

IUGG Annual Report 1996
Georges Balmino
Secretary General

INTRODUCTION

MEMBERSHIP

VITAL STATISTICS

Structure

Inter Association Commissions and Committees

General Assemblies of the Union

Other Scientific Meetings

Publications

ORGANISATIONAL MATTERS

ACTIVITIES IN 1996

International Association of Geodesy (IAG)

International Association of Seismology and Physics of the Earth's Interior (IASPEI)

International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

International Association of Geomagnetism and Aeronomy (IAGA)

International Association of Meteorology and Atmospheric Sciences (IAMAS)

International Association of Hydrological Sciences (IAHS)

International Association for the Physical Sciences of the Ocean (IAPSO)

BRIEF REPORT ON USE OF 1996 ICSU GRANT AND UNESCO SUBVENTION

CONCLUSION AND FUTURE PLANS

ANNEX 1: A REPORT ON CDC/IDNDR WORKSHOP ON "SEISMIC AND OTHER GEOPHYSICAL INSTRUMENTATION"

ANNEX 2: Support for INTERMAGNET

INTRODUCTION

The International Union of Geodesy and Geophysics (IUGG), an international non governmental organisation established in 1919, is one of the scientific Unions grouped within the International Council of Scientific Unions (ICSU).

IUGG is dedicated to the scientific study of the Earth and the applications of the knowledge gained by such studies to the needs of society, such as mineral resources, reduction of the effects of natural hazards and environmental preservation.

The Union is a purely scientific organisation. Its objectives are the promotion and co-ordination of physical, chemical and mathematical studies of the Earth and its environment in space. These studies include the shape of the Earth, its gravitational and magnetic fields, the dynamics of the Earth as a whole and of its component parts, the Earth's internal structure, composition and tectonics, the generation of magmas, volcanism and rock formation, the hydrological cycle including snow and ice, all aspects of the oceans, the atmosphere, ionosphere, magnetosphere and solar-terrestrial relations, and analogous problems associated with the Moon and other planets. Union activities embrace studies of the Earth by artificial satellites and other techniques for deploying instruments at high altitude.

The IUGG has initiated and vigorously supported collaborative efforts that have led to highly productive world-wide interdisciplinary research programmes, such as the International Geophysical Year (1957-58), the Upper Mantle Project (1964-70), the Geodynamics Project (1972-79), the Global Atmospheric Research Programme (1970-80) and the International Lithosphere Programme (1981-). These programmes have set a model for international interdisciplinary co-operation. One major contribution has been the creation, through ICSU, of the

World Data Centre system, from which the data gathered during these major programmes are available to research workers everywhere.

The IUGG co-operates with UNESCO in the study of natural catastrophes. It is also represented on the ICSU Committee for Science and Technology in Developing Countries, and gives particular emphasis to the scientific needs of the Third World (e.g. Geodesy in Africa, International Water Resources, etc...).

The Union also co-sponsors the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) and is a partner with other Unions of ICSU in Inter-Union Commissions (e.g. ICL).

The official languages of the Union are French and English.

MEMBERSHIP

By their very nature, geodetic and geophysical studies require a high degree of international co-operation as well as effective central co-ordination. The Union is fortunate in having 76 Member Countries. The great majority of those countries participate in the Union through IUGG Committees set up by the national academy or another body that adheres to ICSU (other methods of adherence do occur). The Member Countries are distributed throughout the world as follow :

Europe: 31 North & Central America: 4 Asia: 18

Africa: 13 South America: 6 Oceania: 4

The number of member countries may change from one General Assembly to the next due to accepted new applications, also because some countries get unfortunately expelled for being unable to pay their dues during several years.

Besides, several countries, being in serious arrears of payment, are in observer status.

VITAL STATISTICS

Structure

The Union comprises seven semi-autonomous Associations, each responsible for a specific range of topics or themes within the overall scope of the Union's activities and each with a sub-structure; these seven International Associations and their sub-components are shown below:

International Association of Geodesy (IAG/AIG)

Positioning

Advanced Space Technology

Determination of the Gravity Field

General Theory and Methodology

Geodynamics

International Association of Seismology and Physics of the Earth's Interior (IASPEI/AISPIT)

Controlled Source Seismology

Earthquake Hazard and Prediction

International Heat Flow

IASPEI/IAVCEI Commission on Physical and Chemical Properties of Materials of the Earth's Interior

Geodynamics and Tectonophysics

International Decade for Natural Disaster Reduction

Wave Propagation

European Seismological

Federation of Digital Broadband Seismograph Networks (with ICL)

Committee for Developing Countries

International Commission on Earth Sciences in Africa
Committee on Education
Asian Seismological Commission
International Ocean Network
IASPEI/IAVCEI Committee on Volcano Seismology
International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI/AIVCIT)
Explosive Volcanism
Mitigation of Volcanic Disasters
World Organisation of Volcano Observatories
Geochemistry of Volcanic gases
Volcanogenic Sediments
Large-Volume Basaltic Provinces
Volcanism and the Earth's Atmosphere
Remote Sensing
Granite
Volcanic Lakes
IAVCEI-IASPEI Inter-Association Commission on Physical and Chemical Properties of Materials of the Earth's Interior
IAVCEI-IASPEI Inter-Association Commission on Volcano Seismology
International Association of Geomagnetism and Aeronomy (IAGA/AIGA)
Internal Magnetic Fields
Aeronomical Phenomena
Magnetospheric Phenomena
Solar Wind and Interplanetary Magnetic Field
Geomagnetic Observatories, Surveys and Analyses.
History
Developing Countries
International Association of Meteorology and Atmospheric Sciences (IAMAS/AIMSA)
Atmospheric Chemistry and Global Pollution (ICACGP)
Atmospheric Electricity (ICAE)
Climate (ICCL)
Clouds and Precipitation (ICCP)
Dynamic Meteorology (ICDM)
Meteorology of the Middle Atmosphere (ICMA)
Planetary Atmospheres and Their Evolution (ICPAE)
Polar Meteorology (ICPM)
Ozone (IOC)
Radiation (IRC)
International Association of Hydrological Sciences (IAHS/AIHS)
Surface Water (ICSW)
Groundwater (ICGW)
Continental Erosion (ICCE)
Snow and Ice (ICSI)
Water Quality (ICWQ)
Water Resource Systems (ICWRS)
Committee on Remote Sensing and Data Transmission (ICRSdT)
Committee on Atmosphere-Soil-Vegetation Relations (ICASVR)
Committee on Tracers (ICT)
International Association for the Physical Sciences of the Ocean (IAPSO/AISPO)
Sea Ice
Mean Sea-Level & Tides
Cooperation with Developing Countries

Natural Marine Hazards

Permanent Service for Mean Sea Level

IAPSO Standard Seawater Service

The Associations are free to convene their own general assemblies and to sponsor particular symposia, often in partnership with one another, and, like the Union, are managed by a Bureau and Executive Committee whose members are elected during their General Assemblies. Within its own discipline each Association is responsible for determining its own programme of investigations and for supporting the activities of its own component parts.

