly appreciated, in particular for those observatories which are situated faraway from coastlines.

This applies also to observatory records of telluric fields. It has been found out in the past that valuable material over many years of "earth current" observations exists in the archives of observatories to which access would also be most desirable.

As a physical indicator for upper mantle conditions the electrical conductivity is distinctly different from such bulk properties as P-wave velocity and density. Conductivity as a structure-dependent property is sensitive to impurities, fluid content and temperature and thus related to S-wave velocity (i.e. the ratio of P-wave to S-wave velocity), the quality factor Q of seismic absorption, (and thus to the viscous properties) and to thermal conductivity.

During the ELAS project laboratory experiments on rocks and minerals will be performed to test and, if possible, to calibrate the conductivity in relation to these properties for variable impurity content, fluid content and temperature. On the basis of such experiments field observations of the ELAS project will have direct bearing on the results of programs studying seismic waves and heatflow. Their combined interpretation may lead to new insights into the physical state of matter in the asthenosphere, the depth of its boundary and its possible regional variability in correspondence to large-scale motions of lithospheric material.

Part II: ELAS programs of concern to all participating countries

1. Instruments

Coordinator: NN

Test sites are offered for the comparison of instruments, recording on land magnetic and telluric variations in the period range of minutes to several days. It is hoped that a similar test can be arranged for seafloor instruments. In addition, services are offered for the exchange and repair of certain types of instruments. This applies in particular to ASKANIA variographs which were in wide use during the IGY 1957-59 and to GOUGH-REITZEL magnetometers. There are about 150 GOUGH-REITZEL magnetometers, built by groups in various countries. Even though each group has produced its own variant, a limited repair service may be arranged.

2. Inverse methods

Coordinator: A.G. Jones, Institut für Geophysik,
Gievenbecker Weg 61, D-4400 Münster, Fed. Rep. Germany

Even though proof exists that under certain constraints the inverse problem for electromagnetic data has a unique solution, the interpretation of real data involves uncertainties and arbitrariness. Through the initiative of Dr. Jones a comparative study of existing inverse methods has been carried out to interpret electromagnetic data by layered Earth models. In this study a set of magnetotelluric field data was distributed and each participant was asked to submit his solution in terms of a conductivity versus depth profile. The results of the study will be published. It is planned to repeat this comparison of inverse methods with other data sets, relevant for ELAS, with a possible extension to multi-dimensional data to be explained by models with laternal differences of conductivity.

3. Numerical models

Coordinator: J.A. Wright, Dept. of Physics, Memorial Univ. of Newfoundland, St. Johns, N.F., Canada A1C 5S7

Except for models of simple geometry, the electromagnetic induction problem for a given model has to be solved with numerical methods when lateral changes of conductivity are involved. Various methods exist which treat such models in quite different ways. A comparison has been started by distributing two-dimensional models, thin layer models and three-dimensional "island" models and to ask each participant for his solution in terms of the normalized magnetic and electric surface field.

It is planned to report on this model intercomparison in the near future. In the course of the ELAS project this study will be continued with a possible extension to lateral non-uniform spherical Earth models and a test against the results of scale model experiments. Here special emphasis will be given to modelling the effect of surface inhomogeneities on the response from deeper layers.

4. Laboratory measurements of electrical conductivity

Coordinator: A. Duba, Lawrence Livermore National Laboratory, Livermore, California 94550, U.S.A.

Reports describing techniques and results of laboratory measurements will be distributed among interested experimenters as soon as practical during the publication process. Selection of conductivity standards for comparison purposes will allow calibration of measurements from various laboratories.

5. Collection and exchange of data

Coordinator: Y.P. Kharin, World Data Center B2, Molodezhnaya 3, Moscow 117296, USSR

The ELAS project intends to promote international cooperation not only in the field observations but also in data interpretation. Through the initiative of Dr. Kharin a documentation of electromagnetic data relevant to the objectives of the ELAS program has been arranged. Raw data as well as electromagnetic response functions will be accepted.

Participants in the data exchange program will be asked to submit processed data in the following form

1. Station name and coordinates.
   Time of field observations.
2. Type of magnetometers and electrodes.
   Length and azimuth of telluric lines (if any). Mode of recording.
3. Total length of record (or number of events) used for analysis.
   Statistical procedure to derive response functions.
4. Response estimates, if available with confidence limits, for a given sequence of frequencies (or instants of time), including information on degrees of freedom of determination, coherence etc. Depending on the type of observation and analysis these estimates can be
   a) The four complex-valued elements of the magnetotelluric impedance tensor in unrotated coordinates
   b) pairs of apparent resistivities and, if available, of phases for unrotated or rotated coordinates with an indicated angle of rotation

c) coefficients relating vertical magnetic variations with or without subtraction of a normal component to the horizontal magnetic field at the same site, some reference site or a combination of reference sites
d) coefficients relating the horizontal magnetic variations at the recording site to the horizontal field at some reference site or combination of reference sites
e) response functions for global magnetic fields or electrojet fields, using the non-uniformity of the source field

5. Geological setting and other geophysical information available for the recording site and the surrounding region.
6. Comments on points relevant for the material presented (source effects, artificial noise, use of reference stations etc.)
7. Institution which can be consulted for further information, including information on published and unpublished reports on the material presented.

For the exchange of listed observatory data in the work on long period variations, the services of the World Data Centers will be sought. For the exchange of digitized observatory material on magnetic tape, Mr. W. Paulishak, World Data Center A, Environmental Data Service NOAA, Boulder Colorado, 80303 U.S.A. should be contacted for assistance.

Part III: National ELAS Programs

Argentina (J. Febrer, Dpto. Geofisica, Observatorio Nacional de Fisica Cosmica, Avda Mitre 3100)

1. a) Transcontinental profile along 22-24° latitude South, in cooperation with the Instituto de Pesquisas Espaciais of Sao Jose Campos.
   b) Magnetotelluric study over the asismic region of the NW of Argentina - around San Miguel de Tucuman and Cafayate - to know the deepness of a conductive layer appearing very near the surface.
   c) Magnetotelluric study over the cratonic region of Province of Buenos Aires.
2. Deep magnetotelluric sounding in the Antarctic Peninsula and at the Belgrano II base (about 80° latitude South).

Australia (W.D. Parkinson, Dept. of Geology, Univ. of Tasmania, Box 252-C GPO, Hobart, Tasmania 7001)

1. Magnetometer array study in northern India, including the Himalaya foothills, a cooperative program of the Australian National University (Canberra), the Indian Institute of Geomagnetism (Bombay) and the National Geophysical Research Institute (Hyderabad). Field-work completed in 1979.
2. Magnetotelluric survey in northern India, planned as a joint program of the National Geophysical Institute (Hyderabad) with the Bureau of Mineral Resources, Geology and Geophysics (Canberra) and Macquarie Univ.
3. Magnetotelluric soundings in combination with deep seismic reflection and refraction studies in selected regions of Australia.
4. Magnetotelluric traverse from the Australian continent to the floor of the Tasman Sea, a proposal under consideration. Collaboration between the Australian National University and the Scripps Institution of Oceanography, University of California.

5. Continued development and construction of an array of 24 microprocessor-based three-component digital fluxgate magnetometers for geomagnetic deep sounding in remote regions, and on the ocean floor by the Flinders University of South Australia.
6. Cooperative program to start in 1981 between Flinders University and Indonesia, of a 2-D geomagnetic deep sounding array study of the Java trench subduction zone using 12 (in 1981) and 24 (1982-1983) digital fluxgate magnetometers.
7. Large (24 digital magnetometer) array study of the coast effect and structure of the Gawler Pre-Cambrian Craton in South Australia (to commence 1982).

Brazil (N.B. Trivedi, Instituto de Pesquisas Espaciais, C.P. 515, 12200 S.J. dos Campos, SP)

1. Magnetotelluric measurements at Cachoeira Paulista (22°42'S,45°01'W, 25° dip) in the period range 10 seconds to 1 day, to begin in May 1981.
2. Magnetotelluric soundings in the basin of the river Parana are planned to take place in the years 1982 and 1983.
3. Magnetotelluric measurements were conducted at Eusebio (22°42'S, 45°01'W, 3.5° dip), a station under the equatorial electrojet during March, 1979-December, 1980.
4. A geomagnetic deep sounding experiment (jointly with telluric measurements) is planned provided instruments can be obtained from an institution outside Brazil. This experiment could be conducted in the region of electrojet or in the Brazilian Magnetic Anomaly region.

Canada (D.I. Gough, Institute of Earth and Planetary Physics, University of Alberta, Edmonton, Canada T6G 2J1)

1. Further development of seafloor magnetometer systems to be deployed in active tectonic areas in the Northwest Pacific with a few sites over older oceanic crust. In 1980 three seafloor stations have been installed off Vancouver Island and several stations on Vancouver Island.
2. Magnetometer array study in Western Canada. Emphasis will be on two newly discovered anomalies, one in southern Alberta and the south-east corner of British Columbia appears to be related to a Precambrian rift zone and the other within the Rocky Mountain Trench to a geothermal anomaly.

Czechoslovakia (O. Praus, Geophysical Institute, Czechoslovakian Academy of Sciences, Bocni II, 14131 Prague 4)

1. Re-analysis of magnetotelluric sounding curves from the Pannonian basin, the Carpathian foredeep and the Bohemian massif. Emphasis will be on long-period variations, including Sq.
2. New magnetotelluric and geomagnetic deep soundings in the regions mentioned under 1 in cooperation with Polish and Hungarian institutions.
3. Investigation of distortions caused by near-surface inhomogeneities. Construction of maps for the total conductivity in major sedimentary basins in Czechoslovakia.
4. Laboratory studies of the electrical conductivity at high temperature and pressure.

Finland (S.E. Hjelt, Dept. of Geophysics, University of Oulu, SF-90570 Oulu 57)

1. Magnetotelluric soundings on the Baltic (1980) and comparison with results in the Pannonian Basin, a cooperative project with the Geodetic-Geophysical Research Institute in Sopron (Hungary) under the auspices of the Finnish Academy and the Hungarian Academy of Sciences.
2. Magnetovariational array studies in the central parts of the Baltic Shield (1981/82). The Gough-Reitzel type magnetometers are on loan from the the Institut für Geophysik, Universität Münster (BRD).
3. Magnetotelluric and magnetovariational measurements on the Baltic Shield and the construction of the geoelectric model of the shield. A cooperative project under the auspices of the Finnish Academy and the Soviet Academy of Science.

France (H. Fournier, Laboratoire de Géomagnétisme, 24, rue Lhomond, F-75231 Paris, Cedex 05)

1. The facilities of the Geophysical Research Center of Garchy are offered for the calibration of magnetic and telluric recording devices.
2. Geomagnetic differential soundings in selected areas.
3. Magnetotelluric soundings in Southamerica and in the Antarctic, performed since 1976 in cooperation with geophysical institutes in San Miguel, Buenos Aires, La Rioja (Argentina) and San Jose dos Campos / Belem (Brazil).

Germany (Dem. Rep) (G. Porstendorfer, Bergakademie Freiberg, Sektion Geowissenschaften, DDR-9200 Freiberg)

1. Analysis of the longitudinal conductivity of sediments for deep investigations.
2. Work on methods for the interpretation of geomagnetic deep soundings and magnetotelluric soundings.
3. Development for study of the asthenosphere along an international geotraverse from the Caucasus-region to the north-west part of the GDR. Complex interpretation together with information from other geophysical methods. (Cooperation with the Academy of Sciences of the USSR and the Polish Academy of Sciences.)
4. Special magneto-telluric and geomagnetic deep soundings in crystalline complexes of the southern part of GDR.
5. Generalization of electromagnetic soundings, which have been made on the African continent.

Germany (Fed. Rep.) (U. Schmucker, Institut für Geophysik, Postfach 876, D-3400 Göttingn)

1. Comparison and calibration of magnetic and telluric recording devices suitable for the observation of long-period variations. Reconditioning of Askania variograph as a joint service of the Wingst observatory and the Geophysical Institute of Göttingen University.
2. EM sounding profile across the Alps in cooperation with institutions from Italy and Switzerland. This profile will cross a proposed continental collision zone.
3. EM sounding profile crossing of the Eastern Alps into the Pannonian basin, a cooperative program of German, Austrian and Hungarian institutions.

4. Comparative study of long-period telluric and geomagnetic variations in the Rhenish massif and Northern Germany with a possible northward extension towards the edge of the Fennoscandian Shield.
5. Wide-spread magnetometer array study in Western Germany for geomagnetic deep sounding with Sq, Dst and the normal variation field of substorms. The study is scheduled in connection with a survey of the geomagnetic mainfield in 1982/83. The magnetometer stations will be equipped also with telluric instruments specially designed for the recording of long-period variations. Emphasis will be on the distortion effect on the telluric field by surface inhomogeneities and the possible intrinsic anisotropy of deep crustal or mantle conductivity.
6. Laboratory studies of the conductivity of rocks and minerals relevant for the upper mantle at high temperature. Emphasis will be on controlled, realistic oxygen and water partial pressure.
7. Coordinated magnetotelluric soundings by the University of Münster, the Swedish Geological Survey (Uppsala) and the University of Oulu in Northern Scandinavia where the University of Münster has operated a magnetometer array during the IMS. The analysis of the magnetometer data has given evidence for an asthenosphere of low restivity beneath Northern Sweden.

Hungary (A. Ádám, Geodetic and Geophysical Research Institute, Hungarian Academy of Sciences, POB 5, H-9401 Sopron)

1. New magnetotelluric soundings in the Pannonian Basin and reinterpretation of the earlier MT material taking into account the different distortion effect by numerical modelling.
2. Magnetotelluric soundings in the transitional zones between (a) the Carpathians and the Pannonian Basin and (b) the Alps and the Pannonian Basin.
3. Magnetotelluric profile along DDS (deep seismic sounding) - profile across the Eastern Alps in cooperation with the Geophysical Institute Vienna University (Austria) and the institutions in the Federal Republic of Germany.
4. Magnetotelluric soundings on the Fennoscandian Shield a cooperative project of the Oulu University with the Geodetic and Geophysical Res. Institute Sopron (Hungary) under the auspices of the Hungarian and Finnish Academies of Science.

India (B.J. Srivastava, National Geophysical Research Institute, Uppal Road, Hyderabad - 500007)

1. Magnetometer array studies in India, 1978-1983:
Under this Indo-Australian collaboration project among the Indian Institute of Geomagnetism (Colaba/Bombay), the National Geophysical Research Institute (Hyderabad), and the Australian National University (Canberra) two array experiments were carried out: (a) in northwest India including the Lower Himalaya and its foothills and the Aravalli mountain belts; (b) in south Peninsular India covering the electrojet region and the eastern and western coastlines.
A path of concentrated induced currents transverse to the Himalaya and in alignment with the Aravallis has been identified, possibly in association with asthenospheric upwelling beneath the Aravallis. There is no evidence of a major conductor beneath the Himalaya along its strike.

A localized current channelling has been identified in the Palk Strait between India and Sri Lanka, which is possibly associated with the India-Sri Lanka graben, and a proposed step-structure of conductivity at the Moho boundary along the coastlines.

2. Magnetotelluric surveys in India, planned as a joint project of the National Geophysical Research Institute (Hyderabad), with the Bureau of Mineral Resources and Macquarie University (Australia). Telluric investigations in the Puga valley (Ladakh) in the Himalaya. Design and fabrication of a very low noise, low drift, pre-amplifier-filter-assembly for sensing magnetic signals.
3. Theoretical studies for modelling the asthenospheric parameters of dipping plate regions, taking into account the nature of the lithosphere-asthenosphere boundary and the preferred orientations of olivine crystals in the lithosphere. Feasibility study of resolving crustal discontinuities from surface impedance measurements in MT by varying frequencies. Multifrequency MT sounding over colliding plate boundaries of the Himalayan type to understand the basic tectonic process.

Israel (D. Loewenthal, Dept. of Geophysics, Tel-Aviv University, Ramat-Aviv, Tel-Aviv)

1. Existing magnetotelluric soundings at selected points will be extended to longer periods with the possible support of the Geophysical Institute of the Colorado School of Mines (U.S.A.).
2. A geomagnetic deep sounding experiment is planned, provided instruments can be obtained on loan from an outside institution.
3. There are tentative plans for a deep DC geoelectric sounding in cooperation with the Council for Scientific and Industrial Research (South Africa) and offshore magnetotelluric soundings in the Mediterranean Sea in cooperation with the Scripps Institution of Oceanography, Univ. of California (U.S.A.).

Italy (G.P. Gregori, Instituto di Fisica dell'Atmosfera, P. Luigi Sturzo 31, 00144 Rome)

1. Magnetotelluric and geomagnetic deep sounding profile across the Alps from Munich to Ferrara, a cooperative venture with institutions from the Federal Republic of Germany and Switzerland.
2. Magnetotelluric and geomagnetic deep sounding profile from Naples to Bari.
3. Local study of geomagnetic variations in the Abruzzi region in connection with seismic studies.
4. Local magnetotelluric soundings in the Siena graben zone, Travale area and Campi Flegrei area in cooperation with institutions from France and the Federal Republic of Germany.
5. Geomagnetic deep sounding on a planetary scale, using observatory data. This is a cooperative program of the Instituto di Fisica dell'Atmosfera (Rome), the Instituto Nazionale di Fisica (Rome) and the Bell Telephone Lab. (Dr. L.J. Lanzerotti, Murray Hill/N.J., U.S.A.). This is the first application of a theoretical study devoted to search for improved methods for geomagnetic depth sounding. It is planned to extend this investigation also into other period ranges, both for checking the method and for probing shallow and deep structure.

Japan (Y. Honkura, Department of Applied Physics, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152)

1. Development of sea-floor magnetometers. (1980-1985).
2. Investigation of the electric state beneath the Japanese trench-arc-basin system by observing geomagnetic and telluric variations on a profile across the Northeastern Japan Arc. It is intended to extend these land-based observations toward the Japan Trench area in cooperation with the Scripps Institution of Oceanography, U.S.A. The electrical conductivity of the asthenosphere beneath the Western Pacific will also be studied from sea-floor magnetotelluric data (1981).
3. Geomagnetic deep sounding in Southwestern Japan with special reference to the subduction of the Philippine Sea plate. This includes sea-floor observations of geomagnetic variations in the Philippine and Japan Seas. A study of the island effect on Okinoshima Island in the Japan Sea will also be included in this project. (1984-1985).
4. Studies of the electrical conductivity of the oceanic asthenosphere from the island effect on Minami-daito Island (completed in 1980) and other islands in the Philippine Sea and the Western Pacific. (1984-1985).
5. Investigation of the effect of surface inhomogeneities which will be most relevant to the study in Northeastern Japan (project 1). It is planned to study this effect also in Central Japan, where a tectonic line, the Fossa Magna, geologically and tectonically separates Southwestern Japan from the Northeastern Japan Arc. (1984-1985).

Nigeria (E. Oni, Department of Physics, University of Ibadan, Ibadan)

1. Magnetotelluric and geomagnetic observations on profiles across the equatorial electrojet in cooperation with institutions from the Federal Republic of Germany and the United Kingdom.
2. Magnetometer array study of the Bernue trough.
3. Study of the coast effect in Nigeria.

Turkey (A.M. Isikara, Institute of Geophysics, Univ. of Istanbul, Fen Fakültesi, Istanbul)

1. Geomagnetic deep soundings along the North Anatolien Fault zone with a possible extension to other tectonically active areas in Turkey.
2. Magneto-telluric soundings.

United Kingdom (V.R.S. Hutton, Dept. of Geophysics, Univ. of Edinburgh, Mayfield Road, Edinburgh EH9 3JZ)

1. Broadband magnetotelluric and geomagnetic deep soundings at locations chosen to represent different geological zones in England and Scotland.
2. Magnetotelluric observations on South Georgia, Antarctica where the plate and plate fragments contain a complete microcosm of tectonic features.
3. Magnetotelluric and geomagnetic deep soundings in high heat flow region of Northern England (1979) and on the easteuropean platform in Poland (1980). These were cooperative studies with the Geophysical Institute of the Polish Academy of Sciences, Warsaw, and include a comparison of instruments, data analyses and modelling techniques.

4. Analysis of observatory records for global electromagnetic response estimates for periods greater than 2 days with a possible extension to shorter periods.
5. Theoretical studies of the electromagnetic relation of the oceans to the mantle. For investigation of upper mantle conductivities, methods will be developed to remove geomagnetic effects of surface inhomogeneities, such as the oceans.
6. Laboratory studies of seismic velocities and electrical conductivity of mantle-derived nodules.

U.S.A. (J. Filloux, Scripps Institution of Oceanography, Univ. of California, Mail Code A-030, La Jolla, Calif. 92093, U.S.A.;
A. Duba, Lawrence Livermore Laboratory, Univ. of California, P.O. Box 808, Livermore, Calif., 94550, U.S.A.)

1. Extension of existing magnetotelluric soundings in the Northern Pacific westward over areas of increasing crustal age, crossing trenches, subduction zones and associated tectonic features. The recording time will be increased from two to at least four months. The instrumentation, consisting of 3-axial magnetometers and telluric devices, will be augmented by pressure sensors to improve the separation of gravitational tide signals from ionospheric signals. The existing instruments will be modified to increase the operating depth beyond 5 km.
2. EM deep sounding profile across the oceanic lithosphere from the western coast of North America to the Hawaian Islands, Japan and the Asian mainland. Cooperation is sought with institutions in Japan and the USSR.
3. Magnetotelluric survey in the Southwestern United States.
4. Laboratory studies of the electrical conductivity of rocks and minerals at elevated temperature and pressure.

U.S.S.R. (L.L. Vanyan, Soviet Geophysical Committee, Molodezhnaya 3, Moscow 117296)

1. Theoretical model studies with emphasis on the distortion of the EM response from the asthenosphere by near-surface inhomogeneities (coordinator: V.I. Dmitriev).
2. Laboratory studies of the electrical conductivity of rocks under high temperature and pressure (coordinator: A.B. Slutsky).
3. Development of instruments for land-based magnetotelluric soundings with long-period variations and for soundings at the seafloor (coordinator: V.N. Bobrov).
4. Theoretical studies of the inverse problem with emphasis on the problem to distinguish the asthenosphere against the normal background of upper mantle conductivity (coordinators: M.N. Berdichevsky, M.S. Zhdanov).
5. Field observations for the construction of geoelectric models of the asthenosphere beneath different geological zones of the U.S.S.R.:
   5.1 Baltic Shield (in cooperation with the Geophysical Institute of Oulu Univ./Finland).
   5.2 Eastern Carpathians (in cooperation with the Geophysical Institutes of the Hungarian, Polish and Czechoslovakian Academies of Sciences).
   5.3 Caucasus. 5.4 Central Asia. 5.5 Baikal rift zone.
   5.6 Transition zone between Asia and Pacific.
6. Collection and exchange of data (coordinator: E.P. Kharin). This is a joint enterprise of all countries, cooperating within the ELAS project (cf. part II).

INFORMATION FROM RELEVANT INTERNATIONAL BODIES

INTERNATIONAL ASSOCIATION OF METEOROLOGY AND ATMOSPHERIC PHYSICS (IAMAP)

The Third Scientific Assembly of IAMAP was held in Hamburg, Fed. Rep. Germany, during 17-28 August 1981. Twenty-four symposia were held concerning a wide range of topics of current interst; some were cosponsored by IAGA, IAPSO, IAVCEI, IAU, COSPAR, ESA and WMO. IAGA received a kind invitation to this IAMAP Assembly, and Dr. P.C. Simon was asked to be the IAGA representative. The total number of registrants (excluding accompanying persons) was 821 from some 42 countries. The following information of interest to the IAGA scientists has been extracted from a report kindly supplied by the Secretary General of IAMAP, Mr. S. Ruttenberg. His courtesy is greatly acknowledged.

IAMAP adopted six resolutions, regarding (1) Continuation of the ongoing earth radiation budget observation, to meet the requirements of the World Climate Research Program, (2) Improvement in the knowledge of the solar ultraviolet irradiance (i.e., 100 - 400 nm) and its temporal variations, (3) Importance of radiation processes for climatology, (4) Need for improving the quality of turbidity measurement within the background air pollution monitoring network, (5) Global Meteor Observation (full text is shown below), and (6) Thanks to the Local Organizing Committee.