Inter Association Commissions and Committees

Owing to the interactive nature of the subject fields managed by the Union's Associations, a number of Inter-Association Commissions have been established which serve the Union and the international geophysical community by promoting the study of particular interdisciplinary problems:

Committee for Developing Countries (within each Association, also at Union level)

Commission for Natural Disasters (participation to IDNDR)

Fluid Earth Sciences Committee (not a standing committee since 1993).

Committee on Mathematical Geophysics (CMG)

Study of the Earth's Deep Interior (SEDI)

Tsunami Commission (Joint IASPEI - IAVCEI - IAPSO Commission)

Besides, and within the International Lithosphere Program (ILP) of ICSU, IUGG and the International Union of Geological Sciences operate the Inter-Union Commission on the Lithosphere (ICL).

General Assemblies of the Union

General Assemblies have been held since 1922 and, since 1963, at 4 years intervals. The General Assemblies took place at the following locations:

1922 Rome 1960 Helsinki

1924 Madrid 1963 Berkeley

1927 Prague 1967 Zurich

1930 Stockholm 1971 Moscow

1933 Lisbon 1975 Grenoble

1936 Edinburgh 1979 Canberra

1939 Washington 1983 Hamburg

1948 Oslo 1987 Vancouver

1951 Brussels 1991 Vienna

1954 Rome 1995 Boulder

1957 Toronto 1999 Birmingham

The seven Associations of IUGG meet at these General Assemblies and organise separate or inter-Association symposia, and the Union itself organises symposia of high general interest.

Each IUGG Committee, which functions as a non-governmental entity in its relations with IUGG, is represented at the periodic General assemblies of the Union by delegates appointed by its adhering body. During these assemblies, policies governing the Union are agreed on, research programmes requiring international participation are formulated and co-ordinated and plans are drawn for their execution. The scientific results of programmes in progress are discussed at the numerous symposia, Commission and Working Group meetings and other gathering of scientists that are held during these assemblies.

Other Scientific Meetings

Each Association is free to organise its own general assembly in between general assemblies of the Union. These are very important venues where progress in all topics the Association deals with is reported. Associations may sometimes joint in organising a common assembly.

The numerous symposia and workshops organised on other occasions by the Associations, together with the general assemblies, provide the opportunity for geodesists and geophysicists from the majority of the countries of the world to discuss their respective methodologies, results and hypotheses and to plan collaborative research projects.

The symposia are intended to be particularly helpful to the younger scientists from the developing countries of the world. The IUGG tries to help some of them financially to increase their participation in such events.

Publications

The Union and the Associations publish information bulletins of meetings of the Associations and of symposia sponsored by the Associations.

The following bulletins are issued by the Union and the Associations which also publish more specialised bulletins from time to time (e.g. data compilations, etc ...);

IUGG Comptes Rendus of the General Assemblies

Home-page and news on WWW, at: www.obs-mip.fr/uggi

IUGG Year-Book

The Union Chronicle, published by Prof. P. Melchior (Belgium), honorary Secretary General, up to the end of 1995, has been stopped.

IAG Journal of Geodesy as of Jan. 1996

Travaux de l'Association Internationale de Géodésie

IASPEI IASPEI Newsletter (irregularly)

IAVCEI Bulletin Volcanologique (semi-annually)

IAHS Hydrological Sciences Journal (quarterly)

Newsletters (quarterly), Proceedings of Symposia

Series on Snow and Ice

IAGA IAGA News (irregularly)

IAMAP IAMAP News Bulletin (irregularly)

IAPSO Procès Verbaux (2-4 years)

Publications Scientifiques (irregularly)

ORGANISATIONAL MATTERS

Responsibility for directing the Union's affairs is vested in the IUGG Council by the Statutes and Bylaws. The IUGG Council consists of the Council Delegates, who are designated for each Council meeting by their adhering body as the representative of the geodesists and geophysicists of their respective country. A Bureau, an Executive Committee and a Finance Committee administer the IUGG between Council meetings. The Executive Committee has the particular responsibility of overseeing the scientific programmes of the Union.

The Bureau of the Union is composed of:

President P. Wyllie (USA)

Vice-President U. Shamir (Israel)

Secretary General G. Balmino (France)

Treasurer S. Gregersen (Denmark)

Members J. Chen

A.S. Monin

S. Uyeda (China)
(Russia)
(Japan)

The Executive Committee consists of the Bureau, the past President of the Union (H. Moritz, Austria) and the Presidents of the seven Associations, that is:

IAG K.-P. Schwarz (Canada)
IASPEI C. Froidevaux (France)
IAVCEI G. Heiken (USA)
IAGA M. Kono (Japan)
IAMAP R.A. Duce (USA)
IAHS J.C. Rodda (U.K.)
IAPSO V. Shannon (South Africa)

An Advisory Board on Scientific Policy is in charge of looking at the goals of the Union and makes recommendations concerning its missions and objectives. It has been chaired by the IUGG Vice-President and is composed of the Presidents of the Associations.

The Finance Committee is composed of:

President A.A. Ashour (Egypt)
Secretary A.F. Spilhaus (USA)
Members V.K. Gaur
E. Groten
M.J. Hamlin (India)
(Germany)
(U.K.)

ACTIVITIES IN 1996
Administrative matters

The preparation of the 22nd. General Assembly (Birmingham, UK, 1999) started.

The Bureau met in Copenhagen in June 1996, and also had a joint meeting with the Association Presidents and Secretaries General on this occasion. Some organizational and scientific aspects of the 1999 General Assembly were discussed, for instance the composition and the role of the Organizing Committee, the Scientific Program Committee, which chairperson is Prof. Kathy Whaler, U.K.. Recommendations for Union and joint (inter-Association) symposia and suggestions for scientific topics were made. Thoughts about future IUGG activities were debated, in various areas such as : global geophysical observing systems, IDNDR, megacities, education, developing countries.

The role of the Advisory Board on Scientific Policy was discussed : its role was considered terminated for the time being (it could be re-activated any time in the future if a need is perceived).

Activities of the Associations

The following reports have been prepared by the Secretaries General of the Associations, that is:

IAG: C.C. Tscherning (Denmark)
IASPEI: E.R. Engdahl (USA)
IAVCEI: R.W. Johnson (Australia)
IAGA: J.A. Joselyn (USA)
IAMAS: R. List (Canada)
IAHS: G.J. Young (Canada)
IAPSO: F.E. Camfield (USA)

International Association of Geodesy (IAG)

Central Bureau activities:

The "Travaux" of IAG, which contain reports of all IAG sections, services and other groups for the period 1992-96, was published in the spring. The Geodesists Handbook, 1996, was published as Journal of Geodesy, Vol. 70, No. 12 in October. It contains information about the IAG structure, activities and officers, totally 200 pages. Both publications were edited by Pascal Willis of IGN, France. The handbook is in digital form available on the IAG WWW Home-page. This enables the current update of the information, which is an important Central Bureau activity.

The Bureau publishes a monthly newsletter, which is printed in the Journal of Geodesy. This is with the Journal distributed to all National Representatives and the members of the IAG Executive Committee. The newsletter includes a listing of all geodetic publications. (It is provided by the IAG Bibliographic Service).

The Bureau is through the MANICORAL project (European Union Telematics Program funded) engaged in activities testing the use of modern multimedia and communication facilities for scientific cooperation and teaching.

Symposia and meetings:

The 1st Int. workshop of the ICSU supported HIBISCUS Project was held in Munich, Feb. 15-16. The project deals with sea level variations in the Caribbean.

A meeting of Subcommission SSC 8.1, Studies of the Baltic Sea, was held in Riga, Latvia, March 28-29. A GPS Sea-level campaign was planned for 1997.

The 7th General Assembly of the WEGENER project took place June 3-7 in Vila Nova de Gaia, Portugal.

The EUREF Subcommission held a symposium from May 22-25, 1996, in Ankara. The symposium was very successful and the EUREF project has made considerable progress. This symposium was the first one of the newly organized Subcommission which consists now of the former EUREF Subcommission as well as the UELN Subcommission.

The International Symposium on Gravity, Geoid, and Marine Geodesy (GraGeoMar96) was held in Tokyo, September 30 - October 5, 1996. The range of problems discussed at this meeting was rather broad with accent on practical as well as theoretical problems.

In October 28-30, 1996 the First Meeting of SSG 4.170 (Integrated Inverse Gravity Modelling) was successfully organized by Ludwig Ballani, in Walferdange, Luxembourg.

The 2nd Int. Conference GALOS (Geodesy and the Law of the Sea) was successfully organized at Bali, Indonesia.

The 1996 IERS (International Earth Rotation Service) workshop and Directing Board meeting was held in Paris, France, Oct. 9-19.

Educational Activities:

The International Summer School of Theoretical Geodesy was held in Como, May 27 - June 7, 1996. The topic was: "Boundary value problems and the modelling of the Earth's gravity field in the view of the one centimeter geoid". It was an important meeting attended not only by young scientists, but also by a broader community of geodesists, mathematicians, geophysicists and representatives of other branches of related sciences.

The XII International Course in Engineering Geodesy was held Sept. 7-16 in Graz, Austria.

The Tropical school of Geodesy took place 4-16 Nov. in Bandung, Indonesia. The main emphasis was on the use of GPS for precise positioning.

Services:

IAG have services associated with FAGS. One of the services (IERS) is also a service within IAU. The International GPS Service for Geodynamics - IGS, has strengthened its service to both the geodetic, the surveying and the navigation community.

The International Geoid Service (IGeS) has difficulties in becoming operational due to limited funds available from the Italian sponsors. IGeS has coordinated an international group to evaluate a new Earth gravity model.

The IAG Bibliographic Service is now functioning with access to bibliographic information via Internet.

International Association of Seismology and Physics of the Earth's Interior (IASPEI)

The Association held or sponsored a large number of meetings.

Workshop of Eastern and Southern Africa Working Group

Bulawayo, Zimbabwe, 7-15 March 1996 - Sponsored by Committee for Developing Countries (see below).

Methodology of Seismic Risk and Loss Estimation

Stanford, USA, 23-27 April 1996 - Organized jointly with World Seismic Safety Initiative (WSSI) of International Association of Earthquake Engineering by Working Group on Seismic Risk and Loss Estimation.

North London Workshop

North London, UK, May 1996 - Organized by Commission on Controlled Source Seismology.

Fourth International Workshop on Heat Flow and the Structure of the Lithosphere

Trest, Czech Republic, 10-16 June 1996 - Organized by International Heat Flow Commission (IHFC). Support provided for participation of scientists from developing countries and former eastern European bloc countries.

International meeting on Geodynamics of the Lithosphere and Earth's Mantle

Czech Republic, 8-13 July 1996 - Organized by Commission on Geodynamics and Tectonophysics.