5. IAMAP, noting IAGA's resolution concerning the Soviet Geophysical Committee's Global Meteor Observation (GLOBMET) System proposal passed at the Edinburgh Assembly, August 1981, and considering the need for simultaneous world wide observations of mesopause region dynamics, recommends that: (a) IAMAP member countries be encouraged to support and extend such observations, using all practical techniques, and (b) IAMAP accept the invitation extended by IAGA to further this cooperative effort by endorsing a committee to be formed within SCOSTEP with representatives from IAGA, IAMAP, IAU, and URSI, to undertake international coordination and facilitate the implementation of a Global Meteor Observation (GLOBMET) System.

As to the next assembly of IAMAP in 1985, the following was resolved at the final plenary meeting.

In view of the fact that there are no formal invitation for the 1985 IAMAP Fourth Scientific Assembly, and considering that both IAGA and IAPSO have suggested joint sessions, the Bureau recommends that IAMAP plan to meet jointly with IAPSO in 1985, with an emphasis on physical and chemical interactions between the ocean and the atmosphere, including processes important to climate, but recognizes that appropriate IAMAP commissions (e.g. ICMUA, ICPAE, ICAE) may find it advantageous to meet with IAGA, and recommends further that the IAMAP Bureau be authorized to discuss with the interested National Committees the site of the Assembly, to make the decision on the place of the Assembly, and to arrange the dates (to be non-concurrent with IAGA if at all possible).

INTERNATIONAL ASSOCIATION OF SEISMOLOGY AND PHYSICS OF THE EARTH'S INTERIOR (IASPEI)

IASPEI held its 21st General Assembly at the University of Western Ontario, London, Canada, 21-30 July 1981, with 409 registrants and 79 guests from 47 countries. The following is the information (which will be interesting to the IAGA Division I scientists) extracted from the IASPEI Newsletter No. 5 issued by Dr. R.D. Adams, Secretary General, in September 1981.

Eighteen technical sessions were held in the course of the Assembly. They include the following sessions of interest to IAGA:

- Standard Earth Model
- Structure of the Arctic
- Probing the Earth's Lithosphere by Controlled Source Seismology
- Heterogeneity in the Earth's Lithosphere
- Heterogeneity in the Earth's Boundary Layers
- Thermal Evolution of the Earth
- Thermal Aspects of Plate Interactions
- Properties of Materials at High Pressures and High Temperature
- Teaching and Research in Geophysics in Developing Countries.

The following invited Association Lectures were given:

- G.D. Garland, An outsider's view: some aspects of earth structure seen seismically.
- J.T. Wilson, Thoughts about past and potential developments in plate tectonics.
- K. Aki, 3-D seismic structure of the lithosphere and asthenosphere.
- G.W. Housner, What we should know about strong earthquake ground motion, past and future.
- S. Akimoto, Mineralogical constitution of the mantle down to a depth of 650 km viewed from recent laboratory measurements.

Nineteen resolutions were adopted , including one of thanks to the Local Organizing Committee. The scientific resolutions are concerned with (1) the necessary support to the European-Mediterranean Seismological Centre, (2) Code of practice in earthquake prediction, (3) International Seismological Centre and International Seismological Summary data tapes, (4) Directory of world seismograph stations, (5) Seismological practice - amplitude and period, (6) Seismological practice - station bulletins, (7) Seismological practice - seismic moment, (8) Seismological practice - homogeneous magnitude system, (9) Strong motion studies, (10) Strong motion processing, (11) Need for near field data, (12) Continuation of the former activities of the International Institute of Seismology and Earthquake Engineering, (13) Storage of historical data, (14) Regional seminars in and/or for the developing countries, (15) Updating of the directories of digital stations, (16) Standardization of digital recording format, (17) Provision of software for digital analysis, and (18) Inclusion of digital seismograms in the international data exchange.

Statement from the "Standard Earth Model Committee": The Committee thanks Drs. D.L. Anderson and A.M. Dziewonski, the members of the Sub-Committee charged with the preparation of the model, for the effort they have given to the preparation of the Preliminary Reference Earth Model, P.R.E.M. The Committee regards the model as meeting the specifications laid down at the 1975 Grenoble meeting of IUGG and the 1977 Durham meeting of IASPEI. The attention of those interested is drawn to the fact that a description of the model was published in the June 1981 issue of Physics of the Earth and Planetary Interiors, 25 297-356.

INTER-UNION COMMISSION ON THE LITHOSPHERE (ICL)

This new Commission had its first meeting in London, Ontario, Canada, immediately before the IASPEI Assembly. The present structure of ICL is approved by ICSU, IUGG and IUGS, and will run till December 1989. The Bureau of ICL has been formed (see IAGA News, No.19, p.90), and the Commission is composed of the

Bureau + Union Representatives + Immediate Past President + Chairmen of Working Groups (WG's) and Coordinating Committees (CC's)

The Coordinating Committee is a new body aiming to provide interaction between the Working Groups. The list of WG's and CC's is shown below with the names of Chairmen (denoted by C) and Vice-Chairmen (VC).

WG 1: Recent plate movements and deformations
C: K. Kasahara (Japan); VC: P. Vyskocil (Czechoslovakia)

WG 2: Phanerozoic plate motions and orogenesis
C: R. Van der Voo (U.S.A.); VC: J. Monger (Canada)

WG 3: Proterozoic lithospheric evolution
C: A. Sidorenko (U.S.S.R.); VC: A. Kröner (Fed. Rep. Germany)

WG 4: The archean lithosphere
C: B. Windley (U.K.); VC: R. Hargraves (U.S.A.)

WG 5: Intraplate phenomena
C: D. Roberts (U.K.); VC: C. Beaumont (France)

WG 6: Evolution and nature of the oceanic lithosphere
C: J. Francheteau (France); VC: R. Larsen (U.K.)

WG 7: Paleoenvironmental evolution of the oceans and atmosphere
C: H. Hsü (Switzerland); VC: V. Krasheninnikov (U.S.S.R.)

WG 8: Subduction, collision and accretion
C: K. Kobayashi (Japan); VC: H. Gnibidenko (U.S.S.R.)

WG 9: Processes and properties in the Earth that govern lithospheric evolution
C: C. Froidevaux (France); VC: N. Sobolev (U.S.S.R.)

CC 1: Environmental geology and geophysics
C: V. Magnitsky (U.S.S.R.); VC: J. Arnold (France)

CC 2: Mineral and energy resources
C: R. Hutchison (Canada); VC: D. Welte (Fed. Rep. Germany)

CC 3: Geosciences within developing countries
C: D. Ajakaiye (Nigeria); VC: P. Nutalaya (Thailand)

CC 4: Evolution of magnetic and metamorphic processes
C: V. Sobolev (U.S.S.R.); VC: H. Zwart (Netherlands)

CC 5: Structures and composition of the lithosphere and asthenosphere
C: K. Fuchs (Fed. Rep. Germany); VC: T.H. Jordan (U.S.A.)

CC 6: Continental drilling
C: H. Vidal (Fed. Rep. Germany); VC: N. Laverov (U.S.S.R.)

CC 7: Data centers and data exchange
C: M. Chinnery (U.S.A.); VC: A.H. Shapley (U.S.A.)

CC 8: Coordinating Committee of National Representatives

The detailed information on the ICL structure and activity will be found in ICL Report No.1 (April 1981), which is available on request from

Dr. E.A. Flinn, Secretary General of ICL
Mail Code ERG-2, NASA Geodynamics Program Office
Washington, D.C. 20546, U.S.A.

INTERNATIONAL UNION OF RADIO SCIENCE (URSI)

URSI held its XXth General Assembly on 10-19 August, 1981, in Washington, D.C., U.S.A. with great success. The Proceedings of this General Assembly will be published in the near future in a form similar to the previous ones but with possible cost-saving measures. The Review of Radio Science 1978-1980 was available prior to this Assembly and distributed to all registrants. There are copies still available that can be obtained for $20 each by application to the URSI Secretariat (Avenue Albert Lancaster 32, B-1180 Brussels, Belgium).

The following is some selected information from the URSI General Assembly, especially concerned with subjects relating to the ionosphere and magnetosphere.

New Officers of URSI Board and Commissions G and H (1981-1984)

President: Prof. W.E. Gordon (U.S.A.)
Vice-Presidents: Prof. A. Cullen (U.K., Treasurer), Prof. A.P. Mitra (India)
Prof. S. Okamura (Japan), Prof. A. Smolinski (Poland).
Secretary General: Prof. J. Van Bladel (Belgium)
Past President: Prof. W.N. Christiansen (Australia)
Commission G: Ionospheric Radio and Propagation
Chairman: Dr. P. Bauer (France), Vice-Chairman: Dr. J. Aarons (U.S.A.)
Commission H: Waves and Plasmas
Chairman: Dr. M. Petit (France), Vice-Chairman: Prof. R.L. Dowden (New Zealand).

Proposal to Merge Commissions G and H

Background for Proposal

There was a discussion on this subject at the URSI General Assembly in August 1981, based on a proposal from the French URSI Committee outlined below.

During the General Assembly in Lima (1975), Commission H (formerly Commission IV: Magnetosphere) reorganized its activities round several themes concerned exclusively with the propagation of radio waves in plasmas (instabilities, study of wave fields, numerical modelling, non-linear phenomena). Moreover, the adoption of new techniques for radio sounding of the ionosphere has led Commission G to take an ever increasing interest in the basic problems of plasma physics, such as coherent and incoherent scattering, wave interactions, non-linear phenomena in ionospheric heating, etc.

The terrestrial ionosphere and magnetosphere together form a natural plasma which is an exceptional and indeed a unique medium for the study of these phenomena, thanks to the absence of wall effects, the large scale of the medium and the existence of regions free from collisions. For historical reasons the study of these media for their own sake has played a major role in the activities of Commissions G and H, and has been one of the factors contributing to the development and reputation of URSI. But this study, which is essentially a branch of geophysics, is now centred on the problem of the interactions between the ionosphere and both the magnetosphere and the atmosphere, and it is now adequately treated in international bodies such as IAGA (IUGG) and SCOSTEP. It is no longer an appropriate subject for a Union of Radio Science.

On the other hand, it is the role of URSI to take an interest in the propagation of radio waves in plasmas, and such a role would be appropriate for a new Commission formed by the fusion of Commissions G and H.

Needless to say, the new Commission would not be regarded as the only forum for the discussion of the problems of waves in plasmas. However, provided that it makes an intelligent choice of topics for study, the new Commission would be able to establish its position and build its reputation, alongside certain Commissions of IUPAP, in the same way as Commission J continues to play a vital role in relation to IAU.

The central theme of the new Commission would continue to be radio science and the application of radio techniques. However, since the medium it is intended to study has no equivalent in the laboratory, it would be capable of making an active and original contribution to the advancement of our knowledge of the physics of plasmas. In order to underline this development, it is suggested that the title of the new Commission should be Electromagnetism in Plasmas. Its terms of reference would include the study of all wave phenomena in ionized media (propagation and generation of electromagnetic radiation, non-linear phenomena, radio methods for the study of natural or artificial plasmas, modifications - intentional or otherwise - of the Earth's plasma environment by radio waves).

Such a regrouping would make it easier to see the need for the creation of new Commissions in the field of radio science as and when required. It seems possible that some members of Commissions G and H may be opposed to this proposal partly for reasons of nostalgia and partly because of the fear that the replacement of two Commissions by a single Commission would halve the number of participants at General Assemblies. The French Committee believes that such arguments are no longer valid in view of the importance for URSI itself to adapt its structure in the light of the changing needs of science.

Actions taken at the URSI General Assembly

The URSI created a committee (Convener: E.V. Jull) to discuss this problem in detail during the General Assembly. The matter was also discussed in the business meetings of Commissions G and H. The committee presented a report to the URSI Council Meeting on 17 August. Finally the following recommendations were adopted:

1. That the proposal of the French URSI Committee to unite Commissions G and H be accepted in principle.
2. That the final decision on the proposed union be made at the XXIst General Assembly on the basis of the experience of the next three years.
3. That, if formed, the name of the combined Commissions be decided at the XXIst General Assembly.
4. That a Committee composed of the Chairmen and Vice-Chairmen of Commissions G and H be formed to arrange joint sponsorship of meetings, symposia and sessions over the next three years, as well as joint reporting of results for the next Review of Radio Science.
5. That the Official Members for Commissions G and H of the Member Committees similarly combine their activities over the next three years.
6. That there be no reduction in the resources and conference time made available to the combined Commissions G and H during the trial period, and after union if it occurs.

URSI/IAGA Joint Working Groups

URSI recommended the continuation of the following two Joint URSI/IAGA Working Groups, after the discussions held in the business meetings of Commissions G and H.

1) Passive Electromagnetic Probing of the Magnetosphere
   consisting of representatives from
   URSI Commission H and IAGA Division III.
2) Wave Instabilities in Space Plasmas
   URSI Commissions G and H, IAGA Divisions II and III.

The names of representatives are shown elsewhere in this IAGA News under the item "IAGA Internal Structure".

URSI Inter-Commission Coordinating Group on Remote Sensing

The discussion on the need for "remote sensing" technique in the field of radio science was also one of the important items at the URSI General Assembly. An ad hoc advisory group (Chairman: C.G. Little) was set up and it presented the recommendations to the URSI Council for consideration. Based on these recommendations, the URSI Council resolved:

1. to change the title of Commission F (Wave Phenomena in Non-Ionized Media) to: "Remote Sensing and Wave Propagation - neutral atmosphere, oceans, land, ice";
2. to encourage Commission C (Signals and Systems) to accept responsibility for image processing and pattern recognition;
3. to form an Inter-Commission Coordinating Group on Remote Sensing to coordinate the activities internal to URSI;
4. to refer the question of the terms of reference and membership of the Inter-Commission Coordinating Group to the Coordinating Committee of URSI;
5. to accept Commission B (Fields and Waves) recommendation to include inverse scattering in the terms of reference of the Inter-Commission Coordinating Group referred to above;
6. to explore the possibilities, in consultation mainly with IUGG, to set up an inter-organization body to foster the research, organize and coordinate symposia in the area of remote sensing.

The URSI Council resolved to recommend the dissolution of the Inter-Union Commission on Radio Meteorology (IUCRM), based on para 6 shown above.

Some Other Selected Resolutions of the URSI Council

The URSI Council,

- being aware of the recent difficulties in continuing the full programme of the Solar-Terrestrial Physics Data Center at Boulder (WDC-A), recognizing the very great importance of the services of this Data Center for the worldwide scientific activities within several of URSI Commissions, resolves the US authorities to confirm and develop the WDC-A services through the 1980's.
- being aware that the production of the Zürich Relative Sunspot Number has been discontinued, commends the Sunspot Index Data Center (SIDC) at Uccle, Belgium for its willingness to provide a sunspot index; recommends

1. that the SIDC be encouraged to continue its work in computing an index of sunspot activity;
2. that this index be prepared in a manner that makes it consistent with the earlier Zürich series.

considering (a) the most valuable services rendered by the International Ursigram and World Days Service (IUWDS) to the international scientific community by ensuring the speedy transmission of information on phenomena of interest to radio scientists, geophysicists and astronomers; (b) the major contribution being made by this body for implementation of international cooperative research programmes such as the Solar Maximum Year, the International Magnetospheric Study, and the Middle Atmosphere Programme; expresses its appreciation of the excellent work done by this Service; views with great concern the uncertainties regarding the future financing of the Service; and recommends that the three Unions concerned, IAU, IUGG and URSI, jointly approach ICSU and UNESCO asking these organisations to make evry effort to provide adequate financial support for the continuing full operation of IUWDS.

having considered the report of the Commission G Panel on a Southern Hemisphere Incoherent Scatter Facility; endorses the proposal that a feasibility study of a transportable incoherent scatter facility be undertaken, and requests the Panel to investigate possible arrangements for the financing of the study, and to proceed with the study, as soon as possible.

Items of URSI Commission Resolutions Concerning the Study of Ionosphere and Magnetosphere

- Satellite beacons in the HF-UHF range for the long-term trans-ionospheric and atmospheric propagation studies for modelling and application purposes.
- Full use of available equipment on an international basis for investigations of the ionized environment of the earth through multi-technique campaigns.
- The need to maintain stations with long segments of data, or sufficient overlap with replacement stations.
- The desirability to maintain an effective research effort (including new technique) in parallel with the monitoring activities for studying the ionosphere.
- Continuation of the publication of INAG Bulletin.
- To develop multi-purpose geophysical observatories, including appropriate portions of the existing ionosonde network.
- To encourage the exchange of oblique ionospheric sounding data and the evaluation at many geographical locations.
- Requirement for high accuracy N(h) profiles for testing of the International Reference Ionosphere.
- Maintenance of Working Groups on "Wave Analysis" and "Active Experiments" and setting up of a new Working Group on "Computer-Aided Plasma Wave Analysis" in Commission H.

URSI Committee on Developing Countries

URSI established a Committee on Developing Countries with Dr. A.P. Mitra (India) as Chairman and seven other members. This committee's report to the URSI Council was adopted unanimously at the Council Meeting. The report contained the following items:

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Suggested Programme of Activities

(a) Seminar on "Ionospheric Modelling and Mapping for Equatorial Radio Problems" to be held jointly with the CCIR Workshop in Nigeria.

(b) A two-day training programme on Satellite Beacon measurements and their application to Satellite Communications and Direct Satellite TV broadcasts, to precede the International Symposium on "Satellite Beacon Studies", to be organized by the URSI Steering Group on Satellite Radio Beacons in November 1982 in Delhi, India.

(c) Some specific suggestions for topics to be included in the proposed Open Symposium on "Radio Problems of Interest to Developing Countries" at the time of the XXIst General Assembly.

Recommended Programmes

CCIR - URSI Joint Workshops

(a) Ionospheric mapping and modelling for Equatorial Regions.

(b) Tropospheric modelling for Africa and Middle East

Symposium on "Satellite Beacon Studies", Delhi, November 1982

Handbook on HF Propagation

Directory of Radio Science Groups in Developing Countries

Open Symposium on Radio Science Problems for Developing Countries

Young Scientists Programme

At the URSI Council Meeting, Dr. A.P. Mitra emphasized in particular the importance of the proposed "Directory of Radio Science Groups in Developing Countries", and the plans to set up the International Institute of Space Sciences and Electronics and to construct a Giant Equatorial Radio Telescope, as a collaboration effort of developing countries.

Other Information from URSI

Designation of URSI Representatives to Relevant Organizations

COSPAR: Prof. K. Rawer (Fed. Rep. Germany)
COSTED: Dr. A.P. Mitra (India)
SCOSTEP: Prof. A.T. Waterman, Jr. (U.S.A.)
Council of FAGS: Dr. J.C. Ribes (France), Dr. C.M. Minnis (U.K.)
IUWDS Steering Committee: Dr. A.P. Mitra (India)
MONSEE: Dr. D.J. Cole (Australia)

XXIst General Assembly of URSI

The next General Assembly is scheduled for two weeks from the end of August to early September 1984 in Florence, Italy.

Unfortunate Proximity of the Dates of the XXth URSI General Assembly and the Fourth Scientific Assembly of IAGA in August 1981.

This was discussed at the URSI Council Meeting and it was recommended that such an unfortunate clash be avoided in the future through mutual negotiations between the bodies concerned (such as URSI, IUGG, IAGA, IAMAP, IAU, SCOSTEP, COSPAR, etc.).

[Remark] All the above information from URSI was kindly supplied from Prof. J. Van Bladel (Secretary General) and Mrs. Y. Stevanovitch (Executive Secretary), before the texts receive formal approval from the Drafting Committee.

COMMITTEE ON SPACE RESEARCH (COSPAR)

The XXIVth COSPAR Assembly and Associated Activities is taking place in Ottawa during the period 17 May - 2 June 1982, at the invitation of the National Research Council of Canada. The main meeting place will be the Chateau Laurier Hotel, where the registration area will be located, and where scientific sessions, symposia and workshops as well as some business meetings will be accomodated.

The scientific events planned in conjunction with the XXIVth COSPAR Assembly are quite extensive, as can be seen from the listing below.

Symposia:

STP - International Symposium on Solar Terrestrial Physics (SCOSTEP/COSPAR/IAU/IAGA/IAMAP/IUPAP/URSI), 17-22 May. (Outline is shown elsewhere in this IAGA News)

1 - Remote Sensing and Mineral Exploration: National Case Histories based on activities of IGCP Project 43 (COSPAR/IUGS/URSI/IAGOD/AGID), 17-22 May.

2 - Gamma-Ray Astronomy in Perspective of Future Space Experiments (COSPAR/IAU), 18-19 May.

3 - Giant Planets and their Satellites (COSPAR/IAU/IAMAP/IUTAM/URSI), 18-21 May.

4 - Advanced Space Instrumentation in Astronomy (COSPAR/IAU) 20-22 May 1982.

5 - Role and Impact of Space Research in Developing Countries (COSPAR/COSTED/ with the collaboration of the United Nations, and UNESCO), 21-22 May.

6 - Impact Processes of Solid Bodies (COSPAR/IUTAM/IAU), 21-22 May.

7 - Solar Maximum Year (COSPAR/IAU/SCOSTEP) 25-26 May.

8 - Results from IMS Spacecraft (COSPAR) 25-26 May.

9 - Fundamental Aspects of Material Sciences in Space (COSPAR/IUTAM/IUCr/ESA), 25-28 May.

10 - Study of Land Transformation Processes from Space and Ground Observations (COSPAR/SCOPE/IAF/ with the collaboration of UNEP), 31 May - 2 June.

Workshops:

1 - Instrumentation and Technology for Scientific Ballooning (COSPAR), 21-22 May.

II - Comparison of Data with CIRA and Proposed Revisions (COSPAR/SCOSTEP/IAGA/IAMAP), 24-26 May.

III - Reassessment of Planetary Quarantine Requirements (COSPAR), 27 May a.m.

IV - Radiation Safety Standards (COSPAR), 27 May.

V - Selection and Impact of Spectral Bands for Earth Resources Analysis from Space (COSPAR) 27-28 May.

VI - Advances in Instrumentation and Data Display Related to Space Plasmas (COSPAR/URSI) 27-28 May.

Topical Meetings of COSPAR Interdisciplinary Scientific Commissions (ISC's)

ISC A on Space Studies of the Earth's Surface, Meteorology and Climate:
- A.1 Measurement of Aerosols from Space
- A.2 Ozone Variability in the Middle Atmosphere
- A.3 Validation of Meteorological Satellite Observing Systems
- A.4 Stereographic Observations from Meteorological Satellites

ISC B on Space Studies of the Earth-Moon System, Planets, and the Small Bodies of the Solar System:
- B.1 New Data on Meteorite Research
- B.2 Magnetic History of the Early Solar System
- B.3 Topics Related to Cometary Research

ISC C on Space Studies of the Upper Atmospheres of the Earth and Planets:
- C.1 Atmospheres of the Terrestrial Planets
- C.2 Energy Budget of the Mesosphere and Thermosphere
- C.3 Results of Pre-MAP Project 1
- C.4 International Reference Ionosphere
- C.5 Mass Spectrometry of Atmospheres: Results and New Technical Developments

ISC D on Space Plasmas in the Solar System, including Planetary Magnetospheres:
will not hold topical meetings in Ottawa

ISC E on Research in Astrophysics from Space:
- E.1 Future of Solar Physics within Astrophysics
- E.2 IUE and Einstein X-Ray Results
- E.3 Stellar Chromosphere and Coronae

ISC F on Life Sciences as Related to Space:
plans meetings for 5 topics

ISC G on Materials Sciences in Space:
will not hold topical meetings in Ottawa.

In addition to the above scientific sessions, COSPAR is planning to hold an evening session (date to be announced later) entitled "A Quarter of a Century in Space", in order to join in the celebrations of the Polar and Geophysical Years suggested by ICSU.

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The First Circular was distributed in May 1981, and the Second Circular in September 1981. The scientific programs and local arrangements are fully described in these circulars, and the Advance Registration Forms are attached.

The Local Organizing Committee in Ottawa wishes to receive the Advance Registration Form and the Accomodation Request before 15 April 1982. These forms are to be addressed to

Executive Member
LOC XXIV COSPAR
Conference Secretariat
National Research Council
Ottawa, Ontario, Canada K1A 0R6
Telephone: (Area Code 613) 993-2021
Telex: 053 3145 (NRC ADMIN OTT) for the Executive Member, Mr. T.W. McGrath.

Further information on all the above meetings may be obtained from: COSPAR Secretariat, 51 Blvd de Montmorency, 75016 Paris France [Telex: ICSU 630553 F, attention COSPAR; Telegrams: COSPACERES, PARIS; Telephone: (1) 525.06.79].

SCIENTIFIC COMMITTEE ON SOLAR-TERRESTRIAL PHYSICS (SCOSTEP)

The revised constitution of SCOSTEP was approved by the Executive Board of ICSU at its meeting on 27 January 1981. The first section of this new constitution defines the responsibilities of SCOSTEP as follows.

In 1978, by virtue of an action of the 17th ICSU General Assembly, SCOSTEP (previously an Inter-Union Commission in 1966-72, and a Special Committee in 1972-78) became a Scientific Committee of ICSU with the following principal tasks:

(i) To promote international interdisciplinary programmes in solar-terrestrial physics, and to organize and coordinate such programmes of interest to and approved by at least two of the following bodies: IAU, IUGG, IUPAP, URSI, and COSPAR. Each specific programme will normally be of finite duration.

(ii) To define the data relating to these programmes that should be exchanged through the World Data Centres.

(iii) To provide such advice as may be required by the ICSU bodies and World Data Centres concerned with these programmes.

(iv) To work with other ICSU bodies in the coordination of symposia in solar-terrestrial physics, especially on topics related to SCOSTEP's programmes. Where possible, such symposia will be held in association with meetings of interested ICSU organizations.

A General Meeting of SCOSTEP is scheduled on 13-15 May 1982 in Ottawa, Canada, prior to the Fifth International Symposium on Solar-Terrestrial Physics. The agenda items will include: (a) Election of Officers of SCOSTEP, (b) Representatives from the adhering Unions and COSPAR, (c) Financial and Scientific Reports.

The Fifth International Symposium on Solar-Terrestrial Physics, is to be held in Ottawa, Canada, 17-22 May 1982. The outline of the programme of this symposium is shown elsewhere in this IAGA News.

On the last day of this symposium, an Open Forum on "The Future of Solar-Terrestrial Physics" is scheduled. This forum will help in the crystallization of scientific plans and logistic strategies for the prosecution of research in STP in the years ahead. A tentative agenda for the forum is: (1) Gaps in Science, (2) National Interest in STP, (3) Foreseeable viable programs, (4) Assessment of structure of SCOSTEP and need for any new steering committees.

SCOSTEP is now requesting that the adhering Unions and COSPAR express their approval of the dissolution of Steering Committee for Atmospheric Physics Programs (APP). This committee was created during the reorganization of 1972-73 with a two-stage responsibility:

(1) early consideration and planning of future atmospheric physics programs; and (2) subject to Bureau approval, the establishment of ad hoc working or study groups for more detailed planning and the subsequent supervision of those working/study groups. Two of the original four groups were transferred to the inter-Union jurisdiction of URSI, IUGG, and COSPAR in 1974; the other two, MAP and STP-Meteorology have been converted into Steering Committees. These developments, together with the assignment of responsibilities for early planning to the planning committees in the new constitution, leave the APP Steering Committee with nothing to do. Therefore, the Bureau agreed to dissolve the APP Steering Committee, at its meeting in Washington in August 1979, provided that the Unions and COSPAR did not object and that the new constitution was adopted. Because the new constitution of SCOSTEP was approved in January 1981, the member Unions and COSPAR were asked for their approval of the dissolution of the APP Steering Committee.

COMMITTEE ON DATA FOR SCIENCE AND TECHNOLOGY (CODATA)

CODATA is planning to hold the Eighth International CODATA Conference in Kozubnik, Poland, 3-8 October 1982, at the invitation of the Polish Academy of Sciences. The CODATA General Assembly will follow on 8-9 October 1982 at the same place.

The subtitle of the next CODATA Conference is: DATA ON NATURAL RESOURCES - their Use for the Development of Society. The prime focus of the Conference will be on the relevance of scientific date for:

- estimation of world mineral resources, especially those needed for the development of chemical industry, metallurgy, and energy production
- utilization of raw materials including conversion of coal, oil and petrochemicals and production of metals and alloys
- properties of materials, particularly thermophysical and thermodynamical and phase equilibbria
- environmental protection including biological problems.

The following will be covered: - analysis of data needs in selected fields of science and technology, - compilation, generation and preprocessing of data, - data evaluation methodology, - critical evaluation and role of data accuracy, - computers use for storage, retrieval and networking of data; data compressing, - technical and organizational aspects of data banks including demonstration, - materials information systems, - data systems analysis, - correlation, extrapolation and estimation procedures, - mathematical modelling data requirements.

More information is available from:
Prof. A. Bylicki (Chairman of the Scientific Program Committee)
Institute of Physical Chemistry, Polish Academy of Sciences
ul. Kasprzaka 44/52, 01-224 Warsaw, Poland
or Prof. E.F. Westrum, Jr. (Secretary General of CODATA)
Department of Chemistry, University of Michigan
Ann Arbor, Michigan 48109, U.S.A.
or CODATA Secretariat, 51 Blvd de Montmorency, 75016 Paris, France.

CODATA held a Training Course on "Data Management in Geoscience" sponsored by UNESCO, in the Federal University of Ouro Preto, Brasil, 7-12 December 1981.

INTERNATIONAL SERVICE OF GEOMAGNETIC INDICES

Report for the IAGA-Assembly, Edinburgh, August 1981

In the 19 months since the Canberra-Assembly, the following regular publications have appeared:

- Monthly diagrams of Kp and half-monthly tables of Kp, ap, Ap and Cp-indices issued by the Institut für Geophysik, Göttingen. Since July 1976 these publications also contain the international quiet and disturbed days of the month. They were sent to about 500 addresses with a lag of no more than a few weeks.
- Monthly bulletins from De Bilt, containing the aa-indices, the international quiet and disturbed days, preliminary data on rapid magnetic variations (ssc, sfe) and provisional hourly values of the equatorial Dst-index. These bulletins were distributed to about 230 observatories and institutes.
- Monthly tables of Kn, Ks, Km, an, as, am, An, As, Am and diagrams of an, as-indices, issued by the Institut de Physique du Globe, Paris.

IAGA-Bulletin 32i, Geomagnetic Data 1978, the yearly compilation of data on indices, rapid variations and special intervals, appeared in July 1980.

IAGA-Bulletin 32j, Geomagnetic Data 1979, will probably appear in July 1981. Unfortunately the data for the repeatedly announced special IAGA-Bulletin No.40 (Dst-indices 1957-....) are not yet available for publication.

Published as an appendix to IAGA-Bulletin No. 32i was: "A Report on Km-Observatory Visits" by P.N. Mayaud and M. Menvielle (23 pages), which contains the results of a campaign for improvement of the quality of K-indices, used in the determination of the Km-index.

The checking lists for rapid variations 1979 were sent to the observatories in September 1980. According to a decision at the Canberra-Assembly, the so called "very unusual events" will no longer be listed and therefore the checking lists were restricted to solar-flare effects only. In order to improve the identification of sfe's, a new method of classification was introduced by Dr. Romañá. The observatories were asked to assign two indices to each presumed sfe. In spite of the success of this method, the reporting of sfe's by many observatories remains unsatisfactory.

In April 1981 an inquiry was made on the usefulness of IAGA-Bulletin No.32, by means of a questionnaire to the 300 recipients of this publication. Replies were received from 120 persons. The results are presented on the next page.

Change in the Directorship of ISGI

At the IAGA Edinburgh meeting, Dr. D. van Sabben proposed that his colleague Mr. J. A. As should take over the job as the ISGI Director. This proposal was approved by the IAGA Division V Business Meeting, and conveyed to IUGG. According to the statutes of FACS, IUGG made an official nomination of the new director. IAGA would like to thank Dr. van Sabben for his service to ISGI for more than 10 years.

RESULTS OF ISGI-QUESTIONNAIRE, March 1981

Questionnaire distribution: about 300
Replies received: 115

Ref. to Bull.32i page no.	I have used or expect to use IAGA-Bulletin No.32 for the following data: Type of data	Used	Expect to use
4	Indices aa	43	22
9	International quiet and disturbed days	91	29
10	Planetary three-hour indices Kp or ranges ap.	83	31
10	Daily indices Ap	57	21
10	Daily indices Cp	40	15
16	Frequencies of Kp-indices	43	17
17	List of magnetic storms, based on Kp.	66	25
17	Very quiet intervals based on Kp	46	31
17	Index Kp' (Kp, corrected for sfe)	37	16
18	27-day recurrence diagram of Kp	57	22
20	Three-hour indices Kn, Ks or amplitudes an, as (Northern and Southern hemispheres)	44	24
21	Three-hour indices Km or amplitudes am	38	18
20	Daily indices An, As	27	19
21	Daily indices Am	26	16
21	Daily indices Am2	22	9
38	Hourly equatorial Dst-index	61	31
50	Graph of hourly Dst-index	59	31
53	Daily, monthly or annual mean values of Dst.	54	28
54	References to other indices: Q, R, AE	38	19
58	Times of storm sudden commencements (ssc)	82	23
58	Quality indication or duration of ssc	54	25
61	Times of solar-flare effects (sfe)	66	23
61	Further details about sfe's	42	20
69	Diagram of magnetic activity: plots of daily an-as, an+as and Dst	37	18
	Data on selected 4-day intervals:		
70	Diagram of Kp, Kn, Ks, Dst	34	18
70	Magnetic storm data from indiv. observat.	52	18
70	K-indices for individual observ.	43	23
71	Common-scale magnetograms and AE-plot	47	23
72	Prel. AE-indices at one minute intervals.	30	24

Do you think that the publication of the IAGA Bulletin No.32 should be continued? YES: 76

FUTURE INTERNATIONAL MEETINGS OF INTEREST TO IAGA

FIFTH INTERNATIONAL SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

Date: 17-22 May 1982 (during the XXIVth COSPAR Meeting)
Place: Chateau Laurier Hotel, Ottawa, Canada
(the main meeting place for COSPAR meetings and registration)

Program Committee: J.G. Roederer (chairman), C. de Jager, K. Labitzke, D.E. Page; W.I. Axford, A.D. Danilov, B. Hultqvist, H. Rishbeth, C.T. Russell

Information on the Program:

This symposium will focus on the physical mechanisms that govern the transfer, storage and dissipation of energy and momentum in the solar-terrestrial system; the structure, dynamics and mutual interactions of plasma regions and the upper atmosphere; and the generation and propagation of solar disturbances and their effects on the Earth's environment. The papers and reviews will emphasize physical interpretations and theory; discussion of data and instrumental techniques is not envisaged.

PROGRAM SESSION TITLES

Opening Session

Opening address: Solar-terrestrial Physics: The study of mankind's newest frontier (J.G. Roederer)

Keynote address: by Sir Granville Beynon

I. Sun
1. Solar cycle mechanisms
2. General properties of the outer solar atmosphere
3. The flare process: build-up and energization
4. Coronal disturbances

II. Interplanetary Medium
1. Plasmas and fields in the solar wind
2. Large-scale structure of the heliosphere and its evolution during the solar cycle
3. Propagation of solar disturbances in interplanetary space
4. Particle source regions, acceleration and propagation in interplanetary space

III. Magnetosphere and Ionosphere
1. Response mechanisms of the magnetosphere-ionosphere to solar and interplanetary parameters
2. Radiation belt, ring current and plasmasphere relationships
3. Field-aligned currents and electric fields in the ionosphere and magnetosphere
4. Dynamics of the disturbed ionosphere
5. Waves in magnetospheric plasmas
6. Plasma processes in magnetospheric boundary regions

IV. Middle Atmosphere/Thermosphere
1. Atmospheric/thermospheric response to solar output variability
2. Meteorological control of the D-region
3. Interactions between radiation, dynamics and chemistry in the middle atmosphere
4. Middle atmosphere dynamics during winter

V. Human Activity and the Solar-Terrestrial Environment (reviews only)
1. Ozone (speaker to be announced)
2. Rocket motor gas injections (M.J. Mendillo)
3. Electromagnetic injections (T.R. Kaiser)
4. Induction effects in ground systems (L. Lanzerotti)
5. Spacecraft charging and radiation effects (A. Pedersen)

L. Tutorial Lectures
1. Solar dynamos (E.N. Parker)
2. Generation and decay of the magnetospheric ring current (D.J. Williams)
3. Plasmas in the solar-terrestrial system (W.I. Axford)
4. Meteorological control of the D-region (J. Taubenheim)
5. Coronal disturbances and their terrestrial effects (D.M. Rust)
6. Convection in the disturbed ionosphere (H. Volland)
7. Upstream particles and waves in the solar wind (C.T. Russell)
8. Dynamics of the middle atmosphere (M.A. Geller)

Public Forum: Long-range plans for research in solar-terrestrial physics - Chairman: K.D. Cole, President of SCOSTEP.

The details of this STP Symposium are shown in the circulars for "Tenty-Fourth Plenary Meeting and Associated Activities" issued by the COSPAR Secretariat, 51 Boulevard de Montmorency, 75016 Paris, France. For participation, please follow the COSPAR instructions explained in the circulars.

FOURTH INTERNATIONAL SYMPOSIUM ON ANTARCTIC EARTH SCIENCES

Date: 16-20 August 1982
Place: University of Adelaide, South Australia.
Sponsors: SCAR, IUGS, Australian Academy of Science, Geological Society of Australia, Australian Academy of Technological Science.

History of Previous Conferences: Cape Town (1963), Oslo (1970) and Madison (1977) at seven-year intervals. The Adelaide conference has been brought forward to 1982 because that year is the centenary of the birth of Sir Douglas Mawson who apart from his Antarctic work was Professor of Geology at the University of Adelaide from 1921-1952. The tradition of Antarctic research initiated by Mawson has been continued at Adelaide University by other members of the Geology Department and by the Mawson Institute for Antarctic Research.

Proposed Topics:

Precambrian East Antarctic craton (petrology, structure geochemistry, geochronology, geophysics).
East Antarctica - West Antarctica boundary and the Ross Orogen.
Beacon Super Group and associated igneous activity.
Lower Palaeozoic of Antarctica.
West Antarctica and the Scotia Arc.
Marine Geology.
Antarctic resources.
Glacial geology and geomorphology.
Crustal structure of Antarctica from geophysical evidence.
Cainozoic tectonics and climatic record (onshore and offshore evidence).
Antarctica in Gondwanaland.
Plate Tectonics - marine geophysical and geological surveys.
Antarctic meteorites.
Cainozoic igneous activity.

Pre-Symposium and Post-Symposium Excursions:

9-14 August: Eyre Peninsula and Flinders Ranges. On the Eyre Peninsula we will concentrate on the Archaean and Proterozoic gneisses and charnockites of the Gawler Block and the late Proterozoic sediments and igneous rocks of the Stuart shelf. In the spectacularly scenic northern Flinders Ranges we will see Adelaidean sediments (including tillites) and volcanics, folded and penetrated by diapiric structures. We will also see the Pre Cambrian-Cambrian boundary, the Ediacara fauna and the Archaeocyathus limestones.

21 August: Late Proterozoic and Late Palaeozoic glacial sediments south of Adelaide (incl. Hallett Cove).

22 August: Victor Harbor - Early Palaeozoic granites and Cambrian sediments affected by the Delamerian Orogeny.

23 August: Sellicks Hill - Delamere, Early Cambrian sediments, Cambrian Precambrian boundary and Delamerian thrust tectonics.

24 August: Palmer-Reedy Creek, high grade Cambrian gneisses and intrusive granites.

Invitation to Present Papers or Posters:

Intending authors are asked to submit titles by 30 June 1981. Abstracts are requested by 1 March 1982, and complete manuscripts suitable for publication (limited to 10 A4-size sheets of paper, including illustrations and tables) by 1 July 1982.

Steering Committee: R.L. Oliver (Australia, chairman), R.J. Adie (U.K.), C. Craddock (U.S.A.), F.J. Davey (New Zealand), J.C. Dooley (Australia), C.E. Grikurov (U.S.S.R.), R.J. Tingey (Australia).

Contact Person: Dr. J.B. Jago, P.O. Box 1, Ingle Farm, South Australia 5098.

SIXTH WORKSHOP ON ELECTROMAGNETIC INDUCTION IN THE EARTH AND MOON

15-22 August 1982, in Livermore, California, U.S.A.

IAGA Working Group I-3 on Electromagnetic Induction in the Earth and Moon (Chairman: A. Ádám; Vice-chairman: B.A. Hobbs) is now planning its 6th workshop in Livermore, California, U.S.A. during 15-22 August 1982, with the cosponsorship of IUGG. This series of workshop (1st in Edinburgh, U.K. in 1972, 2nd in Ottawa, Canada in 1974, 3rd in Sopron, Hungary in 1976, 4th in Murnau, FRG in 1978, and 5th in Istanbul, Turkey in 1980) has contributed very much to the study of electromagnetic behaviour of the earth's interior, and is now promoting the ELAS (Electric Conductivity of the Asthenosphere) project. The progress report for this project was presented to the IAGA Edinburgh Assembly in August 1981, and it is included in this IAGA News, pp. 58-68.

At the next workshop in 1982, the programme will focus on some of the following topics:

Electromagnetic instrumentation
Controlled sources - surface, borehole and sea floor techniques
Ocean studies
Magnetometer array studies
Electromagnetic studies in geothermal regions
The problem of current channelling
Interpretation of electromagnetic data over 3-D structures
Inversion theory
Laboratory measurements of electrical properties of rocks and minerals
Electromagnetic studies in the Lithosphere and asthenosphere
(including shield and active regions)

The sessions will be introduced by an invited review paper, except for the first topic of instrumentation (which is a poster session following short oral presentations). The workshop will seek to provide ample time and opportunity for full discussion of the presentations. To this end, participants will be limited to presenting one paper only. Exceptional circumstances will be at the discretion of the Programme Committee.

The Programme Committee for the coming Workshop consists of

A. Ádám (chairman), A. Duba (secretary),
C. Cox, J. Filloux, B. Hobbs (ex-officio),
P. Kasameyer, T. Madden, T. Shankland

The Local Organizing Committee consists of

A. Duba (chairman, Lawrence Livermore National Laboratory, Livermore, California 94550, U.S.A.)
W. Dailey, E. Didwall, L. Duba, H. Heard, R. Lytle.

The detailed information on the coming Workshop is available on request from Dr. A. Ádám, Geodetical and Geophysical Research Institute of the Hungarian Academy of Sciences, POB 5, H-9401 Sopron, Hungary. The abstract deadline will be 15 May 1982.

EUROPEAN GEOPHYSICAL SOCIETY and EUROPEAN SEISMOLOGICAL COMMISSION

The University of Leeds, England, 23-27 August 1982

SYMPOSIA*, WORKSHOPS AND OPEN SESSIONS°

Section 1: Earth & Planetary Interiors and Surfaces
Seismotectonics* Heterogeneity of tha Mantle
Earthquake Prediction Engineering Seismology
Filtering Analysis in Geophysics* Palaeomagnetism of Orogenic Belts
Geophysics of the European Continental Shelf and Margin
Space Geodesy: Applications to Studies of Crustal Evolution and Planetary Dyanamics
Planetary Sciences
(a) Planetary Surfaces and Interiors
(b) Isotopic Anomalies in Extraterrestrial Materials
Isotope Geology and Crustal Evolution° Marine Geophysics°
Geomagnetism, Palaeomagnetism and Rock Magnetism°
Geophysical Fluid Dynamics°

Section 2: Hydrospheres; Earth and Planetary Atmospheres
The State of Evaporation Research*
Spatial Variability of Soil Physical Properties*
Planetary Sciences (c) Planetary Meteorology
New Perspectives in Climate Modelling
Predictability in Geophysical Fluid Systems
Geophysical Fluid Dynamics°

Section 3: Interplanetary Medium, Magnetospheres & Upper Atmospheres
Structure of the Upper and Middle Atmosphere (in honour of M. Nicolet)
Ions in the Middle Atmosphere*
The Polar Aurora (for the anniversaries of Polar and Geophysical Years)*
Plasma and Energetic Particle Distribution in the Magnetosphere
Filtering Analysis in Geophysics* The Planet Mars*
Latest Results in Magnetospheric Physics°
Latest Results in Interplanetary Physics°

SOCIETY LECTURES

Rotating Fluids in Geophysics and Planetary Physics.... R. Hide
The Magnetospheres of Jupiter and Saturn..... F.M. Neubauer

PAPER SUBMISSION DEADLINE: 17 May 1982

TRAVEL AWARDS FOR YOUNG SCIENTISTS: Forms are available on request from
Prof. P. Steinhauser, Zentralanstalt fur Meteorologie und Geodynamik
A-1190 WIEN, Hohe Warte 38 (Austria)
Closing Date: 31 March 1982

FOR INFORMATION, AND TO RECEIVE SECOND CIRCULAR
J.T. Gleave
Special Courses Division
The University of Leeds
Leeds, LS2 9JT
U.K.
Tel. 0532 435036
Telex 557939 Expath G

AUTUMN COURSE ON GEOMAGNETISM, THE IONOSPHERE AND MAGNETOSPHERE OF THE INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

21 September - 12 November 1982

The International Centre for Theoretical Physics (ICTP), Trieste, Italy, will organize a Course on the theory of the Earth's magnetic field, the ionosphere and the magnetosphere, and radio propagation in the surroundings of the Earth, together with a Workshop on radio propagation in the tropics, from 21 September to 12 November 1982. The programme is sponsored by the Italian Dipartimento per la Cooperazione allo Sviluppo, the International Union of Geodesy and Geophysics, the International Union for Scientific Radio and the Kuwait Foundation for the Advancement of Sciences. It has been prepared by Prof. A.A. Ashour (Cairo, Egypt), Sir Granville Beynon, FRS (Aberystwyth, U.K.), Prof. A.H. Cook, FRS (Cambridge, U.K.) and Prof. A. Marussi (Trieste, Italy).

1. PURPOSE AND NATURE

The Course is intended to develop the mathematical and physical basis of the phenomena of the geomagnetic field and the plasmas around the Earth, and participants should have completed several years of study and research after a first degree.

The Workshop is intended for those particularly interested in the special problems of radio propagation in the tropics, and familiarity with the material of the preceding courses will be assumed.

The Course and Workshop are open to scholars from all countries of the world that are members of the United Nations, IAEA or UNESCO. While it is the main purpose of the Centre to help scientists from developing countries, graduate students and postdoctoral scientists from other countries are welcome to attend the Course and Workshop. Preference will be given to candidates involved in teaching, research or service activity in a university or research institute.

The programme will be conducted in English and every participant must have a working knowledge of that language. Each participant will have his own desk at the Centre, which is situated a few kilometres from the city of Trieste, and arrangements will be made for discussions, study groups and tutorials outside the formal programme.

11. TENTATIVE PROGRAMME

Weeks 1 - 6 (21 September - 29 October)

COURSES on
- Geomagnetism (description and analysis of the Earth's field, dynamo theory, electromagnetic induction)
- Ionosphere (nature, origin and control of the ionosphere, plasma physics, radio propagation)
- Magnetosphere (nature, origin, electrodynamics, magnetic storms)
- Interactions between the solar wind, terrestrial plasmas and neutral atmosphere
- Radio propagation in the regions around the Earth

Weeks 7 - 8 (2 - 12 November)

WORKSHOP on radio propagation in the tropics

III. PARTICIPATION

Candidates should send the participation form to:

International Centre for Theoretical Physics
P.O. Box 586
I-34100 Trieste
Italy

The participation form is available on request from the above address.

As a rule, travel costs to and from Trieste, as well as subsistence expenses of the participants, are borne by the home institutions. However, funds are available which will permit the Centre to grant an allowance to a limited number of participants from developing countries who will be selected by the Organizing Committee. In exceptional cases this allowance will also cover travel expenses, but preference will be given to those candidates who can obtain their fare (or half fare) from their home country. Such financial support is available only to those attending the entire Course.

Deadlines for the receipt of participation forms

Candidates requesting financial support from ICTP : 31 March 1982
Candidates not requesting financial support from ICTP : 30 June 1982

The decision of the Organizing Committee will be communicated to all candidates as soon as possible after the selection.

1983

XVIII GENERAL ASSEMBLY OF IUGG

15-27 August 1982, Hamburg, Fed. Rep. Germany

The detailed information on the next IUGG (including IAGA) General Assembly will be circulated in 1982, although the First Circular has already been distributed. Those who wish to receive the coming circulars and registration forms are adviced to request them from

Local Organizing Committee, IUGG 1983
Hamburg Messe und Congress GmbH
Postfach 30 23 60
D-2000 Hamburg, Fed. Rep. Germany.

For your information, the chairman of the Local Organizing Committee is Dr. W. Zahel, Institut für Meereskunde der Universität Hamburg, Heimhuderstrasse 71, D-2000 Hamburg 13. Prof. D. Voppel (Deutsches Hydrographisches Institut, Bernhard-Nocht-Strasse 78, D-2000 Hamburg 4) is the IAGA Representative in the Local Organizing Committee, and he is in charge of the arrangements for IAGA sessions during the coming IUGG General Assembly.