IASPEI Regional Assembly in Asia

Tangshan, China, 1-3 August 1996 - The Regional Assembly was sponsored by IASPEI, the IASPEI Asian Seismological Commission, the State Seismological Bureau (SSB) of China, and the Municipal Government of Tangshan city, China, and was organized by the SSB. The assembly was attended by a total of 278 delegates, 92 of these from outside China, representing 29 countries and regions. The assembly scientific program consisted of 9 Technical Sessions (Earthquake Precursors, Earthquake Prediction, and Physics of Earthquake Sources ; Strong Ground Motion and Earthquake Hazard ; Wave Propagation and Tomographic Imaging ; Geothermics and Volcanology ; Recent Devastating Earthquakes in Asia and Southern Pacific Region ; Subduction Processes ; Seismic Tectonics and Space Geodesy ; Societal Impact of Earthquakes ; and Triggered/Induced Seismicity) and 3 Workshops (Implementation of Global Seismic Hazard Assessment Program (GSHAP) in Central and Southern Asia ; Gaps in the World-Wide Seismological Publication Web ; and Earthquake Scenario Seismic Risk and Loss Assessment). In all 185 oral and 95 poster presentations were made.

Although at its 1995 General Assembly IASPEI had already granted commission status to the Asian Seismological Commission (ASC), it remained necessary to complete this process by taking the steps required to formally establish the ASC. This was accomplished at the first ASC Council meeting, held on 3 August 1996 during the IASPEI Regional Assembly in Asia, at which statutes for the commission were adopted, officers elected (President, H. Gupta ; Vice Presidents, K. Hamada and G. Gibson ; and Secretary-General, Zhu Chuanzhen), and a time and venue for the next ASC General Assembly set (NGRI, Hyderabad, India, 1998).

30th IGC Symposium D4

Terrestrial Heat Flow, Hot Spots, Mantle Plumes and Thermal Structure of the Lithosphere, Beijing, China, 4-14 August - Organized by IHFC. Support provided for travel expenses of key speakers.

25th General Assembly of the European Seismological Commission

Reykjavik, Iceland, 9-14 September 1996 - Support provided for participation of young scientists.
7th International Symposium on Deep Seismic Profiling
Asilomar, USA, 16-20 September 1996 - Organized by Commission on Controlled Source Seismology. Proceedings to be published in Special Issue of Tectonophysics.
IDNDR Workshop on Earthquake Risk Management Strategies in Central Asia
Alma-Ata, Kazakstan, 22-25 October 1996 - Sponsored by IASPEI Commission for IDNDR (see below).

IDNDR:

IASPEI intends to continue to make seismic risk reduction a top priority during the second half of the Decade. It has called upon seismological groups in member countries and individual Earth scientists to participate in the effort to reduce the great danger from earthquakes in many places around the world. IASPEI through its Commission for IDNDR has expanded its programs to study the main attributes of earthquakes and to disseminate globally knowledge on earthquakes to governments, engineers, planners, and the public.

The Workshop on Earthquake Risk Management Strategies in Central Asia brought together experts from around the world to confer with Central Asian experts on seismology, earthquake-resistant design, and emergency response. For the Central Asian participants (from Kazakstan, Tadjikistan, Turkmenistan, Uzbekistan, Armenia, Russia, Greece, and Turkey) it was the first time they had met as representatives of independent countries).

Education/Training Activities:

A Committee on Education was formed by IASPEI at its 1995 General Assembly to promote the following activities: (1) Develop teaching materials for seismic instrumentation, data analysis and results ; and (2) Provide training courses on seismic instrumentation, data processing and analysis. Under this program IASPEI can respond to training requests and requests for development of teaching materials on earthquakes and volcanoes from college to elementary school levels.

Activities Involving Developing Countries:

The Eastern and Southern Africa Working Group of the IASPEI Committee for Developing Countries has already held five active workshops at different centers in Africa at which regional seismological analysis has been carried out and regional bulletins of events and associated readings produced. These are the only such comprehensive bulletins in the region, and form a useful starting point for further analysis such as that at ISC, and also for hazards studies as part of programs such as GSHAP. The countries involved are Eritrea, Ethiopia, Kenya, Malawi, Tanzania, Uganda, Zambia and Zimbabwe, with South Africa also participating. At a 1996 workshop records for the period March-August 1995 were analyzed, and a bulletin produced. The working group held a formal meeting during the workshop and, as well as discussing technical problems, adopted a set of statutes which state its main aim as to 'encourage co-operation and promote research among seismological agencies in the Eastern and Southern African region'. A 'Report on the Seismic Hazard Analysis in Eastern and Southern Africa' was also prepared.

Publications Transfer:

IASPEI, and its Committee for Developing Countries, is deeply aware that in many countries of the developing world there is a lack of even basic texts and publications on seismology and related Earth sciences. IASPEI therefore has set up a mechanism to help transfer books and publications from individuals and institutions that have surplus stocks to institutions in developing areas that have need of them. To prevent duplication, the IASPEI Secretariat is prepared to act as a clearing house for such offers and requests. Those with surplus publications, including back runs of journals, are invited to supply a list to the IASPEI Secretariat. Institutions in developing countries with specific needs are also invited to make these known to the IASPEI Secretariat.

Publications:

IASPEI Newsletter

The IASPEI Secretary-General prepares and distributes irregularly an Association Newsletter. The content is primarily personal reports by IASPEI Commission Chairs, meeting organizers, and other member scientists involved in IASPEI sponsored activities. The last issue in 1996 was the first to be distributed using the IASPEI bulk E-mail system to those who have Internet addresses. Hard copy versions of the Newsletter will continue to be distributed to those without Internet addresses with the assistance of the National Geophysical Research Institute in Hyderabad, India.

Committee on Developing Countries Newsletter

The IASPEI Committee for Developing Countries circulates bi-annually from Hyderabad a Newsletter intended to provide a forum for exchanging news and views of geophysical importance among geoscientists, particularly from developing countries.

IDNDR Newsletter

The IASPEI/IDNDR Secretariat in Beijing, China, circulates irregularly a Newsletter concerning IASPEI/IDNDR activities. The Secretariat also publishes a news magazine in Chinese.

Cermak, V. and Rybach, L. (Editors). Special Issue. Geothermal Aspects of Lower Crustal Structure, Heat Flow and Hydrothermal Circulation, Proceedings of the IASPEI Symposium held during the 27th General Assembly in Wellington, New Zealand, Tectonophysics, v. 257, 1996.

Reyners, M. and Hasegawa, A. (Editors). Special Issue. Subduction Zones and Back Arc Basins, Proceedings of the IASPEI Symposium held during the 27th General Assembly in Wellington, New Zealand, Physics of the Earth and Planetary Interiors, v. 93, 1996.

Schenck, V. (Editor). Earthquake Hazard and Risk, Papers selected by the Sub-Commission on Earthquake Hazard and Risk from Symposia and Workshops held during the 27th General Assembly in Wellington, New Zealand, Kluwer series 'Advances in Natural and Technological Hazard Research' No. 6, Kluwer Academic Publishers, Dordrecht-Boston-London, 287 pp., 1996.

Engdahl, E.R., Castano, J.C., Berrocal, J., (Editors). Special Issue. Selected papers from the 1994 Regional Seismological Assembly in South America held in Brasilia, Brazil, Geofisica Internacional, v. 35, 1996.

Young, J.B., Presgrave, B.W., Aichele, H., Wiens, D.A., and Flinn, E.A., Special Issue. The Flinn-Engdahl Regionalisation Scheme : The 1995 Revision, Physics of the Earth and Planetary Interiors, v. 96, 1996.

Anderson, O.L., Jackson, I. (Editors), Special Issue, Thermoelastic Properties of Deep Mantle Phases, Proceedings of the IASPEI Workshop held during the 28th General Assembly in Boulder, USA, Physics of the Earth and Planetary Interiors, v. 98, 1996.

IASPEI also continues development of a home page on the WorldWideWeb (www.csd.net/~bergman/iaspei/) which contains organizational information, a publications list, meeting announcements, and Internet connections.

Special Projects:

Global Seismic Hazard Assessment Program (GSHAP)

The common affiliation of seismic hazard is within the scientific community represented by IASPEI. Several IASPEI commissions and working groups have an active role in the GSHAP implementation. In particular, in 1996 the Committee for Developing Countries and the Commission for IDNDR have been in close contact with GSHAP and the European and Asian Seismological Commissions have supported GSHAP activities and hosted special sessions within their general assemblies. An association lecture and a workshop dedicated to the GSHAP implementation, as well as a GSHAP Steering Committee meeting, are planned at the 1997 IASPEI General Assembly.

A System for Technology Exchange for Natural Disasters (STEND)

IASPEI participates in STEND, an information exchange program aimed at increasing awareness of available technology which is being developed by the World Meteorological Organization (WMO)

in Geneva, Switzerland. Contributors supply 'components', each describing some piece of technology, which are listed in a "STEND Reference Manual" that will be available in a computer-readable form as well as in a printed version at regional and national centers.

IASPEI Seismological Software Library (SSL)

Volumes 4 and 5 of the IASPEI Software Library are now available. Volume 4 is a toolbox for managing bibliographic information and includes programs to automate the reference preparation in manuscripts and to manage a user's own references. Volume 5 is A Programmable Interactive Toolbox for Seismological Analysis (PITSA) and includes a short course on "First Principles of Digital Signal Processing for Seismologists." Each software volume includes the executable code, examples on floppy diskettes, and printed documentation.

IASPEI PC Shareware Library

Under the auspices of the Working Group on Personal Computers, a PC shareware library is being published on diskette, including files with short-form manuals of the programs. The Library provides for fast and wide distribution of geophysical programs and utilities, reduced or demonstration versions of geophysical software, and beta-versions of new programs to be included in future volumes of the SSL.

New Areas of Interest:

IASPEI/IAVCEI Commission on Physical and Chemical Properties of Materials of the Earth's Interior

This Commission was established following the 1995 IUGG General Assembly (Co-Leaders - S. Mackwell and W. McDonough). The stated goal of this Inter-Association Commission is to promote interdisciplinary research and discussion on the nature and dynamics of the Earth's interior by encouragement and facilitation. Through experimental and theoretical studies of the physical and chemical behavior of Earth materials we can further our understanding of the planet's complex and dynamical evolution since accretion. Such studies provide constraints on the structure and composition of the planet's interior and characterize the important physiochemical exchanges between the metallic core, the silicate earth, and the atmosphere/hydrosphere. New understandings of earth processes and evolution will only come about through a strong interdisciplinary approach to the characterization of the nature and dynamics of the minerals, melts and magmas that are the fabric of the interior of the Earth. Moreover, by promoting interdisciplinary research and discussion, we hope to bring forth a greater appreciation of the measurements and uncertainties in the measurements made by geophysicists and geochemists studying the Earth's interior, and thereby facilitating a more informed application of these constraints in models developed in geophysics, geochemistry, petrology and volcanology. A major goal of the Commission is the coordination of international symposia and workshops that will promote the discussion of such interdisciplinary studies of Earth's interior. The Commission will be organizing a Continental Roots Workshop in 1997.

IASPEI/IAVCEI Commission on Volcano Seismology

This Commission was established following the 1995 IUGG General Assembly (Co-Leaders - B. Chouet and Y. Ida) to provide stronger links between IASPEI and IAVCEI in the field of seismic monitoring. Advances in this area are critical to an understanding of the deep interior of volcanoes (their 'plumbing systems') and how potentially threatening magmas move towards the surface and erupt. Volcano seismology is the major tool used in monitoring volcanoes throughout the world, and advances in the subject therefore are likely to be of considerable humanitarian value, particularly in developing countries where most of the Earth's active volcanoes are to be found. The Commission will be organizing joint symposia on volcano seismology at the IASPEI and IAVCEI General Assemblies to be held in 1997.

International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

Introduction:

1996 was another eventful year for IAVCEI. The energy levels of volcanologists, petrologists, and geochemists world-wide remained high, and much of this was channelled into IAVCEI activities through the twelve IAVCEI Commissions, as well as (1) through groups planning IAVCEI workshops, General Assemblies, and other meetings, (2) through Sub-Committees of the IAVCEI Executive Committee, and (3) by individuals raising important issues that needed to be addressed by the Association. Much of the year was spent by colleagues in Mexico planning the January 1997 IAVCEI General Assembly in Puerto Vallarta, and by the IAVCEI Bureau in implementing personal membership following the vote by National Delegates on new Statutes and By-Laws for IAVCEI at the 1995 IUGG General Assembly in Boulder.