The registration fee will be 290 DM, which includes the welcome reception, the General Assembly dinner, part of the Sunday excursion, printing of the Comptes Rendus of the General Assembly, free distribution of the abstracts related to the IUGG Interdisciplinary Symposia plus those of the Association to which the registered participant belongs.

RECENT PUBLICATIONS (IAGA Bulletins and Others)

IAGA BULLETINS

IAGA Bulletin No. 32j: Geomagnetic Data 1979: Indices, Rapid Variations, Special Intervals.

This bulletin continues the series of yearly IAGA-Bulletins no. 32. It contains the following geomagnetic data for 1979:

- the indices aa and a list of monthly and yearly means of aa for the years 1868-1979;
- the international quiet and disturbed days (with an indication of their degree of disturbance);
- the planetary three-hour indices Kp, the corresponding ranges ap, daily indices Ap and Cp with their monthly and yearly mean values; frequencies of Kp, disturbed and quiet intervals, reduced values of Kp after elimination of solar-flare effects and 27-day recurrence diagram of Kp. Also included is a list of monthly and yearly mean values of Ap, 1932-1978;
- the three-hour indices Kn, Ks, Km for the Northern and Southern hemispheres and for the whole earth; the corresponding amplitudes an, as, am, the daily indices An, As, Am and their monthly mean values and a diagram displaying the variation of am and an-as, together with Dst.
- the hourly equatorial Dst-index (tables and graphs), with daily, monthly and annual mean values.

The first part of the Bulletin ends with some pages giving references to other existing geomagnetic indices, namely the quarter hourly index Q, the hourly index R, the auroral electrojet index AE and to tables and diagrams of Kp, Ap and Cp, published in previous IAGA-Bulletins.

The part on rapid variations contains the times of sudden commencements of magnetic storms, solar-flare effects. The so called "unusual events" are no longer given.

The last part of the Bulletin consists of a data survey for five special intervals in 1979, chosen such that they include magnetic storms, namely Feb. 20-23, Mar. 31 - Apr. 3, Apr. 3-6, Apr. 24-27, Aug. 28-31. The following data are given for each interval: a four day diagram of indices Kp, Kn, Ks and Dst, magnetic storm data (ssc, ranges etc.) for about 30 observatories, a four day list of K-indices of 53 observatories. In each interval a two day period is chosen for which common scale magnetograms are shown and preliminary AE-indices at one minute intervals are given.

This publication is now available at the cost of $4.50 per copy from the IUGG Publications Office, 39 ter, Rue Gay-Lussac, 75005 Paris, France.

IAGA Bulletin No. 45: Programme and Abstracts for the 4th IAGA Scientific Assembly, Edinburgh, U.K., 3-15 August 1981.

A4-size, 614 pages. Now available from the IUGG Publications Office at the cost of $5.00 per copy. The stock is very limited.

PUBLICATIONS OF SOME IUGG OR IAGA SYMPOSIA IN CANBERRA

Global Reconstruction and the Geomagnetic Field during the Palaeozoic (IUGG Symposium in Canberra, December 1979)

The proceedings of this symposium appeared as Supplement III of the Journal of Geomagnetism and Geoelectricity, Vol. 32, 1980 (not included in regular subscription) edited by M.W. McElhinny, A.N. Khramov, M. Ozima and D.A. Valencio. This special issue contains 11 papers (142 pages) out of the 19 papers (some of these have been published elesewhere) presented at the symposium.

The proceedings is also available as a hard cover book "Advances in Earth and Planetary Sciences, Vol. 10" published by the Center for Academic Publications Japan (4-16, Yayoi 2-chome, Bunkyo-ku, Tokyo 113, Japan) in co-publication with D. Reidel Publishing Company, P.O. Box 17, 3300 AA Dordrecht, Holland (see the footnote for ordering this publication).

ULF Pulsations in the Magnetosphere (IAGA Symposium in Canberra, December 1979)

The proceedings of this symposium appeared as Supplement II of the Journal of Geomagnetism and Geoelectricity, Vol. 32, 1980 (not included in regular subscription) edited by D.J. Southwood. This special issue contains 9 papers (145 pages), 8 of which are review papers presented during the 3-day symposium on geomagnetic pulsations. The proceedings are available as a hard cover book "Advances in Earth and Planetary Sciences, Vol. 11 (see the remark in the footnote).

Electromagnetic Induction in the Earth and Moon (Papers presented to the 4th Workshop at Murnau, FRG, in September 1978)

This appeared as Supplement I of the Journal of Geomagnetism and Geoelectricity, Vol. 32, 1980 (not included in regular subscription) edited by U. Schmucker. It contains 20 papers (195 pages). This publication is available as a hard cover book "Advances in Earth and Planetary Sciences, Vol. 9" (see the remark in the footnote).

Electromagnetic Induction in the Earth and Moon (Papers presented to the 3rd Workshop in Sopron, Hungary, July 1976)

The review papers were published in Acta Geodetica, Geophysica et Montanistica (by Academiae Scientiarum Hungaricae), Tomus 11, Fasciculi 3-4 (pages 329-509), 1976, with Guest Editors A. Ádám and U. Schmucker. The contributed papers were later published in the same journal, Tom. 12, Fasc. 1-3 (pages 1-422), 1977, with the same guest editors.

Note: The series of "Advances in Earth and Planetary Sciences" is sold in
Asia: by Center for Academic Publications Japan (4-16, Yayoi 2-chome, Bunkyo-ku, Tokyo 113, Japan);
U.S.A. and Canada: by Kluwer Boston Inc. (190 Old Derby Street, Hingham, MA 02043, U.S.A.);
all other countries: by Kluwer Academic Publishers Group (P.O. Box 32, 3300 AH Dordrecht, Holland).

Electromagnetic Induction in the Earth and Moon (Papers presented to the 5th Workshop in Istanbul, Turkey, August 1980)

The review papers were published in the Geophysical Surveys (an international review journal of geophysics and planetary sciences; edited by K.M. Creer; D. Reidel Publishing Company), Vol. 4 (1981), Nos. 1-2 (185 pages) with Guest Editors S.R.C. Malin and A.M. Isikara.

Equatorial Aeronomy (Papers from the Sixth International Symposium on Equatorial Aeronomy)

Journal of Atmospheric and Terrestrial Physics (published by Pergamon Press), Vol. 43, Nos. 5/6 (May/June 1981) and No. 8 (August 1981) are devoted to the papers presented to the 6th ISEA meeting held in Aguadilla, Puerto Rico, 17-23 July 1980, edited by S. Matsushita, B.B. Balsley and H. Rishbeth. The number of papers included in the first issue is 24 (256 pages, including 7 review papers), and 16 (135 pages, including 3 review papers) in the latter issue.

"GEOMAGNETISM" Chapter of the 'Developing Countries Book'

The IUGG Committee for Advice to Developing Countries in the Fields of Geodesy and Geophysics (Chairman: Prof. A.A. Ashour) are publishing a series of booklets. The first four have already appeared: "La Géodésie"(in French by P.C. Baetslé), Near Shore Oceanography" (in English by E.C. LaFond), "Geomagnetism" (in English by V.A. Troitskaya et al.), and "Hydrology" (in English by H. Narain). The fifth one on "Seismology" will appear soon, and the publication of a sixth one on "Meteorology" will be arranged. This series of books has been published under the auspices of UNESCO, and the Secretary General of IUGG, Prof. P. Melchior is the editor.

The content of the "Geomagnetism" chapter consists of Introduction (by V.A. Troitskaya), The Main Geomagnetic Field (by G.N. Petrova, 10 sections), Equipment for Magnetic Observatories (by V.N. Bobrov, 3 sections), The Variable Magnetic Field of the Earth (by M.I. Pudovkin, 15 sections), and concludes with Experimental Field Investigations Recommended for Developing Countries. This tutorial booklet contains 46 pages of text and 30 figures.

Those who wish to receive this booklet are asked to write to N. Fukushima (Secretary General of IAGA), Geophysics Research Laboratory, University of Tokyo, Tokyo 113, Japan. He will convey the request to the IUGG General Secretary who hopefully keeps a small limited number of spare copies.

HANDBOOK FOR "MIDDLE ATMOSPHERE PROGRAM"

SCOSTEP (Scientific Committee on Solar-Terrestrial Physics, under ICSU) published in June 1981, two volumes of "Handbook for MAP" (Volume 1 edited by C.F. Sechrist, Jr., Volume 2 edited by S.K. Avery). Copies of these publications are available from

SCOSTEP Secretariat, University of Illinois
1406 W. Green Street, Urbana, Illinois 61801, U.S.A.

The following descriptions are to introduce the content of these handbooks and their usefulness.

FOREWORD by S.A. Bowhill (Chairman of MAP Steering Committee)

In June 1976, a Middle Atmosphere Program Planning Conference was held in Urbana, Illinois, and the proceedings were issued as the "Middle Atmosphere Program Planning Document". Nearly 2000 copies of that "green book" have been distributed throughout the world, and have been the basis for the planning of MAP programs.

With this volume we initiate HANDBOOK FOR MAP, which will serve the purpose of communicating to the participating scientific unions, countries, and scientists the progress in planning for the Middle Atmosphere Program, due to commence on January 1, 1982. It contains national plans for MAP as they have so far been received by the SCOSTEP Secretariat; and reports from the various MAP projects and study groups. More of these will be contained in subsequent volumes to be issued in the coming months. The total program of MAP will be reviewed at the MAP Assembly to be held at Edinburgh on August 14 and 15, 1981.

Volume 2 in this series contains extended abstracts from the International Symposium on Middle Atmosphere and Dynamics and Transport, held at Urbana on July 28 - August 1, 1980.

Volume 3 will contain further study group reports and condensed minutes of MAP Steering Committee meetings up to the present, a list of members of Groups and Committees and MAP National Representatives, together with an updated version of Chapter 2 of the MAP Planning Document.

It is hoped that these publications will prove useful in their function of communicating and archiving. Any member union, country, committee, or individual may submit material for publication in a future volume of the HANDBOOK FOR MAP. Such contributions should be sent to Dr. C.F. Sechrist, Jr., Chairman of the MAP Publications Committee.

CONTENTS OF VOLUME I

Part 4. Approved MAP Projects (8 pages)
Winter in Northern Europe (MAP/WINE)
Global Budget of Stratospheric Trace Constituents (MAP/Globus)

FOREWORD in Volume II by T.E. VanZandt

The International Symposium on Middle Atmosphere Dynamics and Transport was held at the Coordinated Science Laboratory of the University of Illinois from July 28 to August 1, 1980. This was the first in a series of symposia that will be held under the auspices of the Middle Atmosphere Program (MAP). It was also probably the first international symposium devoted exclusively to the dynamics of the middle atmosphere. In addition to the usual function of a scientific symposium, to serve as a forum for the exchange of ideas, this symposium was intended to focus attention on the principal outstanding problems in the dynamics of the middle atmosphere, so that they can be incorporated in the planning for MAP, which will run from 1982-1985. We believe that the number and quality of the papers in this symposium were such that both functions were well-served. This report contains extended abstracts of most of the 14 invited review and 65 contributed papers presented at the Symposium. Complete papers based on many of the presentations will be published soon in the "Journal of Geophysical Research - Oceans and Atmospheres".

CONTENTS OF VOLUME II

AURORAL ELECTROJET INDICES (AE) PUBLICATIONS

World Data Center C2 for Geomagnetism (in the Faculty of Science, Kyoto University, Kyoto 606, Japan) is now publishing the AE-indices for the period of the International Magnetospheric Study 1976-1979. As of November 1981, the AE-indices for January-June 1978 and July-December 1978 had been published.

The AE-index was originally introduced by Davis and Sugiura in 1966 as a measure of global electrojet activity in the auroral zone, and it is now widely used for studying geomagnetism, aeronomy and solar-terrestrial physics. The index was first derived at the Geophysical Institute of the University of Alaska, and hourly values were published for the years 1957-1964. The production of 2.5-min. values was then tried at the Goddard Space Flight Center of NASA, and the results from September 1964 to June 1968 were published. After that, the index was regularly published at the World Data Center A in Boulder, Colorado, U.S.A., and the WDC-A published 2.5-min. values for the years 1966-1974 and 1.0-min. values for 1975 and the first half of 1976. Because of manpower and other reasons, it became difficult to continue the production of the AE-index at the WDC-A, and it was requested that the index be produced at the WDC-C2 for Geomagnetism in Kyoto. Upon such a request the WDC-C2 agreed to cooperate in producing the index, at least for the IMS.

The Data Books for the AE-indices during July-December 1978, contain

Introductory Remarks with a list of stations used for deriving the AE-indices and the method of derivation.	10 pages
Tables of hourly average AE-indices (AU, AL, AE and AO)	26 pages
Daily graphs of 1.0-min. AE-indices and plots of the stations contributing to AU and AL	64 pages
The H-traces of magnetograms from AE(12) stations	8 pages

The content is the same for the Data Book for January-June 1978 and also for the coming issues.

The Data Books of the AE-indices for January-June and July-December 1978 have been sent recently from the WDC C2 for Geomagnetism to the principal institutions and magnetic observatories over the world, or to IAGA National Correspondents of IAGA/IUGG member countries.

SHORT ARTICLES, NOTICES AND USEFUL INFORMATION

INTERNATIONAL GEOMAGNETIC REFERENCE FIELD 1980

(from a report by IAGA Working Group I-1: N.W. Peddie, Chairman)

IGRF 1965, the first international geomagnetic reference field, was adopted by IAGA in 1968. It consists of a model of the main field at 1965.0, along with a model of secular variation for use in extending the main field model in time, both backward (not earlier than 1955.0) and forward (not later than 1975.0). IGRF 1975, adopted later, consists of IGRF 1965 extended to 1975.0, along with a revised model of secular variation for use in extending the main field model up to 1980.0.

By the late 1970's, the cumulative effect of the inevitable uncertainties in the secular variation models had led to unacceptable inaccuracies in the IGRF. To satisfy the need for an accurate international geomagnetic reference field, this working group recommended the following additions;

1. An international geomagnetic reference field for the interval 1980.0 to 1985.0 (IGRF 1980), consisting of a model of the main field at 1980.0, along with a model of secular variation for use in extending the main field model up to 1985.0
2. A definitive international geomagnetic reference field (DGRF) for the interval 1965.0 to 1975.0, consisting of models of the main field at 1965.0 (DGRF 1965), 1970.0 (DGRF 1970), and 1975.0 (DGRF 1975), with linear interpolation of the model coefficients for intervening dates.
3. A provisional international geomagnetic reference field for the interval 1975.0 to 1980.0 (PGRF 1975), defined to be the linear interpolation of DGRF 1975 and IGRF 1980 (main field).

The working group also recommended that the pattern of these additions should be followed in future updates.

The recommendations, proposed as Resolution 13, were adopted by IAGA on August 15, 1981 at the Fourth Scientific Assembly at Edinburgh.

IGRF 1980 is discontinuous with IGRF 1975 at 1980.0. DGRF, unlike IGRF, results from retrospective analysis. Further revision of DGRF is not anticipated. PGRF 1975 now supersedes IGRF 1975. PGRF 1975 will be superseded if and when a definitive model of the main field at 1980.0, different from IGRF 1980, is adopted.

DGRF 1965, DGRF 1970, DGRF 1975, and IGRF 1980 (including secular variation forecast model) are given in the form of spherical harmonic expansions whose coefficients are listed in the table shown on the following page. Each main field model has 120 coefficients (10th degree and order). The secular variation forecast model has 80 coefficients (8th degree and order). The coefficients are Schmidt quasi-normalized and refer to a radius a of 6371.2 km, i.e. the geomagnetic potential

SPHERICAL HARMONIC COEFFICIENTS g_n^m and h_n^m (in nT) FOR
International Geomagnetic Reference Field (IGRF) 1980, and
Definitive International Geomagnetic Reference Field (DGRF) 1965-1975

		DGRF(1965)		DGRF(1970)		DGRF(1975)		IGRF(1980)		1980-85 in nT/yr	
n	m	g_n^m	h_n^m	g_n^m	h_n^m	g_n^m	h_n^m	g_n^m	h_n^m	$\dot{g}_n^m$	$\dot{h}_n^m$
1	0	-30334		-30220		-30100		-29988		22.4	
1	1	-2119	5776	-2068	5737	-2013	5675	-1957	5606	11.3	-15.9
2	0	-1662		-1781		-1902		-1997		-18.3	
2	1	2997	-2016	3000	-2047	3010	-2067	3028	-2129	3.2	-12.7
2	2	1594	114	1611	25	1632	-68	1662	-199	7.0	-25.2
3	0	1297		1287		1276		1279		0.0	
3	1	-2038	-404	-2091	-366	-2144	-333	-2181	-335	-6.5	0.2
3	2	1292	240	1278	251	1260	262	1251	271	-0.7	2.7
3	3	856	-165	838	-196	830	-223	833	-252	1.0	-7.9
4	0	957		952		946		938		-1.4	
4	1	804	148	800	167	791	191	783	212	-1.4	4.6
4	2	479	-269	461	-266	438	-265	398	-257	-8.2	1.6
4	3	-390	13	-395	26	-405	39	-419	53	-1.8	2.9
4	4	252	-269	234	-279	216	-288	199	-298	-5.0	0.4
5	0	-219		-216		-218		-219		1.5	
5	1	358	19	359	26	356	31	357	46	0.4	1.8
5	2	254	128	262	139	264	148	261	149	-0.8	-0.4
5	3	-31	-126	-42	-139	-59	-152	-74	-150	-3.3	0.0
5	4	-157	-97	-160	-91	-159	-83	-162	-78	0.2	1.3
5	5	-62	81	-56	83	-49	88	-48	92	1.4	2.1
6	0	45		43		45		49		0.4	
6	1	61	-11	64	-12	66	-13	65	-15	0.0	-0.5
6	2	8	100	15	100	28	99	42	93	3.4	-1.4
6	3	-228	68	-212	72	-198	75	-192	71	0.8	0.0
6	4	4	-32	2	-37	1	-41	4	-43	0.8	-1.6
6	5	1	-8	3	-6	6	-4	14	-2	0.3	0.5
6	6	-111	-7	-112	1	-111	11	-108	17	-0.1	0.0
7	0	75		72		71		70		-1.0	
7	1	-57	-61	-57	-70	-56	-77	-59	-83	-0.8	-0.4
7	2	4	-27	1	-27	1	-26	2	-28	0.4	0.4
7	3	13	-2	14	-4	16	-5	20	-5	0.5	0.2
7	4	-26	6	-22	8	-14	10	-13	16	1.6	1.4
7	5	-6	26	-2	23	0	22	1	18	0.1	-0.5
7	6	13	-23	13	-23	12	-23	11	-23	0.1	-0.1
7	7	1	-12	-2	-11	-5	-12	-2	-10	0.0	1.1
8	0	13		14		14		20		0.8	
8	1	5	7	6	7	6	6	7	7	-0.2	-0.1
8	2	-4	-12	-2	-15	-1	-16	1	-18	-0.3	-0.7
8	3	-14	9	-13	6	-12	4	-11	4	0.3	0.0
8	4	0	-16	-3	-17	-8	-19	-7	-22	-0.8	-0.8
8	5	8	4	5	6	4	6	4	9	-0.2	0.2
8	6	-1	24	0	21	0	18	3	16	0.7	0.2
8	7	11	-3	11	-6	10	-10	7	-13	-0.3	-1.1
8	8	4	-17	3	-16	1	-17	-1	-15	1.2	0.8
9	0	8		8		7		6			
9	1	10	-22	10	-21	10	-21	11	-21		
9	2	2	15	2	16	2	16	2	16		
9	3	-13	7	-12	6	-12	7	-12	9		
9	4	10	-4	10	-4	10	-4	9	-5		
9	5	-1	-5	-1	-5	-1	-5	-3	-7		
9	6	-1	10	0	10	-1	10	-1	9		
9	7	5	10	3	11	4	11	7	10		
9	8	1	-4	1	-2	1	-3	1	-6		
9	9	-2	1	-1	1	-2	1	-5	2		
10	0	-2		-3		-3		-3			
10	1	-3	2	-3	1	-3	1	-4	1		
10	2	2	1	2	1	2	1	2	1		
10	3	-5	2	-5	3	-5	3	-5	2		
10	4	-2	6	-1	4	-2	4	-2	5		
10	5	4	-4	6	-4	5	-4	5	-4		
10	6	4	0	4	0	4	-1	3	-1		
10	7	0	-2	1	-1	1	-1	1	-2		
10	8	2	3	0	3	0	3	2	4		
10	9	2	0	3	1	3	1	3	-1		
10	10	0	-6	-1	-4	-1	-5	0	-6		

$V(r, \theta, \lambda)$ is given by

$$V(r, \theta, \lambda) = a \sum_{n=1}^{10} \sum_{m=0}^{n} \left(\frac{a}{r}\right)^{n+1} (g_n^m \cos m\lambda + h_n^m \sin m\lambda) P_n^m(\cos \theta)$$

where

$$P_n^m(\cos \theta) = \left\{\varepsilon_m \frac{(n-m)!}{(n+m)!}\right\}^{\frac{1}{2}} \sin^m \theta \frac{d^m P_n(\cos \theta)}{d(\cos \theta)^m} \quad \text{with} \quad \varepsilon_m = \begin{cases} 1 & \text{for } m = 0 \\ 2 & \text{for } m \neq 0 \end{cases}$$

and the $P_n(\cos \theta)$ are the Legendre functions. For converting geographic coordinates to spherical polar coordinates, the use of the international ellipsoid is recommended: equatorial radius 6378.160 km and flattening factor 1/298.25.

For information regarding the availability of the coefficients in computer-readable form, and computer programs for synthesizing field values, contact

World Data Center A for Rockets and Satellites
Code 601, NASA Goddard Space Flight Center
Greenbelt, MD 20771, U.S.A.

or World Digital Data Centre C1
Geomagnetism Unit, Institute of Geological Sciences
Murchison House, West Mains Road
Edinburgh EH9 3LA, Scotland, U.K.

or World Data Center A
National Oceanic and Atmospheric Administration, EDIS/NGSDC (D62)
325 Broadway, Boulder, CO 80303, U.S.A.

The Working Group I-1 consisted of the following members:

N.W. Peddie (chairman), D.R. Barraclough (vice chairman),
N.P. Benkova, E.B. Fabiano, B.R. Leaton,
F.J. Lowes, W. Mundt, R.D. Regan,
S.P. Srivastava, R. Whitworth, D.E. Winch,
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The working group was assisted by the following consultants:

L.R. Alldredge, F.S. Barker, R.L. Coles,
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S.R.C. Malin, R. Thompson.

The support of IAGA Division I (chairman: D.I. Gough) is acknowledged.

International Geophysical Calendar for 1982

(Operational Edition, September 1981; See Explanations in the following pages)

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

	S	M	T	W	T	F	S
	27	28	29	30	1	2	3
	4	5	6	7	8	9	10
	11	12	(13)	(14)*+	(15)*	16	17
JULY	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	[12	[13	[14
AUGUST	[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
SEPTEMBER	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
OCTOBER	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	12	13
NOVEMBER	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	10	11
DECEMBER	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)	(12)	(13)	14	15
1983 JANUARY	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31					
	S	M	T	W	T	F	S

(13) Regular World Day (RWD)

(14) Priority Regular World Day (PRWD)

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

2 Regular Geophysical Day (RGD)

9 10 World Geophysical Interval (WGI)

[3 Day with unusual meteor shower activity, Northern Hemisphere

5] Day with unusual meteor shower activity, Southern Hemisphere

25 Day of Solar Eclipse

14 15 Airglow and Aurora Period

20* Dark Moon Geophysical Day (DMGD)

20+ Incoherent Scatter Coordinated Observation Day and Coordinated Tidal Observation Day

NOTES:

1. An Alpine Experiment (ALPEX), of the WMO/ICSU World Climate Research Program, continues from 1 January 1982 through 30 September 1982.

2. Post-SMY STIP INTERVAL XIII (started 1 December 1981) runs through 31 January 1982; and STIP INTERVAL XIV is 20 May through 20 July 1982.