1997 IAVCEI General Assembly:

Planning for the 1997 IAVCEI General Assembly in Puerto Vallarta progressed well during the course of the year and an exciting scientific program was assembled by the Organising Committee, partly assisted by the leaders of several IAVCEI Commissions. In addition, an excellent selection of pre- and post-Assembly field excursions was arranged to areas of volcanic interest throughout Mexico and in Nicaragua, as well as specialist workshops.

Arrangements were made also for an IAVCEI Information and Discussion Forum to be held in Puerto Vallarta. These are open meetings that have been held during previous IAVCEI General Assemblies in Canberra (1993) and Boulder (1995) and the International Volcanological Congress in Ankara (1994). They permit any participant of the conference to provide comment on, and ask questions about the management and future directions of IAVCEI. These meetings have been well attended and they offer an excellent opportunity for the IAVCEI Executive Committee to receive direct feedback from people interested in the future of the Association. A good attendance was anticipated at the 1997 General Assembly given the fact that nearly 600 people are now fully paid up members ('affiliates') of IAVCEI.

Personal Membership:

Personal membership of IAVCEI was implemented during the course of the year. A membership form was distributed widely through National Correspondents, Commission Leaders and newsletters, members of the Executive Committee, in Bulletin of Volcanology, on the IAVCEI homepage, and by means of a postal mailing list. A professional agency in Canberra was contracted to receive membership applications and fees. A graded scale of membership fees was established using an 'honesty' system whereby prospective members were asked to identify a fee that corresponded to their annual level of income - from US\$32.00 where the income exceeded US\$10,000, down to US\$8.00 if the income was less than US\$7000.

The system seemed to work well in that people from wealthy countries paid the full amount whereas students generally and people from economically under-privileged countries in particular, were able to join the Association for a low amount. US\$8.00 is a substantial amount of money in some countries and indeed some people have said it is too much. However, this amount is in effect being subsidised by those paying the full amount and we feel that offering an even lower amount would be quite impractical and uneconomical.

Transferring money to Canberra from underprivileged countries is also a problem, but people in these countries were urged to send in single-payment blocks of applications and to use the credit-card facility of a colleague in more wealthy countries as a means of payment. Very few people seem to have abused the honesty system, although there is of course no way of checking this fully.

The total membership by 25 December 1996 was 542 (355 people paid the maximum fee, and 146 the minimum). Ten countries with the greatest numbers of members were, in decreasing order, the USA, Italy, Japan, Australia, United Kingdom, Russia, New Zealand, Indonesia, Germany, and

France. We plan to seek further memberships during 1997 but to manage the membership from a newly established IAVCEI Secretariat in Canberra, rather than use a professional agency which takes a percentage of each membership fee.

IAVCEI News:

IAVCEI News is a membership newsletter that previously was produced three times each year in the IAVCEI international journal *Bulletin of Volcanology* which is published by Springer-Verlag (Germany). A decision was taken during the year to publish IAVCEI News as a separate item for delivery by mail to each paid-up member of IAVCEI. An arrangement was made for Springer to publish and mail out (at cost) the newsletter. Dr Hazel Rymer (Open University, United Kingdom) was appointed the IAVCEI News Editor, and she edited the inaugural issue (a combination of issues 1 and 2) which was published and distributed before Christmas. Alternative ways of publishing IAVCEI News more economically are being pursued - for example, desk-topping by the IAVCEI Secretariat itself.

IAVCEI Homepage:

The IAVCEI Homepage (http://geont1.lanl.gov/HEIKEN/ONE/IAVCEI_HOME_PAGE.HTM) was established during the year by the IAVCEI President, Grant Heiken, assisted by Vice-President Andy Duncan. It has proved to be most successful as a contact point for information and news items about the Association. It is being accessed increasingly.

Bulletin of Volcanology - the International Journal of IAVCEI:

A smooth transition took place in the change of Executive Editorship of the *Bulletin of Volcanology*. Dr D.W. Swanson (United States Geological Survey, now based at the Hawaii Volcano observatory) is the Editor-in-Chief, assisted by his colleague Dr C.G. Newhall (also USGS, but based at the University of Washington, Seattle). The report of a review of the *Bulletin of Volcanology* undertaken in 1993-4 by a Sub-Committee appointed by the IAVCEI Executive contained recommendations that have helped the Executive Editor establish a management system that he feels best suits the needs of the Editorial Board and prospective authors. Dr Swanson visited the publisher's headquarters (Springer) in Heidelberg, and the IAVCEI Secretary General visited the Berlin office of Springer in June to discuss progress with the management of the *Bulletin of Volcanology*, plans for IAVCEI News, and to discuss future collaboration between IAVCEI and Springer.

New IAVCEI Video:

A highlight of the year was the completion of the video *Reducing volcanic risk* which was funded in part by a grant from ICSU. This video is the second of a series dealing with volcanic eruptions and their impacts on society. The first video was entitled *Understanding volcanic hazards* and it presented graphic images of volcanic hazard types. The second video complements the first one by focusing on the ways in which communities can lessen risk through mapping volcanic hazards, monitoring volcanoes, and having emergency plans established and practiced by the community. Both videos were completed as a result of the dedication and commitment of several people, but most notably Steve Brantley of the United States Geological Survey. IAVCEI is selling the videos either singly or together at a reduced price.

Relationships with IASPEI:

A special effort was made during the year in continuing to establish stronger linkages with IAVCEI's sister Association, IASPEI. This was achieved mainly through further development of two IAVCEI - IASPEI Inter-Association Commissions: *Physical and Chemical Properties of Materials of the Earth's Interior*, and *Volcano Seismology*.

Attempts were made to organise a Joint Assembly of the two Associations, including the idea of a joint meeting in Indonesia where earthquake and volcanic activity are at high levels and where they threaten populous communities. IAVCEI plans to hold a General Assembly in Indonesia in the year 2000 (see below), but at the present time 2000 is an inconvenient year for IASPEI.

A successful collaboration between the two Associations is more likely to be found in a joint venture in Chile where IAVCEI and the IASPEI Commission for the IDNDR are making arrangements to hold an international workshop on the use of modern technologies in reducing the risk from earthquakes, volcanoes, and tsunamis and in providing rapid information immediately following disasters caused by these hazards. The workshop is expected to be held in April 1998 (see below).