3. Middle Atmosphere Program (MAP) begins 1 January 1982 and runs through 1985.

(from the next page)

EXPLANATIONS

This Calendar continues the series begun for the IGY years 1957-58, and is issued annually to recommend dates for solar and geophysical observations which cannot be carried out continuously. Thus, the amount of observational data in existence tends to be larger on Calendar days. The recommendations on data reduction and especially the flow of data to **World Data Centers (WDCs)** in many instances emphasize Calendar days. The Calendar is prepared by the **International Ursigram and World Days Service (IUWDS)** with the advice of spokesmen for the various scientific disciplines. For greater detail concerning explanations or recommendations your attention is called to information published periodically in **IAGA News, IUGG Chronicle, URSI Information Bulletin** or other scientific journals.

The definitions of the designated days remain as described on previous Calendars. **Universal Time (UT)** is the standard time for all world days. **Regular Geophysical Days (RGD)** are each Wednesday. **Regular World Days (RWD)** are three consecutive days each month, always Tuesday, Wednesday and Thursday near the middle of the month. **Priority Regular World Days (PRWD)** are the RWD which fall on Wednesdays. **Quarterly World Days (QWD)** are one day each quarter and are the PRWD which fall in the **World Geophysical Intervals (WGI)**. The **WGI** are fourteen consecutive days in each season, beginning on Monday of the selected month, and normally shift from year to year. In 1982 the **WGI** will be February, May, August and November.

The **Solar Eclipses** are January 25 (partial) beginning in South Atlantic Ocean skirting the Antarctic continent, crossing the Antarctic peninsula and ending in South Pacific Ocean south of New Zealand; June 21 (partial) beginning in South Atlantic Ocean, passing south of Africa and ending in Indian Ocean; July 20 (partial) beginning over Kamchatka peninsula, crossing Siberia, southern Finland, Denmark and ending in Portugal; and December 15 (partial) beginning west of Portugal in Atlantic Ocean, crossing England, Norway, Sweden, Finland, USSR, and ending in China north of Pakistan.

Meteor Showers (selected by P. M. Millman, Ottawa) include important visual showers and also unusual showers observable mainly by radio and radar techniques. The dates are coded to indicate whether the shower is observable in the northern or southern hemisphere.

The occurrence of unusual solar or geophysical conditions is announced or forecast by the IUWDS through various types of geophysical "**Alerts**" which are widely distributed by telegram and radio broadcast on a current schedule. Stratospheric warmings (**STRATWARM**) are also designated. The meteorological telecommunications network coordinated by WMO carries these worldwide Alerts once daily soon after 0400 UT. For definitions of Alerts see IUWDS "Synoptic Codes for Solar and Geophysical Data, Third Revised Edition 1973" and its amendments. **Retrospective World Intervals** are selected and announced by MONSEE and elsewhere to provide additional analyzed data for particular events studied in the ICSU Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) programs.

RECOMMENDED SCIENTIFIC PROGRAMS
OPERATIONAL EDITION

(The following material was reviewed in 1981 by spokesmen of IAGA, WMO and URSI as suitable for coordinated geophysical programs in 1982.)

identified by Retrospective World Intervals. The importance of obtaining full observational coverage is therefore stressed even if it is possible to analyze the detailed data only for the chosen events. In the case of vertical incidence sounding, the need to obtain quarter-hourly ionograms at as many stations as possible is particularly stressed and takes priority over recommendation (a) below when both are not practical.

For the vertical incidence (VI) sounding program, the summary recommendations are: (a) all stations should make soundings at least every quarter hour. Stations which normally record at every quarter should, if possible, record more frequently on **RWDs**; (b) all stations are encouraged to make f-plots on **RWDs**. f-plots should be made for high latitude stations, and for the so-called "representative" stations at lower latitudes for all days (i.e., including **RWDs** and **WGIs**). (Continuous records of ionospheric parameters are acceptable in place of f-plots at temperate and low latitude stations); (c) copies of hourly ionograms with appropriate scales for **QWDs** are to be sent to WDCs; (d) stations in the eclipse zone and its conjugate area should take continuous observations on solar eclipse days and special observations on adjacent days. See also recommendations under **Airglow and Aurora Phenomena**.

For incoherent scatter observation program, every effort should be made to obtain measurements at least on the **Incoherent Scatter Coordinated Observation Days**, and intensive series should be attempted whenever possible in **WGIs** or the **Airglow and Aurora Periods**. The need for collateral VI observations with not more than quarter-hourly spacing at least during all observation periods is stressed. Dr. M.J. Baron (U.S.A.), URSI Working Group G.5, is coordinating special programs.

For the ionospheric drift or wind measurement by the various radio techniques, observations are recommended to be concentrated on the weeks including **RWDs**.

For traveling ionosphere disturbances propose special periods for coordinated measurements of gravity waves induced by magnetospheric activity, probably on selected **PRWD** and **RWD**.

For the ionospheric absorption program half-hourly observations are made at least on all **RWDs** and half-hourly tabulations sent to WDCs. Observations should be continuous on **solar eclipse** days for stations in eclipse zone and in its conjugate area. Special efforts should be made to obtain daily absorption measurements at temperate latitude stations during the period of Absorption Winter Anomaly, particularly on days of abnormally high or abnormally low absorption (approximately October-March, Northern Hemisphere; April-September, Southern Hemisphere).

For back-scatter and forward-scatter programs, observations should be made and analyzed on all **RWDs** at least.

For synoptic observations of mesospheric (D region) electron densities, several groups have agreed on using the **RGD** for the hours around noon.

For ELF noise measurements involving the earth-ionosphere cavity resonances any special effort should be concentrated during the **WGIs**.

It is recommended that more intensive observations in all programs be considered on days of **unusual meteor activity**.

Meteorology. Particular efforts should be made to carry out an intensified program on the **RGD** — each Wednesday, UT. A desirable goal would be the scheduling of meteorological rocketsondes, ozone sondes and radiometer sondes on these days, together with maximum-altitude rawinsonde ascents at both 0000 and 1200 UT.

Airglow and Aurora Phenomena. Airglow and auroral observatories operate with their full capacity around the New Moon periods. However, for progress in understanding the mechanism of, inter alia, low latitude aurora, the coordinated use of all available techniques, optical and radio, from the ground and in space is required. Thus, for the airglow and aurora 7-day periods on the Calendar, ionosonde, incoherent scatter, special satellite or balloon observations, etc., are especially encouraged. Periods of approximately two weeks' duration centered on the New Moon are proposed for high resolution studies of ionospheric, auroral and magnetospheric observations at high latitudes during northern winter.

Atmospheric Electricity. Not-continuous measurements and data reduction for continuous measurements of atmospheric electric current density, field, conductivities, space charges, ion number densities, Ionosphere potentials, condensation nuclei, etc.; both at ground as well as with radiosondes, aircraft, rockets; should be done with first priority on the **RGD** each Wednesday, beginning on 6 January 1982 at 1800 UT, 13 January at 0000 UT, 20 January at 0600 UT, 27 January at 1200 UT, etc. (beginning hour shift six hours each week, but is always on Wednesday). Minimum program is at the same time on PRWD beginning with 20 January at 0600 UT. Data reduction for continuous measurements should be extended, if possible, to cover at least the full RGD including, in addition, at least 6 hours prior to indicated beginning time. Measurements prohibited by bad weather should be done 24 hours later. Results on sferics and ELF are wanted with first priority for the same hours, short-period measurements centered around the minutes 35-50 of the hours indicated. **Priority Weeks** are the weeks which contain a PRWD; minimum priority weeks are the ones with a QWD. The World Data Centre for Atmospheric Electricity, 7 Karbysheva, Leningrad 194018, USSR, is the collection point for data and information on measurements.

Geomagnetic Phenomena. It has always been a leading principle for geomagnetic observatories that operations should be as continuous as possible and the great majority of stations undertake the same program without regard to the Calendar.

Stations equipped for making magnetic observations, but which cannot carry out such observations and reductions on a continuous schedule are encouraged to carry out such work at least on **RWD** (and during times of **MAGSTORM** Alert).

Ionospheric Phenomena. Special attention is continuing on particular events which cannot be forecast in advance with reasonable certainty. These will be

During **WGI** and **STRATWARM** Alert Intervals, intensified programs are also desirable, preferably by the implementation of **RGD**-type programs (see above) on Mondays and Fridays, as well as on Wednesdays.

Middle Atmosphere Program (MAP). MAP runs from 1 January 1982 through 1985. Techniques for observing the middle atmosphere should concentrate or center their observations on the RGDs, PRWDs, and QWDs. It is recommended that observing runs for studies of planetary waves and tides be at least 10 days centered on the PRWDs and QWDs. Non-continuous studies of stratospheric warmings and the effects of geomagnetic activity on the middle atmosphere must be initiated by STRATWARM and MAGSTORM alerts, respectively. For more details see the "Recommended Scientific Programs" on the reverse of the **Middle Atmosphere Dynamics Calendar for 1982,** which will be published as a special edition of the **IGC for 1982.**

Solar Phenomena. Observatories making specialized studies of solar phenomena, particularly using new or complex techniques, such that continuous observation or reporting is impractical, are requested to make special efforts to provide to WDCs data for **solar eclipse** days, **RWDs** and during **PROTON/FLARE ALERTS**. The attention of those recording solar noise spectra, solar magnetic fields and doing specialized optical studies is particularly drawn to this recommendation.

Space Research, Interplanetary Phenomena, Cosmic Rays, Aeronomy. Experimenters should take into account that observational effort in other disciplines tends to be intensified on the days marked on the Calendar, and schedule balloon and rocket experiments accordingly if there are no other geophysical reasons for choice. In particular it is desirable to make rocket measurements of ionospheric characteristics on the same day at as many locations as possible; where feasible, experimenters should endeavor to launch rockets to monitor at least normal conditions on the **Quarterly World Days (QWD)** or on **RWDs**, since these are also days when there will be maximum support from ground observations. Also, special efforts should be made to assure recording of telemetry on **QWD** and **Airglow and Aurora Periods** of experiments on satellites and of experiments on spacecraft in orbit around the Sun.

For URSI/IAGA Coordinated Tidal Observations Program (CTOP) contact Dr. R. G. Roper (USA) for the 1982 calendar.

(go back to the previous page)

The International Ursigram and World Days Service (IUWDS) is a permanent scientific service of the International Union of Radio Science (**URSI**), with the participation of the International Astronomical Union and the International Union Geodesy and Geophysics. IUWDS adheres to the Federation of Astronomical and Geophysical Services of the International Council of Scientific Unions. The IUWDS coordinates the international aspects of the world days program and rapid data interchange.

This Calendar for 1982 has been drawn up by J. V. Lincoln, of the IUWDS Steering Committee, in close association with A. H. Shapley, Chairman of MONSEE of SCOSTEP, and spokesmen for the various scientific disciplines in SCOSTEP, IAGA and URSI. Similar Calendars have been issued annually beginning with the IGY, 1957-58, and have been published in various widely available scientific publications.

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Additional copies are available upon request to IUWDS Chairman, Dr. P. Simon, Ursigrammes Observatoire, 92190 Meudon, France, or IUWDS Acting Secretary for World Days, Miss H. E. Coffey, WDC-A for Solar-Terrestrial Physics, NOAA, D63, 325 Broadway, Boulder, Colorado 80303, U.S.A.

SITUATION OF WORLD DATA CENTER A FOR SOLAR-TERRESTRIAL PHYSICS

In March 1981 it was announced that the STP Division and Data Studies Division of the NGSDC (National Geophysical and Solar-Terrestrial Data Center) of EDIS (Environmental Data and Information Service) of NOAA were proposed for termination at the end of September 1981, pending U.S. Congress approval. This of course meant the collocated WDC-A for STP as well. These actions were part of a major proposed U.S. Federal Government retrenchment. At that time there were no plans to transfer the functions of the STP Data Center to any other agency, public or private.

This announcement came as a great shock to the IAGA community. A large number of scientists (more than 400), both leaders of relevant international or national organizations and individuals, wrote letters to the NOAA Administrator, key persons and the WDC-A, asking for the possible continuation of STP data services.

In June 1981, the Acting Administrator (J.P. Walsh) published a status report, stating that NOAA had developed the following proposal to retain a core capability in STP data services.

A. Programs which would continue at minimum level:
   - Solar-Geophysical Data publication
   - Geomagnetic Variations (magnetograms)
   - Ionospheric Data Services (except ionosonde stations)
   - Stallite and Digital Data
   - WDC-A for STP

B. Programs which would be reduced:
   - Upper Atmosphere Geophysics data publications
   - Special Analyses
   - Active Data Search and Purchase Program
   - Data Product Development

C. Programs which would be discontinued in the NOAA Core Program:
   - Ionosonde Station Operations
   - International Newsletter
   - Geomagnetic Activity Indices (Auroral Eelctrojet (AE))
   - Related Editorial Functions.

The elements to be continued were determined from an analysis of projected user needs, including comments from the world STP community.

In July 1981, Mr. A.H. Shapley (EDIS Senior Advisor on Scientific and International Programs) and Dr. J.F. Lander (Acting Director of NGSDC) wrote circulars to the world STP community explaining the situation and they extended their thanks for the expressions of confidence in and support of the services they have tried to provide. In the meantime, Miss J. Virginia Lincoln, the first Director of the complex WDC-A for STP, retired on May 1 from her Government position. She has been prominent in STP services since 1942, for nearly four sunspot cycles, and is succeeded by Mr. Joe H. Allan. He wrote the following sentences for the IAGA colleagues.

At the 4th IAGA Scientific Assembly, it was announced that the U.S. National Oceanic and Atmospheric Administration (NOAA) will "retain a core capability" for providing Solar-Terrestrial Physics (STP) data services, including continuation of "all of the current activities of World Data Center-A for STP."

Current plans are for retention in the core STP program of "a minimum level" of support for "publication of Solar Geophysical Data" for continued routine archiving and distribution services for solar, geomagnetic, and ionospheric data, and for operation of WDC-A for STP. Other programs will continue at "reduced" levels as part of the core of STP services. These include annual publication of a few UAG Reports, some active data searching and data buying, special analyses, and new product development. A third group of past activities are to be "discontinued" within the minimum core program. These include ionosonde station operation and network support, international newsletters, derivation of the AE (auroral electrojet) magnetic activity index, and STP-related editorial functions.

As budget and staff support are provided to NOAA by other organizations in the STP community, it may be possible to expand the core STP services program to include continuation of some activities now designated for reduction or termination. These may be continued at Boulder or elsewhere. For example, the U.S. Department of Transportation in Washington, D.C. is now preparing the MAP Newsletter with NASA support. As MAP participating countries send temporary staff to WDC-A for STP during 1982-85, it will be possible to operate a MAP Central Information Exchange (MAP CIE) Office to provide the type of support given by WDC-A to the IMS. Also NASA, the NSF, and university groups are exploring possibilities for supporting continued AE index derivation at WDC-A. This would complement the current AE derivation work now in progress at WDC-C2 (Kyoto, Japan).

Although no government agency can give unqualified guarantees about the future, NOAA management has clearly expressed its support for the World Data Center system and accepted responsibility for continuing support of WDC-A for STP into future years.

J. H. Allen

Questionnaire Distributed to the Participants of the IAGA Assembly

The support crisis in a major U.S. Government Agency for WDC-A for STP, alerted us to the possible vulnerability of the data exchange mechanism. We need to assume that the ICSU-sponsored mechanisms have the support both of the participants and of the users, and that the ICSU data center system evolves into a sensible, modern, cost-effective, and feasible one. The ICSU Panel on World Data Centres has initiated a pilot study of the system with these objectives in mind. It is important that the user community broadly provide input, or at least be aware of what is happening. Therefore the IAGA Assembly in Edinburgh provided an opportunity for the IAGA community to participate, and to give any additional views or comments on the subject of the World Data Centres, or on international data exchange in general. [The same action was taken at IASPEI, IAMAP and URSI Assemblies in the summer of 1981.]

The questionnaire prepared by WDC-A and the result of 35 responses from IAGA participants are shown below. [Mr. A.H. Shapley will analyze the results more extensively after he receives all the results from IASPEI, IAMAP and URSI. According to the IAGA result, there seem to be mixed feelings on 6A. He will be interested to see how the others "vote". To him, the response to 9 was suprising. Perhaps also 6B, though he can see that the question was badly worded --- it should have provided for circling "none" and left room for free-form response; the same for 8.]

QUESTIONNAIRE ON INTERNATIONAL DATA EXCHANGE

1. Are you familiar with the ICSU World Data Centre System, or the IGY Guide to International Data Exchange through the WDCs?
   Yes: 30 Somewhat: 5 Not really until now: 0

2. Have you obtained observational data from one of the WDCs?
   Yes: 30 No: 5

3. Have you used data products issued by one of the WDCs, e.g., Meteorological Rocket Data Compilations, FGGE data sets, Solar Geophysical Data, JGR data page, AE indices, STP-Meteorology Working documents, etc.?
   Yes: 33 No: 2

4. Can you use data in computer format? Add details as needed.
   Yes: 32 No: 2 With difficulty (e.g. specify): 1

5A. Do you favor adoption of standard computer data formats by ICSU bodies, in collaboration with other appropriate bodies?
   Yes: 34 No (please explain): 1

5B. If you are a data supplier, could you and would you change to a standard format?
   Yes: 20 No (please explain): not checked = 15

6A. What are the critical roles of the WDCs in this decade? Please circle one of the following:
   (a) Maintaining as complete a central archive as possible: 17
   or (b) Maintaining an archive of key or high current demand data along with an inventory of data held elsewhere: 16
   or (c) Maintain inventories of data held elsewhere: 2

6B. Should the centers also continue to be involved in any of the following? Please circle one or more:
(a) Provide data products, e.g., complications, merges of data from different sources, geophysical indices: 30
(b) Reformatting of data into standard formats, digitizing of analog data, etc.: 23
(c) Acquiring and preserving "historical" data sets for current and future use: 27

7. Current practice is that copies or services are supplied at "cost", more-or-less covering the cost of the medium, direct time and other related charges. Should users help support the WDC services through additional, modest surcharges on data copies or data products?
Yes: 24 No(please explain): 8 not checked, ambiguous: 3

8. Should data takers help support WDC services by (circle one or more)
(a) Direct financial support: 3
(b) Not expecting free data in exchange for submitted data: 16
(c) Submitting data in standard formats or in computer formats to reduce the reformatting load on WDCs: 32

9. For the IGY, duplicate parallel WDCs were established - A in the USA, B in the USSR, C for the most disciplines separately in many countries. This approach was taken (i) to guard against catastrophic loss of a unique archive, and, (ii) for the convenience of contributors and users. In the course of the last 25 years, this concept has evolved to duplication of only the core data in WDCs A, B, and C; the rest of the data are available through the exchange of specific inventories and through referrals.
WHAT ARE THE NEEDS OF THE 1980s?
(a) Continue as now, with WDCs A, B and C: 23
or (b) Continue with only the "complex", interdisciplinary Centers A and B: 5
or (c) Identify only a single World Data Centre for any given data set or data type and provide for coordination among them; recommend that these centres provide for nearby comprehensive security copies of their archives: 7

10. Would you like to serve as a correspondent to URSI and to the ICSU World Data Centre Panel in their detailed consideration of these and further questions on modernizing the ICSU role in international data exchange?
Yes: 16, No: 4, comment: 9, not checked: 6

11. Other comments: (not indicated in this statistics)

ABOUT THE SCALINGS OF K-INDICES

M. MENVIELLE

in-charge of the am indices

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A new computer method for scaling K-indices is proposed in a short technical paper, which has appeared recently in IAGA News (Rangarajan and Murthy, 1980).

According to these authors, the main goal of such a method would be to "completely eliminate subjectivity in determining the quiet day variation", and then provide the observer with a tool which "should prove useful in standardizing the K-scaling at all magnetic observatories". These authors, indeed, assert that, since "K-indices are scaled visually, using the subjective element of a trained observer", then "however careful and consistent the observer may be, it is not certain whether another independent observer using equal care would duplicate his work" and therefore conclude to the need of a computer method in order to "entirely eliminate the subjectivity in the scalings".

In order to estimate the validity of such a proposal, one has to carefully discriminate two problems:

1 - is the proposed method consistent with the definition of the K-index?

2 - is the proposed method objective, i.e. do two independent scalings of the same set of data lead to the same result?

It is clear that for the first question, the answer is NO. For a given 3-hour interval, indeed, Rangarajan and Murty (1980) deduce the K-index from the difference between the actual field and a zero level computed using the days of the month "which have an identifiable quiet pattern, not severely contaminated by disturbances effect". Thus, the used zero level does not fairly represent the non-K-variation of the day, which is following Bartels et al.(1939) the solar regular variation of the day, denoted later on S_R by Mayaud (e.g. 1967). When using a fixed zero level for the month, however it might be determined one does not take into account the day-to-day variability of the S_R, which may be non-negligible, according to Bartels et al.(1939, p.413 and figure B) and Mayaud (1967). Thus for a set of very quiet days in a given month, the variability of the S_R would lead to K-indices different from zero if using the computer method proposed by Rangarajan and Murty when it would be evident for a well-trained observer that the actual variation is a non-K-variation.

In other words, the proposed method is nothing but the "iron-curve" method, as called by Bartels (1957). Let us remind that Bartels claimed that the observer has to guard himself against a dangerous mistake, namely, to take the staistically obtained average of the S_R as an invariable non-K-variation and to count all deviations from that "iron curve" as K-variation.

As for the second question, it is clear that the choice of days having "an identifiable quiet pattern, not severely contaminated by disturbance effects" is nothing but subjective. In the results set forth by Rangarajan and Murty (1980) we consider that the effect of such a subjective choice is lowered by the small day-to-day variability seen on the H component in tropical stations (note that D component rarely determines the K-index at such latitudes). It would be no longer true at other latitudes.

Furthermore, one may note that other computer methods have been proposed before, in which the non-K-variation is defined differently (see for instance Alldredge (1960) and Van Wijk and Nagtegaal (1967)); then the results they give are different from those obtained by Rangarajan and Murty. Therefore, one may reasonably wonder about the 'objectivity' of such computer methods.

We wish to take this opportunity to strongly emphasize that K-indices must be handscaled by a well-trained observer. Then, as it is discussed in more detail in Mayaud and Menvielle (1980) and Mayaud (1980,p38-40), it should be noticed that:

1) in a routine way, scaling of K-indices is not expensive in time and money: it takes less than 10 minutes to scale the eight K-indices per day. Compare the computer cost!

2) The observer, who has a true knowledge of the S_R day-to-day variability during day-time and of the possible extension of the S_R during part (or the whole) of the night-time at his own station is able to discern K-variations from non-K-variations.

The experience shows that the percentage of differences in the determination of K-indices by two well-trained observers is less than 5%; furthermore, the observed differences are not more than one unit, randomly distributed and randomly positive or negative.

3) any attempt to scale K-indices by computer must follow the very same rules as the ones which were originally given by Bartels et al.(1939) and later, extensively described by Mayaud in the Atlas of K-indices (1967) as for their application. This is definitely not the case of the method proposed by Rangarajan and Murty (1980).

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TAPE FORMATS FOR GEOMAGNETIC DATA

discussed between Scandinavian countries and used for common archive tapes

C. Buckadorff (Finnish Meteorological Institute, Helsinki, Finland)

TAPE FORMAT FOR HOURLY MEAN VALUES

The same format can be used for more dense values down to 2 min. One record of hourly means = one day or monthly summary record for all days (day 32), 5 quietest days (33) or 5 most disturbed days (34).

- Record length	4	characters
- Length of one record	3	in 0.1 hour units
- Type of data	2	00 = geomagnetic;
- Station identification	6	(e.g. 3 numbers, 3 letters)
- Geographic latitude	5	in 0.01° (space or sign and 4 numbers)
- Geographic longitude	5	in 0.01°E
- Year	4	
- Month	2	
- Day	2	32, 33 or 34 for monthly means of all days, 5 quietest days or 5 most disturbed days.
- Hour	2	00...23 UT. The first hour of the record.
- Interval between datapoints	3	in minutes
- How produced	1	0 = digital recording; 1 = digitized from primary recording; 2 = digitized partly from supplementary recording; 9 = unknown
- Quality information	1	1 = final data in absolute units; 2 = final data but absolute level uncertain; 3 = preliminary data
- Error less than	2	nT
- Components	1	1 = X, Y, Z; 2 = D, H, Z
- Character of the day	1	0 = normal; 1 = one of the 5 international quietest days; 2 = international disturbed day
- Free	31	
- X_1, Y_1, Z_1 X_2, Y_2, Z_2 : : X_{24}, Y_{24}, Z_{24}	7×72	values in 0.1 nT units (0.1' if D). The first character from left is the sign, which is minus or, for positive values, space.
- Daily mean of X, Y and Z	7×3	000 000 if not the last part of the day.

The value of the interval is its mean, e.g. the value of the first hour is the mean value from $00^h00^m00^s$ to $01^h00^m00^s$, etc.
The values are given in units 0.1 nT.
One record contains 600 characters. Missing values are marked with 999 999.
Leading zeros have to be used for too long fields.
The code used: ASCII.

TAPE FORMAT FOR ONE-MINUTE AND MORE DENSE VALUES

- Record length	4	characters (1440)
- Length of one record	3	in minutes
- Type of data	2	00 = observatory; 01 = temporary st.;
- Station identification	6	(e.g. 3 numbers, 3 letters)
- Geographic latitude	5	in 0.01° (space or sign and 4 numbers)
- Geographic longitude	5	in 0.01°E
- Free	23	
- Year	4	
- Month	2	
- Day	2	
- Hour	2	00...23 UT
- Minute	2	00...59. The first minute of the record.
- Interval between datapoints	2	in seconds
- How produced	1	0 = digital recording; 1 = digitized from primary recordings; 2 = digitized from supplementary recording; 9 = unknown.
- Filter breakpoint	4	0000 if values are means between datapoints. Otherwise period in seconds at which low pass filter is 3 db down (0.7 amplitude). 9999 if no filtering was employed.
- Filter slope	2	Number of db per octave, i.e. 6, 12, 18 db/octave or measured equivalent for numerical filter.
- Base line information	1	1 = final data, absolute base line, accuracy $\sim$1 nT; 2 = final data but no absolute measurements; 3 = preliminary data; 4 = data relative to quiet day night values.
- Probable base line change within one day	2	in 0.1 nT
- Components	1	1 = X, Y, Z; 2 = H, D (0.1), Z; 3 = A, B, Z.
- Character of the day	1	0 = normal; 1 = one of the 5 international quietest days; 2 = one of the 5 international disturbed days.
- Free	85	
- X_1, Y_1, Z_1 X_2, Y_2, Z_2 : : X_{60}, Y_{60}, Z_{60}	7 × 180	values in 0.1 nT units (0.1' if D). The first character from left is ths sign, which is minus or, for positive values, space.
- Hourly mean of X	7	000 000 if not the last part of the hour
- Hourly mean of Y	7	- " -
- Hourly mean of Z	7	- " -

The value of the interval is its mean, e.g. the value of the first minute of an hour is the mean value from $XX^h00^m00^s$ to $XX^h01^m00^s$, etc. The values are given in units 0.1 nT. One record contains 1440 characters. Missing values are marked with 999 999. For merged tapes the stations follow each other by record. Leading zeros have to be used for too long fields. One record = one hour in case of one-minute values, or part of one hour in case of more dense values. The code used: ASCII.

IAGA ASSISTANCE IN GEOMAGNETIC OBSERVATORY AND MEASUREMENT PROBLEMS

In its meeting in Edinburgh 1931 August 13, Working Group V-1 discussed, among other things, ways in which it might be possible for Magnetic Observatories or the Institutions which manage them to help one another in a practical way. Two categories of mutual aid were identified where it was felt that IAGA, through the officers of Division V, could assist.

1) In the training of personnel. Many observatories are being operated by technical and scientific staff who have had to teach themselves the job and learn its peculiarities the hard way, sometimes by bitter experience. Other institutions are contemplating setting up new observatories in areas of the world where they are badly needed, but are put off by the fact that they do not have sufficiently well trained staff to supervise the installation of equipment with confidence and to take responsibility for the observatory operation and management. It is possible that there are Institutions who are willing to help by allowing a 'trainee' to visit an established observatory with experienced staff for a long enough period of time to satisfy his needs. The institutions concerned, and means of paying for such visits, have yet to be identified. Anyone interested in participating in such a scheme should contact

   Dr. W.F. Stuart
   Geomagnetism Unit
   IGS West Mains Road
   Edinburgh EH9 3LA
   Scotland

   Dr. Stuart will attempt to coordinate visits by putting anyone wishing to make a training visit in touch with the nearest or most convenient host Institute. Funds for each case will need to be raised as and where possible.

2) In supplying circuit diagrams and engineering drawings for basic electronic magnetometers and data collection systems. It was felt too that many commercially available instruments require modification to make them fully applicable or reliable in observatory use. In addition many magnetic observatories, Institutions and University departments have magnetometers which have been 'retired' and which could be used by other, less fortunate, establishments. It is hoped that by acting as a coordinating centre ways may be found to pass such diagrams and unused instruments on to those who will use them. Those interested should contact

   Dr. Emil Kring Lauridsen
   Danish Meteorological Institute
   Lyngbyvej 100,
   DK-2100 Copenhagen

   This scheme is critically dependent on 'donors'. Individual scientists are requested to bring the scheme to the attention of their administrations with persuasion so that a network of 'hosts' and 'donors' can be established. Only when such a network is seen to exist can we hope to achieve any success in financing the arrangements which are necessary.

GEOMAGNETIC OBSERVATIONS FOR EARTHQUAKE PREDICTION

It seems probable that there will be experiments using geomagnetic absolute observations at arrays of stations in tectonically active areas, the object being the devlopment of earthquake prediction techniques. Division V notes this activity with interest. It may be that experimenters will wish to have advice on instrumentation which is appropriate to the work, and also on the measuring techniques required to maintain best resolution free from baseline drift. It may also be necessary to correct measurements for secular variation. Division V is anxious to ensure the best results from these operations because of the potential value of the repeated observations to secular change analysis, and it suggests that scientists embarking on geomagnetic research of tectonic areas contact Dr. W.F. Stuart, Geomagnetism Unit, IGS West Mains Road, Edinburgh EH9 3LA (Telex 727343 SEISED) either to notify him of their intention, locality, instrumentation and measuring technique, or for advice on any problems. Dr. Stuart will act as a clearing house, either commenting directly on any problems or trying to find out answers from the other specialists who notify him.

BIBLIOGRAPHY OF PALEOMAGNETISM AND GEOMAGNETISM

The paleomagnetic group at the University of Hawaii is compiling a computerized bibliography of paleomagnetism and geomagnetism for publication. The compilation should be complete in approximately one year. In order that the bibliography be as complete as possible, investigators working in these fields are requested to contribute to the bibliography by sending publication lists and/or reprints to;

Dr. Barbara Keating
Paleomagnetism Lab.
Hawaii Institute of Geophysics
University of Hawaii
Honolulu, Hawaii 96822, U.S.A.

IAGA INTERDIVISIONAL COMMISSION ON HISTORY NEWS

The Interdivisional Commission on History is responsible for keeping records of the history of IAGA and its activities, for the utilization of historical records in scientific studies, and the general study of history as it pertains to those fields of science covered by IAGA. The purpose of the commission is to encourage these activities and to serve as a means of exchanging information about on-going efforts in these areas. These functions are fulfilled by the publication of a quarterly newsletter, through history sessions at IAGA meetings, and at the history commission meetings at IAGA assemblies.

The Commission also publishes a quarterly newsletter. This newsletter is intended to serve as a listing of on-going historical research in the IAGA community and as a bibliography of current publications. Ideas, short papers, and other information will be gratefully accepted. Anyone wishing to contribute or to receive the newsletter should contact the chairman:

Dr. Henry B. Garrett
Mail Code 144-218
Jet Propulsion Laboratory
4800 Oak Grove Dr.
Pasadena, CA 91103, U.S.A.

CONTEST FOR NEW IAGA LOGO

It was announced in the last IAGA News (No.19, p.119, December 1980) that the winner of the new IAGA logo competition would be selected at the Edinburgh Assembly. The Secretary General received a variety of designs from 10 colleagues (artists?). All entries were displayed in the registration area of the IAGA Edinburgh Assembly.

The Executive Committee gave President Cole the power to select the winner of the new IAGA logo competition, but he reported at the Final Conference of Delegates that it was impossible to reach a conclusion during the Edinburgh Assembly. He spent a lot of time taking opinions from innumerable people about the various logo designs submitted, but there was no clear preference for any one of them, and many people voiced their opinion on what they considered the inadequacies of various designs. It was impossible for him to select "only one", in which "geomagnetism" and "aeronomy", or all the activities of IAGA Internal Structure were adequately symbolized. President Cole thought it best to leave the competition open and to postpone further judgement on the matter until the Hamburg Assembly in 1983.

The competition will therefore continue until the Hamburg Assembly, allowing modifications to the submitted entries and also new entries. The modified or new designs should be sent to the Secretary General (N. Fukushima, Geophysics Research Laboratory, University of Tokyo, Tokyo 113, Japan) before 1 December 1982. President Cole may ask a professional designer to make minor refinements to the designs from contributors before the final decision, however the person whose idea was principally adopted will be the winner of the contest.

IUGG INTERDISCIPLINARY SYMPOSIUM ON "DATA MANAGEMENT"

Prof. Robert L. McPherron (Institute of Geophysics and Planetary Physics, University of California at Los Angeles, Los Angeles, CA 90024, U.S.A.) is the chief convener of this symposium to be held in August 1983 with the cosponsorship of all sister Associations in IUGG. He wrote the following short explanation of the thrust of this symposium:
Geophysical research depends on large collections of diverse data gathered at many times and places. Reducing these data to common formats, cataloguing, preparing summary displays, archiving and advertisement are parts of the first step in distributing these data to potential users. Convenient methods of access to specified subsets of the data, techniques for editing and reformatting, simple means of display, are parts of the second step. Once the data reach the user, they are analyzed by a variety of techniques, as, for example, time series analysis. The growth of computers, the increasing prevalence of digital data, advances in communications, make it possible to automate these processes of data collection, organization dissemination and analysis. It is the purpose of this symposium to identify and discuss various techniques which have evolved in the subdisciplines of geophysics to carry out these tasks of scientific data management.

Prof. McPherron is in the process of putting together a second announcement, and he welcomes any suggestions towards the success of this symposium. Topics that interest him personally include:

1) Low-cost digital acquisition and recording systems (e.g. microcomputer and tape cassette).
2) Use of commercial communication links for remote data acquisition.
3) Mass store devices for small computers (video-disk, tape, etc.).
4) General purpose data formats for instruments that produce time series data, image data, sparsely sampled functions of many variables (particle detectors), randomly spaced samples (mineral exploration, oceanography).
5) Software to access contents of data formats; types of utility programs required to display data.
6) Schemes for managing a large number of data files (e.g. concepts like Hewlett Packards' personal, group, public, and archive cartridges). Includes archival and retrieval strategies.
7) Schemes for managing program libraries--source, object, and executable code; related programs; various levels of modification.
8) Use of commercial data base management systems in scientific data management.
9) Characterization of a modern world data center.
10) Networking protocols, allowing micro, mini, and main frame computers to communicate at high data rates.

He feels that this symposium should avoid extensive discussion of "high-cost solutions". With sufficient money, one can buy a mini for data acquisition, a satellite channel for data transmission, a mass store device for storage, a main frame computer for processing, and a commercial data base management system to keep track of things. Instead, we should emphasize general principals and techniques accessible to the typical scientist at an international meeting.

NEWS FROM IAGA MEMBER COUNTRIES

AUSTRIA

Dr. Siegfried J. Bauer has accepted the chair of meteorology and geophysics at the University of Graz, to succeed his former teacher, Prof. Dr. Otto Burkard. The chair was once held by Alfred Wegener. Prof. Bauer returned to his alma mater in September 1981, after more than 25 years of research in the United States, including 20 years with the NASA Goddard Space Flight Center, where he last served as Associate Director of Sciences. He plans to maintain his current research interests and would like any communications to be sent to "Institut für Meteorologie und Geophysik, Universität Graz, Halbärthgasse 1, A-8010 Graz, Austria".

GERMANY (DEMOCRATIC REPUBLIC)

The National Committee of GDR for IUGG issues the following series of publications.

Series I. Reports of the National Committee
Series II. Solar-Terrestrial Relationships and Physics of Atmosphere
Series III. Physics of Solid Earth
Series IV. Physics of Fluid Earth

There is an additional series: "Physica Solariterrestris".
These publications will be available on request from

Nationalkomitee für Geodäsie und Geophysik
bei der Akademie der Wissenschaften der DDR
DDR-15 Potsdam, Telegrafenberg.

GERMANY (FEDERAL REPUBLIC)

At the Fourth Scientific Assembly of IAGA in Edinburgh, September 1981, the National Committee for IAGA in the Federal Republic of Germany presented a national report (A4-size, 175 pages) compiled by G. Lange-Hesse. This report includes the addresses of 20 research institutes in FRG and the list of 391 papers (in most cases with abstract) sorted according to the IAGA internal working groups and topics. This publication is available on request from

Dr. G. Lange-Hesse, Max Planck-Institut für Aeronomie,
Postfach 20, D-3411 Katlenburg-Lindau 3, Fed. Rep. Germany.

HUNGARY

The International Conference on Cometary Exploration is to be held in the main building of the Hungarian Academy of Sciences (Budapest V, 9 Roosevelt Square), 15-19 November 1982. This conference being planned now, is organized by the Central Research Institute for Physics of the Hungarian Academy of Sciences and the Hungarian Astronautical Society, and will be sponsored by the European Physical Society and the VEGA project.

The scientific sessions are for [1] Observations (infrared, ultraviolet, radio, radar and visible comet observations, in situ and indirect dust measurements, laboratory simulations), [2] Models (dust, neutral gas, cometary nucleus, plasma environment, and photometric models of various comets), [3] Origin and Evolution (origin and evolution of comets, and their relationship to the origin of the solar system), [4] Missions (scientific goals, instrumentation and strategies of various missions; coordination of ground based and space observations by the International Halley Watch), and [5] Working Group Sessions (TV systems and pointing, dust and gas environment, plasma environment, photometry, cooperation and optimization of spacecraft operation and navigation, and some other topics).

Further information is available from: Local Organizing Committee "International Conference on Cometary Exploration", c/o Dr. K. Szegö, Central Research Institute of Physics, P.O. box 49, H-1525 Budapest, Hungary. The Local Organizing Committee wishes to receive the pre-registration not later than 15 February 1982. Abstracts should be submitted not later than 1 July 1982.

JAPAN

Publications introducing Japanese contributions to "Rock Magnetism and Paleogeophysics".

The Rock Magnetism and Paleogeophysics Research Group in Japan has been publishing annual progress reports (Vol.7 of 137 pages was published in December 1980), which contain a collection of summaries or extended abstracts of various research work carried out within the group. This series of publication is available on request from

Prof. M. Kono, Faculty of Science,
Tokyo Institute of Technology, Ookayama, Meguro-ku,
Tokyo 152, Japan.

Publications introducing Japanese contributions to "Solar-Terrestrial Environmental Research".

Since 1977, the Institute of Space and Aeronautical Science, University of Tokyo (this institute became a national institute in April 1981, see the next item) has been publishing an annual publication entitled "Solar Terrestrial Environmental Research in Japan", which contains the condensed summaries of all recent papers published by Japanese space scientists as well as future research plans. This publication is available on request from

Prof. A. Nishida, Institute of Space and Astronautical Science, Komaba 4-6-1, Meguro-ku, Tokyo 153, Japan.

New Institute and Research Center in Japan

The Institute of Space and Astronautical Science, a new national research institute was established in Tokyo, in April 1981, through a substantial reorganization of the Institute of Space and Aeronautical Science formerly belonging to the University of Tokyo. The new institute is organized into 31 research sections which are grouped into 9 scientific fields and engineering, space observation, and administrative divisions as well as research facilities such as Kagoshima Space Center, Sanriku Balloon Center, and Data Analysis Center. Prof. D. Mori is the director.

The Radio Atmospheric Science Center (Director: Prof. S. Kato) was founded in Kyoto University in April, 1981, with a repletion of research facilities utilizing radio techniques. A backscatter radar will be equipped at Shigaragi about 60km north-east of Kyoto and is expected to be in provisional operation in early 1983.

KENYA

The IAGA National Committee in Kenya consists of a President, Secretary, Treasurer and five committee members. The committee works in close cooperation with the national committee of IUGG.

Efforts are being made to establish a new magnetic observatory and a radio-telescope observatory in Kenya. The latter is in the advance stages.

A Second Symposium in Geodesy in Africa is taking place from 9-14 November 1981 in Kenya.

KOREA (REPUBLIC OF)

The Korean National Committee for IUGG (Office in National Geographic Institute, 43-1 Hwikyung-Dong, Dong Moon-Ku, Seoul 131) publishes an "Annual Review of the Korean National Committee"; the 9th issue in December 1981 contains one article and 131 abstracts of the papers published in 1980, mostly in Korean periodicals. The Korean National Committee for IUGG wishes the mutual exchange of information.

UNITED KINGDOM

The U.K. National Committee is very pleased to have heard from so many of the participants of the IAGA Edinburgh Assembly that they enjoyed the conference very much. The success of the Edinburgh Assembly was due to the great effort of the Local Organizing Committee chaired by Mr. B.R. Leaton, who incidentally retired from his position as Director of Geomagnetism Unit, Institute of Geological Sciences at the end of September 1981. Mr. Leaton will continue to chair the Local Organizing Committee until it winds up. His home address is:

5 Winton Terrace, Edinburgh 10, Scotland.

His position in the Geomagnetism Unit in the Institute of Geological Sciences is now succeeded by Dr. S.R.C. Malin.

IAGA News, No. 20
(December 1981)

EVOLUTION OF THE IAGA ORGANIZATION

Leroy R. Alldredge
(IAGA General Secretary from 1963 to 1975)

I. Introduction

When new areas of any science open up there is always competition from old organizations to fill the void. In geophysics these old organizations may be established Associations and Unions which behave very much like living organisms. The old ones give birth to new ones. Some expand. Some die at an early age. All of them experience change if they are to survive. Increasing specialization calls for more effective efforts to ensure the interdisciplinary nature of the attack on a given general problem.

The competition for dominance in a new area often starts with some belligerence. Hopefully the condition soon moves to one of cooperation and accommodation followed by a final resolution.

The International Association of Geomagnetism and Aeronomy (IAGA) has been no different than other organizations in this respect. Since its very beginning IAGA has had to argue with its neighbors in trying to carve out and maintain a comfortable definition of its area of operation without excessive overlap with other organizations.

Geology, Geodesy, and Meteorology appeared very early as Earth sciences and because of their historical importance still enjoy positions of prominence in the organizational structure of the Earth sciences. For example, there is a separate union for the geological sciences. There is a World Meteorological Organization, Geodesy is in the title of the International Union of Geodesy and Geophysics (IUGG). Because of this preeminence these disciplines have generally fared better financially than the newer geophysical disciplines.

Perhaps there are many equally good solutions to jurisdictional conflicts of the kind referred to above. In the long run, it may not be important whether IAGA, The International Union of Scientific Radio (URSI), The International Association of Meteorology and Atmospheric Physics (IAMAP), the Committee on Space Research (COSPAR) or the Inter-Union Committee on Solar-Terrestrial Physics (IUCSTP), which became the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP), was recognized finally as the organization that should do most of the upper atmosphere and space research. The important thing is that it be done effectively. In discussing how the IAGA organization evolved, I do not mean to imply in any way that IAGA was necessarily the best. This is just a summary of how the arguments went, and how the decisions were made as I see it.

II. Early Formation of Cooperative Geophysical Organizations Related to Geomagnetism.

The International Meteorological Organization (IMO) a nongovernmental organization of the heads of various national weather services was founded in 1873. The IMO had a Commission of Terrestrial Magnetism and Atmospheric Electricity which, among other things, later published

the magnetic character index for each day. This early work of the IMO in geomagnetism no doubt explains why, in several countries, the geomagnetic work is still done under a weather bureau organization.

The International Polar Commission was organized in 1879 to plan the First International Polar Year (1982-83). During the First International Polar Year, auroral and magnetic investigations were carried out at various stations. Fourteen expeditions finally took the field, twelve around the Arctic regions and two in southern latitudes. Some twenty volumes of results and many scientific papers appeared during the following years as a direct result of these expeditions (Robin, 1956).

The first truly global association of scientists of many disciplines was the International Research Council (IRC), founded in Brussels in 1919 at an Assembly which brought together representatives of twelve Academies and twelve International Scientific Unions (ICSU, 1976). Of the twelve Unions, three (Astronomy, Geodesy and Geophysics, and Chemistry) had been created at a Paris Conference in November 1918, and their Statutes were adopted at the first assembly of the IRC. The International Union of Scientific Radiotelegraphy which subsequently became URSI joined IRC later. In 1931 the IRC was dissolved and replaced by the International Council of Scientific Unions (ICSU).

One of the original component parts of the IUGG was the section of Terrestrial Magnetism and Electricity which, in what follows, will be called The International Association of Terrestrial Magnetism and Electricity (IATME) which it became known as in 1933. The creation of IATME in the IUGG immediately gave rise to the question of a possible conflict of interest with the Commission of Terrestrial Magnetism and Atmospheric Electricity of the IMO.

I do not have available all of the IATME Bulletins so it is impossible for me to determine just how the competition went, but John A. Fleming said in his Edinburgh 1936 Presidential Address (LaCour, 1937)

> It is a source of congratulation that fullest cooperative and harmonious relations have been maintained between the Commission of Terrestrial Magnetism and Atmospheric Electricity of the International Meteorological Organization and our Association. The Transactions of the Warsaw meeting of the Commission in September 1935, so promptly published, afford ample evidence in its communications and resolutions of this effective cooperation. This close contact makes the existence of the two bodies of mutual benefit, which is further assured by the appointment of joint committees to study basic problems. Thus, loss of time, duplication of effort, and unnecessary expense of publication that would otherwise result have been almost entirely eliminated. The service given by the Central Office of the International Meteorological Organization in preparing and publishing the daily magnetic characters and the daily numerical character-figures is of inestimable value in geophysical fields and one for which our Association is most grateful. These daily magnetic characters have proved so valuable in many directions of inquiry that we may well record a desire that they be extended back from 1906, when they were begun, to selected long series of records thus furnishing material for long-time

consideration of magnetic activity and its correlation. We should therefore adopt the resolution of the Commission of Terrestrial Magnetism and Atmospheric Electricity at its Warsaw meeting to compile such data from records older than the De Bilt publications.

At the IATME Assembly in Washington in 1939, the general secretary reported that (Goldie and Joyce, 1940)

> The item of 902.31 Swiss gold francs (£ 60) appearing in the accounts for "Charactere magnetique de chaque jour" was incurred by special authority of the Executive Committee. The cost of this publication was formerly met by the International Meteorological Organization, but in June 1937 the Council of that Organization decided that the publication lay outside the domain of the Organization and invited the Association of Terrestrial Magnetism and Electricity to provide for its continuation. The annual cost is about £ 30.

so it appears that the potential conflict was solved peaceably.

III. The Ionosphere and Radio Propagation

I cannot be sure of the IATME internal structure at its inception in 1919 but it had a serious interest in aurora, airglow, rapid variations, Earth currents, and the high atmosphere for a long time. This lead IATME to have an active interest in the ionosphere which was for obvious reasons of great interest to the International Union of Scientific Radiotelegraphy which as noted earlier became URSI.

The Second Polar Year took place in 1932-33. Radio propagation, which appeared to be affected by magnetic storms, and which for obvious reasons were not a part of the First Polar Year were added to the program of the Second Polar Year. New instruments such as the continuously recording magnetometers which could be checked periodically replaced the earlier ones used during the First Polar Year, which required hourly visual readings. A study of the sun's radiation was also included in order to examine the connection between sunspots and magnetic storms (Robin, 1956).

In Dr. J. A. Fleming's IATME presidential address at the Washington meeting in 1939 the following statements are recorded (Goldie and Joyce, 1940):

> A striking development in our knowledge of geomagnetism has been consummated since our last meeting. In the Transactions of the Edinburgh Assembly a note appears calling attention to sudden fade-outs of high-frequency radio signals. These had been noticed several years before, but widespread interest had never been aroused. Even at that time these fade-outs had been associated with sudden disturbances in the Earth's magnetism. Astronomers had been called upon to seek possible associations with solar phenomena. The astronomers announced that in a number of cases these fade-outs were simultaneous with bright eruptions in the solar chromosphere.

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During magnetic storms the ionosphere becomes turbulent. On such occasions the ionic density drops to values very much below normal, and the ordinary uniform distribution is broken up so that clouds or patches of ionization are formed. The magnetic record and the ionospheric record of August 2, 1937, as shown in figs. 19 and 20, demonstrate the nature of the observational material from which these deductions can be made. Of unusual interest is the fact that during magnetic disturbances which commence at night, as for the one shown, there is an immediate counterpart in a corresponding ionospheric disturbance.