Another area of mutual interest to both Associations is in the vulnerability of megacities to the impact of volcanic eruptions and earthquakes. This is a topic of considerable interest to volcanologists concerned with the impact of eruptions on large urban conurbations, such as in the Naples region of Italy. The topic will attract significant interest from IAVCEI during the 1999 IUGG General Assembly where megacity vulnerability is expected to be a prominent topic of discussion.

Linkages with ILP:

Efforts were made also in 1996 to establish linkages between IAVCEI and the International Lithosphere Program (ILP). Both organisations have a strong interest in the physics and chemistry of the lithosphere yet, for historical reasons, have never adopted until now collaborative approaches towards the subject. Discussions are under way, particularly in regard to the co-sponsoring of future conferences and symposia, most notably the 1998 IAVCEI General Assembly to be held in South Africa where the chemical evolution of the lithosphere is expected to be a major theme, as well as the 1999 IUGG General Assembly in the United Kingdom.

A current member of the IAVCEI Executive Committee is Dr Marta Mantovani, Brazil, who also is the Chair of National Committees for the ILP. She and South African colleagues have already started a dialogue concerning shared interests in the program of the 1998 IAVCEI meeting.

New IAVCEI Commissions:

Indications of the robustness of IAVCEI during 1996 are seen in the emergence of proposals to establish four new commissions. These are: (1) Education and Public Awareness (including the collection of video and photographic material), (2) Arc Volcanism, (3) Ocean Island Volcanism, and (4) Electromagnetism of Volcanoes (possibly a Joint Commission with IAGA). Discussions are continuing about the best way in which these Commissions might be established. However, there is some concern that too many separate Commissions may be an indication of the need to ensure greater collaboration between existing interest groups, rather than establishing a plethora of separate ones, in order that the benefits of interdisciplinary activity be maximised. The correct balance is seen to be critical to the success of intra-Association activities within IAVCEI.

IAVCEI Sub-Committees:

IAVCEI currently has four Sub-Committees, all but one of which are temporary groups of people who consider and report on particular issues that the Executive Committee feels need addressing by the Association. The one exception is the Awards Sub-Committee which every four years considers nominations for two IAVCEI awards: the Thorarinsson Medal and the Wager Medal (formerly the Wager Prize). A call for nominations was made during 1996 so that winners could be identified for presentation of the awards at the 1997 IAVCEI General Assembly in Mexico.

The three other Sub-Committees that worked during the course of the year are as follows:

1. Crisis Protocols: Guidelines or protocols are being developed that will cover the behaviour of scientists during volcanic crises. These crises are times when local scientists are under considerable pressure to monitor volcanoes and to report findings to local authorities, but their task can be made more difficult when well-intentioned visiting scientists feel the need to visit the crisis ostensibly to assist them.

2 Volcano Alert and Public Warning Systems: This group was established towards the end of 1996 and its aims are to examine the best ways of generating alert and warning systems (colour-coding and number systems, for example) for volcanic eruptions.

3. Directory of Crisis Expertise: The concept of establishing this Sub-Committee was discussed during the year, with a view to producing a directory of people and their respective skills and experience in volcano-crisis management, so that individuals can be drawn on by volcanological groups who require assistance as times of crisis.

A Sub-Committee on Safety for Volcanologists in 1993-5 produced a set of guidelines for use by people planning to work on active volcanoes. The guidelines were published in English in IAVCEI News and as a poster that has been distributed worldwide, particularly to people in volcanological observatories. This poster was redesigned during 1996 and produced in Spanish for release in early 1997. Spanish is the most common first language spoken by people who live on or near the world's active volcanoes.

Future meetings:

IAVCEI currently is planning General Assemblies, conferences, and workshops, most of which are referred to above, but which are all listed in the following for convenience.

24-28 February 1997: International Workshop on Volcanic hazards and emergency management in the Southwest Pacific being held in Port Vila, Vanuatu, in association with the South Pacific Applied Geoscience Commission (SOPAC)

July 1998: IAVCEI General Assembly in South Africa, having the theme Magmatic diversity: volcanoes and their roots

April 1998: Joint IASPEI/IAVCEI IDNDR Conference in Chile on Modern prediction and response systems for earthquake, tsunami and volcanic hazards

1999: IUGG General Assembly in Birmingham, United Kingdom

2000: IAVCEI General Assembly in Indonesia

Concluding Remarks:

IAVCEI is the smallest of the Associations in IUGG which, in turn, is one of the largest of the unions comprising the International Council of Scientific Unions, ICSU. We are greatly encouraged by the energy and enthusiasm of the individual members who now make up our Association. We believe that in 1996 we have taken a step away from the traditional hierarchical structure of ICSU-style scientific associations. We have empowered individuals through the introduction of personal membership of IAVCEI and, in so doing, are guaranteeing a robust future for the Association.

International Association of Geomagnetism and Aeronomy (IAGA)

The first full year of the quadrennium has been an active one. In 1996, IAGA cosponsored eight meetings, published 2 books, convened the first meeting of 1995-1999 Executive Committee (of the Association), participated in a meeting of the IUGG Association Presidents and Secretaries-General, published Issue No. 35 of IAGA News, and planned for the 1997 IAGA Assembly in Uppsala, Sweden. An ICSU grant through IUGG to support the INTERMAGNET project supported their efforts to modernize and standardize global observations of Earth's magnetic field. Congratulations were extended to Prof. Jack Jacobs on the occasion of his 80th birthday, and we mourned the death of IAGA members including Honorary Member Baron Marcel Nicolet.

IAGA Co-Sponsored Symposia and Workshops:

Regional and topical scientific workshops are important to the work of the Association. Each of the eight meetings and workshops cosponsored by IAGA are listed below:

Co-sponsored and financially assisted by IAGA:

Fourth Latin American Conference on Space Geophysics (COLAGE) ; April 22-26, San Miguel de Tucuman, Argentina

Co-sponsored and financially assisted by IAGA and IUGG:

Electromagnetic Induction Workshop, a biennial activity of Working Group I.2 of IAGA (Electromagnetic Induction in the Earth) ; July 11-19, Hokkaido, Japan

Co-sponsored by IAGA with travel support from the IUGG Developing Countries fund:

Symposium on Magnetism in Studies of Dynamics of Earth's Interior and Electrodynamics of its Far Environment; November 18-20, Colaba, Bombay, India.