Numerous other instances of advance attained through international cooperation may be cited--advancement which marks the past three years as most significant in our science.

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More than fifty years ago Balfour Stewart and Arthur Schuster inferred from geomagnetic data that there must be a high atmospheric layer of great electrical conductivity. This has been confirmed and extended by direct investigation of the ionosphere which began in 1927.

International scientific meetings could not be held during World War II. IATME resummed its meeting in Oslo in August 1948. Dr. J. A. Fleming had been President for 18 years (Joyce, 1950). He noted that "a world net of nearly 60 ionospheric stations--many near magnetic observatories--has been set up."

The above statements clearly foreshadow a conflict between IATME (IAGA) and URSI which would last for many years.

IV The Upper Atmosphere

Minutes of the IATME(IAGA) Rome meeting (Laursen, 1957) in 1954 revealed pressing problems not only with URSI but this time mainly with the International Association of Meteorology (IAM). J. Coulomb in his presidential address discussed the problem of the IATME overlap with URSI and IAM in the ionosphere and the high atmosphere.

At the plenary session on 15 September 1954, "in reply to a question raised by Sir Harold Spencer Jones, the President underlined that there would be no overlapping of work between IATME and URSI because all questions relating to radio transmissions are left entirely to URSI" (Laursen, 1957, p. 9).

The discussion was opened on the provisional agreement which had been established between IATME and IAM on the position within the IUGG of Upper Atmospheric Physics. Because of the importance of this question in the development of the future IATME organization a good part of this provisional agreement is reproduced below:

Proposal concerning the position within the IUGG of the physics of the high atmosphere

At the Brussels meeting 1951 the IUGG passed the following resolution:

The means of providing for adequate treatment of the Physics of the High Atmosphere require further careful consideration. This Assembly authorizes the International Association of Terrestrial Magnetism and Electricity to continue discussion with the other Associations, Joint Commissions and Scientific Unions concerned, in the hope that a satisfactory solution to the problem may be reached at the next Assembly of IUGG.

In pursuance of this resolution the Bureau of the Association of Terrestrial Magnetism and Electricity initiated a general inquiry among all international organizations concerned with the study of upper atmospheric physics, and on the base of the replies received the two Associations most directly interested, namely the Association of Meteorology and the present Association, agreed upon a proposal which is submitted for the consideration of the Rome Assembly.

1. Composition of the Commission:

President: Mr. S. Chapman, President of the Union
Members: Messrs. J. Coulomb, President of the IATME
K. R. Ramanathan, President of the IAM
V. Laursen, Secretary of the IATME
J. Van Mieghem, Secretary of the IAM

2. Conclusion of the discussion:

2.1.1 The Commission considers that the problems of the ionospheric physics and the airglow are of a particular interest to the IATME. Papers concerning these problems should be presented to the IATME, discussed by this Association and published under its auspices.

2.1.2 The Commission considers that papers relating to the atmospheric ozone, to the thunderstorms, to the propagation of sound waves and to their reflexion by the upper atmosphere, etc., fall into the domain that interests more directly the IAM. Such papers should be presented to the IAM, discussed by this Association and published under its auspices.

2.1.3 On the other hand the phenomena of the mesosphere will be of interest to both Associations. Problems situated on the borderline between the fields of activity of the two Associations (meteorites, luminous night clouds, wind and turbulence in the mesosphere, etc.) should be discussed at joint meetings of the two Associations.

2.2.1 In order to coordinate the activities of the two Associations within the domain of the upper atmospheric physics, and to establish within this domain a fruitful cooperation between them, a joint Committee on the upper atmosphere should be appointed, the members of which should be nominated by the two Associations.

(The next nine paragraphs spelled out details and mechanics of carrying out joint committee activities).

The interest of both IATME and IAM in the upper atmosphere is further demonstrated by the fact that both associations soon changed their names so that the names themselves would both reflect this interest.

At the plenary session of 21 September 1954 (Laursen 1957, p. 29) President Coulomb opened the discussion on the question as to whether the IATME was to change its name. The President suggested, that the discussion be limited to the following three possibilities:

1) That the Association retains its old name.
2) That the name is changed as suggested in the agreement between the Association of Terrestrial Magnetism and Electricity and that of Meteorology, the new name being
   International Association of Geomagnetism and Ionospheric Physics
   Association Internationale de Géomagnétisme et de Physique de l'Ionosphère.
3) That the name is changed as suggested by Prof. Chapman into
   International Association of Geomagnetism and Aeronomy
   Association Internationale de Géomagnétisme et d'Aéronomie.

A lively discussion followed some of which is reproduced below:

Dr. Ambolt opened the discussion by expressing the hope that a change of name, leaving out the word "electricity," would mean no change in the position of the atmospheric electricity within the domain of the Association.

Prof. Ferraro: The term "Ionospheric Physics" suggests that only the ionized layers of the atmosphere are being considered, whereas in fact many other aspects of the physics of the atmosphere are being included in our Association. It is clear that the second name proposed is thus not sufficiently comprehensive.

Prof. Nicolet: Je pense qu'il faut éviter toute confusion dans l'utilisation du mot inonosphère. Nous avons, en effect, la Commission Mixte de l'Ionosphère qui peut s'occuper de tous les aspects des recherches ionosphèriques. De plus il faut utiliser un nom ayant un sens beaucoup plus large.

Dr. Berkner made the following comments: May I speak in favor of the title Geomagnetism and Aeronomy as the name of the Association. There is real need for a new word to express the scientific interests of the Association in the outer atmosphere. The word, aeronomy, suggested by Prof. Chapman, is the science connecting astrophysics and our interests in the outer atmosphere. It is always difficult to become familiar with a new word. Twenty-five years ago there was much objection to introduction of the word "ionosphere," yet this word has become very useful. In fact, the development of our science has depended on it. The word "aeronomy" expresses, similarly, ideas

that are very important for which we need such a single word. The word aeronomy properly expresses our interests in the high atmosphere and astrophysical effects upon it. Therefore I would urge adoption of the name Geomagnetism and Aeronomy as the title of this Association.

Captain Roberts supported the view expressed by Dr. Berkner, and so did Prof. Chapman, who said: It occurs to me that there is advantage in having a brief title for an Association. Proposals 2 and 3 shorten Terrestrial Magnetism to Geomagnetism. Proposal 3 also simplifies the second part of the proposed title, and I hope the new word aeronomy will in time become a familiar name for the not yet (and perhaps never to be) precisely defined subject of the physics of the high atmosphere.

Needless to say proposal number 3, IAGA, was selected for the new name of IATME.

The IAM soon changed its name to one which appears to increase its competiveness in the upper atmospheric area. An account of this change in name is recorded in IAM Resolution No. 40 passed at the XIth IUGG Assembly at Toronto in 1957 (Laclavère, 1957):

The International Association of Meteorology

NOTES with regret the choice of the word aeronomy in the title of the Association of Geomagnetism and Aeronomy

CONSIDERS that the word is not well suited to indicate a special and limited interest in certain problems of the high atmosphere

RESOLVES, in order to establish the fact that the Association of Meteorology is interested in all branches of atmospheric physics, that the name of the Association shall be extended to:

"The International Association of Meteorology and Atmospheric Physics".

V. The Space Age

Much of the foregoing jockeying for position was no doubt prompted by the use of rockets and in anticipation of the coming of the satellite era where in situ measurements could be made in the upper atmosphere and out into space.

Geophysical programs were moving very fast in the late 1950's. The International Geophysical Year (IGY) was an 18 month period from 1 July 1957 to 31 December 1958 which was organized with programs in solar activity, cosmic rays, the ionosphere, aurora and airglow, and geomagnetism, all of which were of interest to IAGA, plus many other programs. Sixty-seven nations and about 30,000 scientists participated in the IGY.

The first spacecraft, the Soviet Sputnik 1, was launched on 4 October 1957. It weighted 84 Kg. The first U.S. satellite, EXPLORER 1, which was launched 31 January 1958, led to the discovery of the inner (Van Allen) radiation belt. Space organizations, which

would employ thousands of research scientists, over the next 25 years, sprang up in many countries. NASA in the U.S.A. was established in 1958.

At this time, none of the existing geophysical scientific organizations were prepared to cope with this huge increase in space physics. The space physicists, on the other hand, needed an organization which would provide a place for them to meet and discuss their work. In the U.S.A. the American Geophysical Union (AGU) rather quickly organized new sections to accommodate this new group of scientists.

On the international scene it became clear that the IAGA internal organization with its committees on:

1. Observatories
2. Aurora and Airglow
3. High Atmosphere
4. Secular Variation and Palaeomagnetism
5. World Magnetic Survey and Magnetic Charts
6. Lunar Variations (Jt. Comm. with IAMAP)
7. Comparisons
8. Magnetic Instruments
9. Characterization of Magnetic Activity
10. Rapid Variation and Earth Currents
11. History
    (see Cardus, 1969, p. 162).

was not adequate to meet the space age.

The whole question was thoroughly discussed when the IAGA Executive Committee met in Paris in March 1962. It was decided to dissolve the existing committees and create a new system of Commissions better able to meet the new space age demands as follows:

Commission	I.	Observatories and Instruments.
	II.	Magnetic Charts.
	III.	Magnetism of the Earth's Interior.
	IV.	Magnetic Activity and Disturbances.
	V.	Solar-Terrestrial and Cosmic-Terrestrial Relationships.
	VI.	Aurora.
	VII.	Airglow.
	VIII.	Upper-Atmospheric Structure.
	IX.	History.

(It was also proposed to retain two Jt. Committees with IAMAP: one on Lunar Effects and one on Atmospheric Electricity.)

Most of what I have written up to this point I have gathered from the records, but much of what follows I can remember quite well, because I began attending IAGA in Helsinki in 1960 and was elected General Secretary at Berkeley in 1963 and served in that capacity for 12 years with another four years on the Executive Committee.

I remember well the very lively discussion (which appeared quite hostile at times) at Berkeley in 1963, where M. Nicolet was elected president of IAGA, when President V. Laursen proposed the above new Commission

structure for IAGA. Copies of the proposed new structure had been widely distributed resulting in quite a number of URSI scientists being present.

The important gist of the discussion can be summarized under the following items (Cardus, 1969, p. 100)

a) Relation between IAGA and other international bodies interested in the same fields of geophysical research.
b) Proposed new grouping of the Commissions.

a) The discussion on this topic over the relationship between our new structure and the new structures of other International Bodies was opened by Prof. Jacobs, who asked whether the new IAGA Structure takes into account the fact that URSI, at its General Assembly, in September 1963, is going to consider the creation of new groups, some of which may cover approximately the same fields of research as now suggested for the new IAGA Commissions. Professor Beynon and Dr. Berkner expressed the views that IAGA, before considering a new structure involving subjects which will be discussed in other international bodies, ought to consult such bodies.

The President remarked that there is no doubt that our Association has the full right to discuss its own structure and to change this structure without consulting other bodies; on the other hand he wanted to make it absolutely clear that IAGA is fully prepared to get in touch with other Unions in order to ensure that its organization will help to the furtherance of Science and not be a hinderance to it. Prof. Nicolet stressed the point that before entering into a discussion with other Associations or Unions it was necessary for IAGA to have a good scientific and operational organization; the lack of such an organization might easily lead to the disappearance of our Association. Father Cardus pointed out that our Association is in a rather delicate position: on one hand the importance of the magnetic field for many studies of geophysics and space science is being recognized, and therefore many scientists, also from distant fields of science, are becoming more interested in the subjects of our organization; on the other hand this increasing interest causes the Scientific Bodies to create new Committees that in several cases have terms of reference which are clearly covered by IAGA. He explained that although he does believe that any one presenting a valuable contribution to Geomagnetism or Aeronomy must be most welcome we cannot accept the principle that if some other organization takes an active interest in the field of IAGA, IAGA must automatically step out; if we accepted this principle it is easy to see from programs presented by other international bodies, that IAGA has nothing left and that the work of our Association has already come to an end.

b) Professor Coulomb opened the discussion on the second item: merging of two or more Commissions into only one: he found that Commissions 5 and 8 were very closely connected and that it might be better if they were combined into one. Professor Nicolet expressed as follows the difference between Commissions 5 and 8:

Commission 5 deals with high energetic particles and Commission 8 deals mainly with particles with thermal energy. Father Mayaud pointed out that the title of Commission 5 is Solar-Terrestrial and Cosmic-Terrestrial Relationships, and that the relationship between the Sun and the Earth exists not only in the high energy particles but also in the particles with low energy. Also Professor Lebedinsky, Dr. Selzer and others contributed to the discussion.

Another proposal was of combining Commissions 4 and 5 into one, but after a short discussion and following Professor Bartels' advice it was decided, that it was better to keep them separate as their terms of reference were quite different.

Finally it was decided to adopt the commission structure as given earlier. This structure served the needs of IAGA quite well until 1973.

Meanwhile the discussion about how to manage atmospheric research in IUGG was still a live topic. At the Rome meeting of the IUGG Executive Committee, March 14-17, 1963, it was decided to propose an Inter-Union Committee for Atmospheric Sciences Research (Cardus, 1969, p. 113), and it was requested that IAMAP pursue the proposal to set up such a committee and to ensure adequate participation by IAGA, IASH and IAPO.

The IAGA Executive Committee at the Berkeley meeting in 1963, after considering the document submitted nonofficially by IAMAP found that the document did not offer proper ground for an Inter-Union Committee and that therefore IAGA would not be interested in the proposed participation.

VI. Reorganization of IUGG

At the Berkeley IUGG Assembly in 1963 President V.V. Beloussov reviewed the background to the suggestion that the Union consider a reorganization. He explained that the structure was then over 40 years old, that there had been great changes in geophysics since it was founded, and that when new projects are started, special committees are often set up to conduct them. He said that the Union could become only a kind of scientific club. One of the reasons for considering reorganization was that at Berkeley no invitations had been received for the 1967 Assembly. It was presumed that IUGG was too large to be accommodated in most countries at a single site.

Subsequent to the General Assembly, the new president J. Kaplan invited V.V. Beloussov (USSR), E. C. Bullard (U.K.), T. F. Malone (USA), and T. Nagata (Japan) to form a select committee of four to draw up an initial series of recommendations for the reorganization of the Union. A second committee of fourteen was to review and modify the recommendation of the select committee of four for submission to the National membership for their vote.

Each Association was invited to send reorganization suggestions to the committee of four. IAGA forwarded the following suggestions after an IAGA Executive Committee meeting held at Florence, Italy, 15 May 1964 (Alldredge, 1964):

Size alone has made it necessary to reorganize IUGG into smaller units. The following realignment of associations is recommended:

	DIVISION	ASSOCIATIONS	AREAS OF INTEREST
I	Geodesy	Geodesy	
II	Solid State Geophysics	Seismology Volcanology Geochemistry (New)	
III	Fluid State Geophysics	Meteorology Hydrology Oceanography	
IV	Geomagnetism and Aeronomy	Geomagnetism and Aeronomy	Geomagnetism Planetary Aeronomy Solar-Planetary Physics Interplanetary Physics

Divisions I and II logically could be consolidated into one Group or Division.

Divisions I and II could meet together during one year, followed by Division III the 2nd year, and Division IV on the 3rd year. COSPAR is recognized as a very fine disciplinary tool. At the present time the IUGG would be wise to foster interdivision symposia on a more or less regular basis.

The select committee of four sent their report to the comittee of fourteen in the fall of 1964. This report contained the following recommendations, in addition to suggestions regarding Assemblies, which directly related to IAGA (Alldredge, 1965):

Relations with other Unions, Special and Scientific Committees

URSI: The overlap is with the commissions of IAGA dealing with external magnetism. The Association has stated its interest in these fields, in the titles of these commissions. It is recommended that there be no attempt to restrict the field of activity of IAGA. It would be desirable to have URSI confine its activities to engineering aspects, but as this does not appear to be realistic, it is felt that coordination of symposia, to avoid overlap, is the most important step.

In this regard, the programme of IUGG symposia should be drawn up much farther in advance: preferably, the programme for the following three years should be completed before the end of each Assembly, by a committee consisting of representatives of each Association. In this way, other Unions would be invited to take part in IUGG symposia, instead of vice versa.

COSPAR: The Committee realized the need for COSPAR, as a coordinating body in space science. It is particularly valuable in providing information to countries without space research facilities. However, its activities in arranging symposia and assemblies on fundamental questions should be watched. Associations should take the lead in arranging such symposia, and should invite COSPAR to take part.

Finally the Committee of fourteen made its report in January 1966. Their report suggested essentially no changes to the Association structure. It did suggest a few changes in the IUGG governing procedure requiring a few changes in the Statutes, but it concentrated very heavily on restructuring the Assemblies. Several of the resolutions are given below (Alldredge, 1966):

Resolution No. 1

The Committee of 14, considering that the Union is a federal type organization with the Associations as its component bodies, expresses the view that in any reorganization every consideration should be given to preserving the autonomy and freedom of action that the Associations have always enjoyed.

It recognizes, however, that the problem of future General Assemblies can be solved only by combined action on the part of the Associations, as members of the Union.

In pursuance of this policy the Committee, having studied the Report of the Committee of four and opinions submitted by countries and Associations, recommends the following:

1. The working time of the General Assembly should, as in past years, be divided between scientific discussion meetings and business meetings both of the Union and of the Associations.

2. That the scientific meetings at the General Assembly be confined to joint sessions of two or more Associations for the discussion of topics of an interdisciplinary character.

3. That the program of meetings and selection of topics for discussion at the General Assembly should be decided by the Executive Committee of the Union on the basis of recommendations made by the Associations, well before the time of the General Assembly.

4 That as far as possible such meetings should consist of the reading of a number of invited papers followed by a limited number of submitted short papers selected jointly by the Associations concerned.

5. That topics of specific interest to the individual Associations should be dealt with by meetings of the Associations, either singly or jointly, in the intervals between General Assemblies.

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Resolution No. 4

The Committee took note of the resolution of ICSU at its Bombay meeting by which an inter-union commission dealing with solar-terrestrial relations was set up. The Committee expressed concern regarding the proposed terms of reference which over-ride many of the interests of IUGG. The Committee considered that IUGG, and in particular IAGA, should be regarded as natural leaders in this field and requests that the constitution of the new inter-union commission be drawn up accordingly. The Commission should be kept small, without national representatives, and put under the auspices of the IUGG as in the case of the Upper Mantle.

The changes in the Statutes required by the report of the Committee of Fourteen were approved at the Extraordinary General Assembly of IUGG in Zürich in 1967, the resolutions needed no voting approval (Garland, 1967).

IAGA was now under the leadership of T. Nagata, who was elected president at St. Gallen, in 1967. IAGA would not comply with the spirit of Resolution No. 1, that the scientific meetings at the General Assembly be confined to joint sessions of two or more Associations for the discussion of topics of an interdisciplinary character.

The speed with which research was being accomplished, especially in aeronomy, left no choice but for IAGA to hold a full scientific program at each General Assembly in addition to a full IAGA Scientific Assembly between IUGG General Assemblies. This disobedient act on the part of IAGA caused difficulties with the Union and other Associations, but the infraction has been tolerated to the present day.

VI. The French Proposal and IUCSTP-SCOSTEP

Efforts to reorganize the IUGG did not stop here. The Council of the French National Committees corresponding to IUGG and URSI saw a real danger in the overlap of the areas shared by IUGG, URSI, COSPAR and IUCSTP which later became SCOSTEP. As a result they proposed a Federation of Three International Scientific Unions which is explained in detail in the following letter from L'Ingenieur General Gougenheim, Président du Comité National Francais de Géodesie et Geophysique to the Presidents of IUGG and URSI, dated 11 February 1969:

Re: Plan to create a Federation of Three International Scientific Unions

Mr. President:

The French National Committee for Geodesy and Geophysics has

been recently led to realize that there are important overlappings in certain fields of activity of IUGG and URSI, especially in those fields related to the International Association of Geomagnetism and Aeronomy (IAGA) and the International Association of Meteorology and Atmospheric Physics (IAMAP). These overlappings appear to result from the rapid expansion in the last while of research in the earth and environmental sciences, as well as from the increasing role of radioelectricity and electronics in the development of spatial research.

It is true that, with a view to coordinating scientific progress in these realms, the International Council of Scientific Unions (ICSU) created the Committee on Space Research (COSPAR) and Inter-Union Commissions; replaced lately with a single Commission, the Inter-Union Commission on Solar and Terrestrial Physics (IUCSTP). But it seems that these new organisms do not limit themselves to their mission of coordination, and they tend to substitute themselves for Unions in the obtaining, study and interpretation of scientific data.

Without going so far as to think that IUCSTP will supplant URSI and IUGG in all that concerns its own domain of investigation, the existence of this Inter-Union Commission nonetheless causes a dispersion of effort and a certain wastage of influence. It must not be forgotten, in fact, that the best specialists in the questions treated are of a limited number in the world, that they are naturally part of all the scientific organizations which deal with these questions and that they are present at the corresponding meetings, at a cost of countless repetition and waste of time.

The Councils of the French National Committees corresponding to IUGG and URSI, hoping that an effective solution can be rapidly found for the situation, have established the following plan to create a Federation of three international Unions which would result in a combining of IUGG and URSI.

(a) Union of Scientific Radioelectricity and External Geophysics consisting of, apart from the present parts of URSI, the parts of IAGA concerned with aeronomy and external magnetism.

(b) Union of Geodesy and Internal Geophysics consisting of IAG, IASPEI, and IAVCEI, as well as parts of IAGA concerned with internal magnetism.

(c) Union of Meteorology and Physics of the Hydrosphere consisting of IASH, IAPSO and IAMAP.

The creation of a Federation of Unions is an innovation, which, far from overburdening the functioning of ICSU, would, on the contrary, be capable of improving it, especially if this were extended to other Unions. In fact, an important decrease would result in the number of those organisms, Unions and Inter-Union Committees which are ICSU-dependent, and with whom the Council must deal. In particular, the problem of the admission of new Unions to ICSU could be simplified by its treatment at the federation level.

The French National Committee for Geodesy and Geophysics at its last General Assembly, 28 January 1969, voted in favour of this project. The French National Committee for Scientific Radioelectricity will hold its General Assembly toward the end of March and it is quite possible that they will vote the same way.

As a result, I have the honour to bring this plan to your attention, and ask you to be so kind as to examine it, and if you consider that it has useful proposals, undertake the necessary procedure in the two Unions concerned, and then in ICSU, for its adoption.

This very thoughtful plan would of course have destroyed IAGA as a separate organization and would have had far reaching effects throughout the world scientific community if it had been adopted. It stirred great interest in all of the Associations of IUGG. Predictably most of the IAGA Commissions dealing in aeronomy favored the proposed Union under (a) of the French plan, but they were not sure about the idea of a Federation.

IAGA Commissions dealing with geomagnetism were very apprehensive about the French plan because it would split geomagnetism into two parts: internal and external. They argued that it was one subject and instrumentation was common to both of them. Admittedly the aeronomy side of IAGA had by 1969 grown to be much larger than the geomagnetic side, but the geomagnetic people felt much more closely related to aeronomy than they did to IAG, IASPEI or IAVCEI.

In Madrid in September 1969, the IUGG Executive Committee again established a small committee this time consisting of J. Coulomb, J. Levallois, T. Malone, M. Nicolet and R. W. Stewart to investigate the future structure of the Union. They were instructed to examine, in particular, relations with URSI, and to maintain contact with a similar committee established by URSI. It was to examine the French proposal, but not restrict its consideration to this proposal.

This committee issued a preliminary report after holding two meetings in Brussels on 21 March 1970. Dr. Minnis, secretary general of URSI, was present at the afternoon meeting. Their report follows (Alldredge, 1970):

Following a discussion of the facts of the situation and an exchange of individual points of view, the Group unanimously submits the following recommendations:

1. In external geophysics the present situation, in which URSI, IAGA and IUCSTP deal with the same questions, is abnormal and it is worth making a serious attempt to modify it.

2. The size of the component Associations of IUGG is satisfactory for it permits the members to work closely together. Thus it seems reasonable to use them as the foundation for a new structure. However, it is possible to envisage the separation of the two distinct sections of IAGA (geomagnetism and aeronomy) into two different Associations; any further subdivision should be avoided: for example, the separation of geomagnetism into two parts internal and external (especially if these two parts were to belong to

different Unions as suggested in the proposals made by the French National Committee for Geodesy and Geophysics (CNFGG).

3. In considering the present structure of URSI, it appears to the group that URSI consists first of a fairly coherent section dealing with radiophysics on one hand and radioastronomy on the other. The remaining section, like IAGA, is concerned with the magnetosphere, the ionosphere, and the nonionized parts of the upper atmosphere. It may perhaps be possible to distinguish between scientists who are directly concerned with electromagnetic waves, such as those working in the field of external geomagnetism, and others who are interested in questions closer to aeronomy. However, avoiding further consideration of detailed distinctions of this kind, which would depend on individual opinions, it seems reasonable to suggest that URSI and IAGA, taken together, would correspond fairly well to three Associations of the size of those now in IUGG. We shall refer to them here as the Associations for Radiophysics, Geomagnetism and Aeronomy, but it is understood that both the titles and subdivisions themselves would be completely open to further review during discussions with URSI.

4. Assuming that the Associations (or groups with a different title but similar responsibilities) would form the basic units, the new structure would cover, without duplication, the present responsibilities of URSI, IUGG and IUCSTP, and would be composed of nine Associations with the following provisional titles:

a. Radiophysics	b. Geomagnetism	c. Aeronomy
c. Geodesy	e. Seismology	f. Volcanology
g. Meteorology	h. Oceanography	i. Hydrology

The group considered two quite different types of structure for the entire group of Associations, although it would be possible to suggest structures of intermediate type. In both cases the Unions would be dissolved. At the end of the IASY (International Active Sun Years), IUCSTP would also be dissolved since its responsibilities for long-term programs could be taken over by the new structure. The present Unions would be replaced in the first case by one Union, and in the second case by a Federation of Unions. The Group agreed that it would not be possible to choose between these two structures without first making contact with the representatives of URSI.

The ultimate establishment of either structure will be a slow process and the Group considers that it would be appropriate to establish permanent contacts with URSI and to organize joint meetings etc., without waiting for the completion of the new structure.

5. In the first possibility, a new Union would be created with a title such as International Union for the Physical Environment. The nine Associations would be attached to it. The national members would adhere to the Union and make financial contributions to it, and the national Committees would be the Committees of the Union. However, the rules would permit a country to allocate a greater fraction of its contribution to a particular Association,

and an adhering country would always be free to decide the relative importance of the support it gives to the different parts of its national Committee.

The interval between General Assemblies of the Union would be fairly long, for example four years. The General Assembly would include only organizational meetings and those devoted to general reviews of scientific activity so that the national delegations would be quite small. The detailed scientific work would be carried out during meetings organized by each Association during the four-year period. These meetings could be jointly organized by several Associations which could be always the same, or different on each occasion. The meetings could also be organized jointly with other Unions or with Scientific Committees of ICSU (SCOR, COSPAR, etc.).

In order to allow such an important Union to act effectively as an organizing body, the Group believes that it ought, like URSI, to appoint a permanent secretary, in spite of the difficulty of finding a scientist willing to accept a partly administrative position.

6. In the second possibility, the nine Associations would form a number of Unions: for example, Electromagnetism and Aeronomy (a,b,c); Geodesy and Physics of the Solid Earth (d,e,f); Physics of the Atmosphere and Oceans (g,h, i). ICSU would be asked to admit, to the Executive Committee, representative of Federation of Unions; each representative would have a number of votes equal to the number of Unions in his Federation. Taking the three Unions mentioned above as an example, they would group themselves into a Federation on the Physical Environment which would have three votes in the ICSU Executive Committee.

With this solution, the administrative and financial powers of the Federation could be very great (office and permanent secretariat with central responsibility for membership and annual contributions); alternatively it could be very small, and in the extreme case the Federation would be simply an informal agreement between the Presidents of the three Unions. Although the Group expressed its preference for the simplest possible structure, consistent with effective organizational ability, it was considered premature to discuss this in more detail.

7. It will be noticed that the two solutions envisaged would have the desirable result of reducing by one the number of members of the Executive Committee of ICSU (if the number of members of this Executive Committee continues to increase,it will be difficult to avoid the constitution of an upper level).

8. The Group recommends that the present report should be widely distributed within IUGG and to other bodies, and that, in particular, it must be transmitted to the Working Group established by URSI. The comments received will enable the Group to decide in what way it can best continue its work, the aim being to submit to the Executive Committee of IUGG a more detailed report which could serve as a basis for discussion at the General Assembly.

9. The Group wished to thank Prof. Van Mieghem for the hospitality offered by the Institut Royal Meteorologique of Belgium and Dr. Minnis for having provided the necessary information about the structure of URSI.

The above report was vigorously discussed at an IAGA Executive Committee meeting at Leningrad in May 1970. There was general agreement that a Federation of Unions was better than just one Union. It was also generally agreed that Dr. Nicolet had obtained important concessions for IAGA in the report. The following, at times conflicting, points were made by various members of the Executive Committee (Alldredge, 1970):

1. The proposals do not give sufficient focus to Solar-Terrestrial Physics (STP) problems. Greater notice should be taken of this important area of research and it should be organized by the scientists themselves. ICSU should be asked to set up a committee of scientists to define the internal structure of the three proposed Unions.

2. STP scientists should not alone be allowed to decide how to organize the future Unions. Only a few nations contribute heavily to the STP work, yet many countries have a great interest in ICSU and its Unions.

3. It would be better to have just one new Union (a), (b), and (c). The other six Associations should together form just one other Union.

4. If it takes years to get reorganized, we should no nothing to impede the work of IUCSTP in the mean time.

The record (Garland, 1971) indicates that at the XV IUGG General Assembly, held in Moscow in 1971, the IUGG Council received word that any general organization along lines indicated above were impossible at the present time because URSI had rejected all of the proposals including the ideal of federation. However, a letter received from the President of URSI urged that negotiations continue.

Dr. J. G. Roederer, who was vice president of IAGA, took a very active part in trying to fit Solar Terrestrial Physics into the ICSU structure with minimum overlap. To further this cause, Dr. Roederer attended the XVIIth General Assembly of URSI, in Warsaw, 21-29 August 1972, representing IAGA President V.A. Troitskaya. He pointed out (Alldredge, 1972) that although the URSI Council had rejected the recommendations, worked out jointly by the Presidents of URSI and IAGA, that a "superunion" or an environmental sciences be established, in which URSI Commissions and IUGG Associations could form, conveniently grouped, autonomous sections, URSI did, however, want a closer and more efficient cooperation with IAGA. During the following years four Jt. Committees of IAGA and Commissions of URSI functioned quite well.

As far as I can tell from the record available to me, no definite action has been taken on the French proposal or any other proposal to generally reorganize IUGG and URSI. On the other hand, as Roederer pointed out in an IAGA Executive Committee meeting, at Madrid in May 1972, the problem of reorganizing IAGA internally could not be properly considered until the external problem of the organization of IUGG(IAGA) and URSI is solved.

At this meeting, it was agreed, however, that the Executive Committee should assume that the future long range plan for reorganizing IUGG(IAGA) and URSI would be to have them both replaced by a single Union concerned with radio science and the physics of the environment.

VIII. The Most Recent Reorganization of IAGA

At the Moscow Assembly in 1971, the IAGA Executive Committee expressed a need for a reorganization within IAGA to better face new problems especially in the solar-terrestrial field. Even though the reorganization of IUGG(IAGA) and URSI was still uncertain, it was decided that IAGA must take action on its own internal organization even though it might have a short life if IUGG and URSI took some action.

Vice President Roederer took the lead. Many proposals were made which were submitted to the IAGA mailing list of nearly 900 individuals for comment. At the IAGA Executive Committee meeting at Kyoto, in September 1973, Roederer explained the reorganization plans. At various sessions official representatives, or officers, of other interested organizations, namely: E. R. Dyer (IUCSTP), E. A. Lauter (COSPAR), J. London (IAMAP), A. A. Ashour (IUGG), G. D. Garland (IUGG), J. W. King (URSI), and F. L. Scarf (URSI) met with the IAGA Executive Committee. The background of the proposal to reorganize IAGA was explained by J. G. Roederer.

Most of these guests expressed no opposition to the reorganization as long as existing effective working groups in their organizations were not duplicated when the details of the proposed Divisional Structure were completed and as long as suitable Joint Committees were maintained with other organizations.

Dr. Roederer explained the reasons for reorganizing IAGA to a general meeting of the Association in Kyoto. His remarks, some of which are reproduced below, tell the story very well (Alldredge, 1973):

> As a result of the IGY and ensuing "space age," the scientific field of IAGA has undergone a profound transformation. A whole new dimension of concern to geophysicists was uncovered as a result of the satellite exploration program, and a conglomerate of disciplines has emerged unified into what is now known as solar-terrestrial physics. The earth's magnetic field and atmospheric plasma were found to extend into what we now call the magnetosphere. The solar corona on the other hand, expands outward in the form of the solar wind, carrying embedded in it the solar magnetic field with imprints of solar surface perturbations stretched far out into outer-planetary space. The solar wind and the magnetosphere meet at the magnetopause, the cusps and the tails boundary layer. Energy and particles of the solar wind are continuously being fed into the magnetosphere, and dissipated continuously as well as sporadically thoughout its base, the ionosphere.

In recent years we have reached a point of sufficient understanding of this complicated solar wind magnetosphere system so that we can now clearly identify the problems and propose strategies for their solution. The solar-terrestrial complex exhibits multiple surface and low-latitude manifestations whose correlation with space phenomena is now sufficiently understood so that STP has become experimentally accessible to all countries, regardless of their satellite-launching capabilities. It is one of the primordial duties of an international organization like IAGA to inform smaller, developing countries of all the possibilities of research open to them and to assist in drawing up plans that will allow their scientists to participate in STP activities.

With the emergence of solar-terrestrial physics, the whole perspective of research in geomagnetism and aeronomy has changed, converging more and more toward a multidisciplinary approach; geomagnetic, auroral and aeronomic measurements, radio probing, and in situ satellite and rocket observations must all be conducted in a coordinated, simultaneous way to provide the required information on the multiple interconnected processes, on the strong feedback systems that rule our outer environment. At the same time, we have witnessed how enormously lunar and planetary studies have flourished in the last few years thanks to the active participation of geophysicists.

This development has deeply affected several ICSU bodies, and has created serious overlap of interest among different Associations, Commissions and Working Groups of IUGG, URSI, IAU and IUPAP. A solution to this problem was attempted originally by these organizations, through the establishment of COSPAR and, later, of IUCSTP. It became clear, however, that in the end the overlap was only aggravated, particularly when it came to the conduct of international meetings, to the point of bewildering and appearing sometimes ridiculous to the working scientists. COSPAR, of course, was quite successful in providing a channel for information exchange on satellite work, particularly in the early phase of space exploration. IUCSTP is instrumental in providing a forum and home for special interdisciplinary STP projects. But still, up to this very day, seriously conflicting overlaps remain between several of the Unions.

An initially promising attempt to fuse part of URSI with IAGA was over-whelmingly defeated by the Council of National Delegates to the 1972 URSI Assembly in Warsaw, an extremely regrettable step. But most of those delegates were telecommunications specialists and not-so--specialists with little expertise in STP. Such an IAGA-URSI marriage would have provided a quite natural, unified and stable home for STP within ICSU.

So the problem remains: STP needs a stable, unified home within ICSU. IAGA is the natural place, for scientific and historical reasons. Provided, of course, we offer the right furniture and interior decoration! Drs. Sugiura and Lanzerotti have recently made a survey of opinions, that included a question on which of the ICSU bodies was considered to be the appropriate one to deal with STP matters. IAGA "won" with an overwhelming majority! As a matter of fact, the number of STP papers presented at IAGA meetings has been increasing steadily over the past decade. Here in Kyoto,

for instance, we have 203 papers on solid earth geomagnetism plus 17 papers on observatories, 230 papers on aeronomy and 305 papers on the atmosphere and solar wind. I should point out that this time we have had no symposia on the solar wind. This number of STP papers has not forced its way into IAGA: their authors have been attracted to IAGA and their presentation represents a quite natural expansion of IAGA's original scope in the light of the developments mentioned earlier.

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Why reorganize IAGA? Can't the emergence of STP and other even newer topics be satisfactorily accommodated in the present structure? Is not the present structure, conceived in 1963, already a result of the emergence of STP? I have no time to dwell at length on all the various arguments that have been given in support of the need for reorganization. Let me just point out some of the inconsistencies or inadequencies of the present structure. For instance, we have a Commission that encompasses a wide range of upper atmosphere phenomena. At the same level we have another Commission that deals with just one phenomenon, airglow. We have a Commission on magnetic variations that encompasses a wide range of phenomena determined by currents flowing in the base of the magnetosphere and further out. At the same level we have another Commission that deals with just one type of variations, those caused by tidal effects in the atmosphere. Next, we have one Commission on solar-magnetospheric relations that, if it were to follow its terms of reference literally, would cover everything that happens between the solar wind and the ionosphere. At the same level we have another Commission that deals with just one manifestation of magnetospheric instability, the aurora. We have a Commission on magnetic observatories and instruments - yet all other types of observatories and instrumentation had to be dealt with sometimes cramped into one of the pertinent Commissions. Please don't misinterpret me: I am not saying here that I consider magnetic observatories, the aurora and lunar variations as of secondary importance. What I am trying to point out here is the need to equalize the scope of each one of IAGA's permanent subdivisions.

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To meet all these adverse circumstances successfully, we need hard workers in IAGA positions from top to bottom. People willing to give a significant portion of their time to IAGA. A figurehead, however famous, will be worthless to IAGA as long as he remains just a figurehead.

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Finally the following IAGA structure was adopted at Kyoto:

DIVISION I Internal Magnetic Fields

Working Groups

1. Analysis of the main field and secular variations.
2. Theory of the main field and secular variations.
3. Electromagnetic induction and electrical conductivity of the earth and the moon.
4. Magnetic anomalies.
5. Paleo- and archeo- magnetism.
6. Rock magnetism.

DIVISION II Aeronomic Phenomena

Topics

1. Structure, composition and dynamical processes of neutral and ionized constituents.
2. Solar fluxes, and photochemistry of ionized and neutral constituents, including excited species.
3. Atmospheric quantal emissions, including auroral processes and airglow.
4. Ionospheric irregularities, including small-scale auroral structures.
5. Ionospheric-magnetosphere interactions, including large-scale auroral structures.
6. Upper atmosphere-lower atmosphere interactions.
7. Aeronomy of other planetary atmospheres.
8. Laboratory experiments of aeronomical interest.

DIVISION III Magnetospheric Phenomena

Topics

Each of the subdivisions should be covered by two reporters.

1. Magnetic fields, electric fields and current systems, including relevant ground observations.
2. Magnetosheath, magnetospheric boundary and plasma penetration.
3. Distribution and properties of magnetospheric plasmas.
4. Energetic particle population including cosmic ray entry.
5. Magnetic oscillations, waves and wave-particle interactions.
6. Magnetic storms and substorms, including aurora-magnetosphere relations.
7. Magnetosphere-ionosphere interactions.
8. Magnetospheres of other planets.
9. Laboratory experiments of magnetospheric interest.

DIVISION IV Solar Wind and Interplanetary Magnetic Field.

Topics

1. Structure of the solar wind and the interplanetary field.
2. Interplanetary plasma physics.
3. Interaction of the solar wind with unmagnetized bodies.

DIVISION V Observatories, Instruments, Indices and Data

Working Groups

1. Magnetic observatories.
2. Meteor-radar observatories.
3. Geomagnetic instruments and standards.
4. Optical calibration standards.

5. Magnetic surveys and charts.

6. Geophysical indices.

7. Collection and dissemination of data.

Reporters Only

8. Geophysical alerts and forecasts.

Ad Hoc Working Groups

9. Ad hoc advisory group on coordination of IMS ground-based, balloon and rocket experiments.

10. International geomagnetic survey by satellite.

11. Two IAGA members of a joint working group with Commission 22 of IAU. "Ad hoc committee on radar observations of meteor flux, radiants and anomalies at the base of the theremosphere."
This joint committee would report to IAGA through Division V.

INTERDIVISIONAL WORKING GROUP Relations between External and Internal Variations

INTERDIVISIONAL COMMISSION History

Working Groups

1. American Area

2. Pacific-Asian Area

3. European-African Area

4. Development of research

INTERDIVISIONAL COMMISSION Antarctic Research

INTER-UNION AND INTER-ASSOCIATION WORKING GROUPS

1. The auroral oval and its extension into space (with URSI)

2. Physics of the plasmapause (with URSI)

3. Stratospheric and Mesospheric processes (with IAMAP)

The new organization became effective on 1 January 1974. The basic organization has survived to this day. The number of topics and working groups and the exact names have been viewed as flexible and several small changes of this type have occurred and the number of Interdivisional Working Groups and Joint Working Groups between Divisions has changed to accommodate changing needs.

In June 1974, at the time of the COSPAR meeting in Sao Paulo, Brazil, a Memorandum of Agreement on Joint IUGG-URSI Activities, with respect to the upper atmosphere, was signed by five IAGA officials, headed by President V. A. Troitskaya, five URSI officials, one SCOSTEP official, and one IAMAP official. This agreement spelled out five URSI/IAGA Joint Working Groups, two of which had already been approved by IAGA in Kyoto. The agreement recognized that IAGA and IAMAP were establishing an IAGA/IAMAP Joint Committee so that IAMAP was invited to participate in appropriate IAGA/URSI Working Groups. SCOSTEP agreed to assign the responsibility of several of its programs to appropriate IAGA/URSI Working Groups. This agreement was approved later by the IAGA Executive Committee.

The above arrangement has given some stability to an otherwise very volatile situation and has gone a long way toward maintaining peace and a cooperative and helpful spirit in the areas of the upper atmosphere and solar-terrestrial physics among the existing organizations with interests in these fields. This stable situation has lasted for seven years and appears to be at least a good interim solution to the problem.

This stability has no doubt been helped by a rather basic change in attitude on the part of at least some URSI adherents evidenced by a letter in 1974 from Henry G. Booker to W.J.G. Beynon who was President of URSI at the time. Quotes from the letter follow (Alldredge, 1974):

> .....the post-sputnik era has created a new situation. Whereas international leadership in ionospheric and magnetospheric physics had previously been largely exercised de facto by URSI, during the post-sputnik era three or four international organizations have been trying to do so, and this has led to undesirable overlapping of activities and to inexcusable duplication of meetings. Suggestions were made at an early stage for dealing with this situation, but only limited success has been achieved.
>
> Although the consequent confusion affected only a minority of URSI, nevertheless the Union as an organization became deeply involved in the jurisdictional dispute. According to my understanding, the majority of URSI is now tired of seeing its Union sidetracked by these arguments, and intends to ensure that URSI rededicates itself to the telecommunications and remote sensing science that is its prime responsibility.

URSI is interested in all aspects of electromagnetic theory, electromagnetic measurements and electromagnetic observations. In particular, URSI is interested in electromagnetic wave phenomena in ionized media anywhere in the universe. The Earth's ionized environment is, of course, particularly important in practice. URSI needs to understand relevant properties of the Earth's ionized environment without denying IAGA's responsibility for the geophysics of the ionosphere and magnetosphere. In association with remote sensing techniques, URSI has contributions to make to the geophysics of the ionosphere and magnetosphere, and should make them without denying IAGA's responsibility for the geophysics of the upper atmosphere. Conversely, IAGA should recognize that URSI has a prime responsibility to handle electromagnetic wave phenomena everywhere, and is the international scientific organization charged with so doing.

Contact between URSI and IAGA is required for three reasons:

(a) URSI needs to keep abreast of all relevant developments in the geophysics of the upper atmosphere.
(b) Via remote sensing techniques, URSI has contributions to make to the geophysics of the upper atmosphere.
(c) There are upper atmospheric geophysicists in URSI who have so far had little contact with IAGA and who need to be brought into the IAGA orbit.

The current approach to contact between URSI and IAGA is through the novel mechanism of Inter-Union Working Groups. Why this is superior to the traditional approach of the Inter-Union Commission is unclear. We seem to be reinventing in a clumsy way a version of the Mixed Commission on the Ionosphere that was abolished about a decade ago. Nevertheless, if the new concept of Inter-Union Working Groups serves a legimate purpose, let it do so. But let it not be used in any way to prolong confusion about the respective responsibilities of URSI and IAGA.

At the IAGA Executive Committee meeting held at Grenoble, France, in September 1975, C. -G. Fälthammar, chairman of Division III, reported that, because of the URSI reorganization that deemphasized geophysics not directly related to Radio Science, URSI has abolished their former connection with two of the URSI/IAGA Joint Working Groups.

Another strong factor in the stability of the present organizational management is that many IAGA scientists have been very active in Upper Atmosphere and Solar-Terrestrial Physics work outside IAGA itself. For example, Dr. J. G. Roederer served as chairman of the International Magnetospheric Study (IMS) Steering Committee while he was President of IAGA, Dr. K. Cole, while serving as Vice President and then as President of IAGA was President of SCOSTEP. M. Nicolet, who became President in 1963 served as the IUGG representative to COSPAR for many years, and T. Nagata, who became President of IAGA in 1967, served for many years as the IUGG representive to the Special Committee on Antarctic Research (SCAR).

J. G. Roederer, V. A. Troitskaya, who became President of IAGA in 1971, and B. A. Tinsley, who served as an IAGA Division Chairman, have all served in SCOSTEP. Many IAGA scientists have helped plan the Middle Atmosphere Program (MAP). This close contact between IAGA scientists and the Solar-Terrestrial Groups outside of IAGA permitted IAGA to exist harmoniously with the other groups and to fill a needed function in the scientific community.

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The INTERNATIONAL ASSOCIATION OF GEOMAGNETISM AND AERONOMY (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 the above subjects by individual countries, institutions or persons and to facilitate its international coordination;
c) to provide an opportunity, on an international basis, for discussion and publication of the results of the research work indicated above;
d) to promote appropriate standardizations of observational programs, data acquisition systems, data analysis and publication.

At present the components of IAGA are as follows.

Division I: Internal Magnetic Fields,
Division II: Aeronomic Phenomena,
Division III: Magnetospheric Phenomena,
Division IV: Solar Wind and Interplanetary Magnetic Field,
Division V: Observatories, Instruments, Indices and Data,
Interdivisional Commission on Antarctic Research,
Interdivisional Commission on History,
Interdivisional Commission on the Middle Atmosphere,
Interdivisional Working Group on Relations between External and Internal Magnetic Variations.

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

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

IAGA has now two kinds of publications, i.e. IAGA Bulletins and IAGA News. The IAGA Bulletins include (i) Transactions of the IAGA General Assemblies; (ii) Programs and Abstracts of Papers for IAGA General Assemblies; (iii) Geomagnetic Data and Indices for each year; and (iv) Special Data Summary or Useful Information Booklet (published occasionally). All of these publications are available through the IUGG PUBLICATIONS OFFICE (39ter, rue Gay-Lussac, 75005 Paris, France).

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

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REMARKS TO THE IAGA NEWS RECIPIENTS

IAGA News is usually published on a yearly basis, and it is available free of charge on request from the Secretary General of IAGA. At present it is distributed to (i) those scientists who have requested to be on the mailing list, (ii) participants of the previous IAGA Assemblies, (iii) principal observatories, and (iv) officers of the international organizations which are closely related with IAGA's scientific activities. If you know of some new colleagues (or research institutes or observatories) wishing to receive IAGA News, please let me know their names and addresses or advise them to write to me directly. Some back issues (Nos. 15-19) of IAGA News are still available on request.

IAGA welcomes all scientists throughout the world to join in research in "Geomagnetism and Aeronomy". IAGA is subdivided into Divisions and Interdivisional Bodies (as shown inside back cover), many of which have Working Groups or Topic Groups for the study of specific subjects. Some of these IAGA internal bodies occasionally issue their own circulars or newsletter, and these are available on direct application to their leaders, the names of which are shown in pages 48-58 of this IAGA News.

IAGA News No.20 contains a summary of the successful Fourth General Scientific Assembly (3-15 August 1981, in Edinburgh, U.K.), as well as the latest useful information for the IAGA community. The Transactions of the IAGA Edinburgh Assembly will appear soon as IAGA Bulletin No.46, and will be distributed free of charge to all the registrants of the Edinburgh Assembly. Those who wish to purchase the Transactions are invited to send their request to the IUGG PUBLICATIONS OFFICE (39 ter, rue Gay-Lussac, 75005 Paris, France). The IUGG Publications Office receives orders for any other IAGA publications on sale, including the yearly publications of Geomagnetic Data and Indices (Bulletin No.32-series).

The Secretary General welcomes any comments on the IAGA News and information related to IAGA's activity, including any criticism regarding the management for the world IAGA community. The recipients are also asked to kindly notify the Secretary General of any error or necessary modification or change of postal address, to ensure the mail delivery to you.

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