Co-sponsored by IAGA:

International Solar-Terrestrial Predictions Workshop; January 23-27, Hitachi, Japan.

Workshop on Atmospheric Interactions: Downward and Upward Coupling to the Middle and Upper Atmosphere; February 5-16, Trieste, Italy.

Workshop for Latin American Magnetic Observatories; July 1-12, Univ. Nac. Autonoma de Mexico, Mexico D.F.

VIIth IAGA Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing; September 8-15; Niemege, Germany.

First General Assembly of Stratospheric Processes And their Role in Climate (SPARC); December 2-6, Melbourne, Australia.

Publications:

Two IAGA Guides were printed in 1996: the IAGA Guide on Magnetic Measurements and Observatory Practice, by J. Jankowski and C. Sucksdorff, and the IAGA Guide for Magnetic Repeat Station Surveys, by L.R. Newitt, C.E. Barton, and J. Bitterly (the latter Guide is not yet in circulation). These guides join a manual, Observing Noctilucent Clouds by M. Gadsden and P. Parviainen, which was published in 1995. These manuals were printed with the assistance of a 1995 ICSU grant. To date, 127 copies of the Guide on Magnetic Measurements and Observatory Practice have been distributed free of charge to active magnetic observatories world-wide; another 30 have been ordered and sold.

IAGA Bulletin No. 32s - Geomagnetic Data for 1988, and IAGA Bulletin No. 32t - Geomagnetic Data for 1989, were published by ICSU with the financial assistance of UNESCO through the mediation of the Federation of Astronomical and Geophysical data analysis Services. The Bulletins are produced by the International Service of Geomagnetic Indices (ISGI) Publications Office which is hosted at the Centre d'étude des Environnements Terrestre et Planétaire (CETP, Saint-Maur, France), under the responsibility of Annick Berthelier and Michel Menvielle.

IAGA Executive Committee Meeting:

The first meeting of the 1995-1999 IAGA Executive Committee was held July 22 and 24 in Brisbane, Australia. Discussions were lively and wide-ranging and included the specific matters listed below.

The nomination of Dr. Michael Gadsden as an IAGA Honorary Member was unanimously approved.

A procedure was established for approval and support of IAGA sponsorship of regional and topical scientific workshops and meetings. The amount budgeted to support these meetings was increased.

A procedure was established for awarding travel assistance grants to participants in the 1997 Uppsala Scientific Assembly ; the registration fee guidelines were approved.

It was agreed that IAGA Symposia will not be scheduled in conflict with IUGG Lectures at the July 1999 General Assembly in Birmingham, England.

It was decided that a voluntary contribution to IAGA of \$20 to \$40 will be solicited in IAGA News. Persons who contribute will be recognized as benefactors of the Association unless they request anonymity.

A proposed revision in Statutes was discussed that would change EC membership to include Division Leaders. It was resolved that there is not strong support for a change in the Statutes ; however, there can be increased communication. The EC will henceforth meet with Division Leaders at all Assemblies.

IAGA News will continue to be printed and mailed. If possible, it will be put on the Internet too.

More generally, the IAGA WWW page received firm endorsement and further development of content and presentation was urged.

The EC deliberated at some length about IAGA's future. We must seek ways to earn support, both from governments and from other sources such as the private sector.

Should IAGA expand its scientific agenda to include "biosphere issues". This issue will be added to the Agenda for the joint EC/DL meeting in Uppsala.

Looking Ahead:

The Eighth Scientific Assembly in Uppsala, Sweden, in August (4-15) will be the highlight of 1997. The Assembly is being held jointly with the 9th Solar Terrestrial Physics (STP) Symposium of the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) and International Commission on the Middle Atmosphere (ICMA) of the International Association of Meteorology and Atmospheric Sciences (IAMAS). We are expecting at least 1 000 participants. Much of the communication about the Assembly, including registration and submission of abstracts, is via the INTERNET. The Assembly home page on the World Wide Web is www.irfu.se/iaga_97.php.

A special address at the Assembly will be the "Commemorative Lecture on the Contribution of Hannes Alfvén to Geophysics". This lecture will be given by Professor C.-G. Fälthammar, who was for many years a close collaborator of Professor Alfvén and succeeded his chair at the Royal Institute of Technology. Professor Alfvén's contributions are fundamental to the development of plasma physics, cosmical physics, and many subdisciplines of geophysics. Thus it is quite fitting for IAGA to honor Professor Alfvén on the occasion of our General Assembly held in Sweden.

International Association of Meteorology and Atmospheric Sciences (IAMAS)

Major Commission Activities:

Four Commissions of IAMAS had organized international Conferences, as documented by the appropriate printed (impressive) Proceedings. At these occasions they also had their administrative meetings, electing new officers and establishing membership to commissions.

These Commissions are:

II. Atmospheric Electricity (ICAE): Both President and Secretary were reelected for another 4year term. They are: Prof. E.P. (Phil) Krider, President ICAE, and Dr. E. (Earle) R. Williams, Secretary ICAE.

IV. Clouds and Precipitation: Dr. George A. Isaac, has been elected President ICCP, succeeding Prof. Peter R. Jonas. This Commissions has had, for quite a while, no secretary. Instead they elected a Vice President, Prof. Gabor Vali.

IX. Ozone (IOC): Prof. Robert D. Hudson, was elected as the new President of IOC, following Prof. G.M. Megie. The Secretary, Prof. Dr. Rumen D. Bojkov, was reelected Secretary IOC.

X. Radiation (IRC): Prof. William Smith is the new President of IRC, stepping up from Secretary in the last period, and replacing R.J.E. Harries, the former President IRC.

IAMAS involvement:

President R.A. Duce is a member of the SCOR Executive Committee, and on behalf of IAMAS he attended the annual meeting of SCOR in Southampton, England from 16-17 September 1997.

Dr. Eugene Bierly of the American Geophysical Union has been representing IAMAS during discussions of the IAG/CSTG Working Group on the IUGG Fundamental Reference and Calibration Network (FRCN). Dr. Bierly attended a meeting of the working group at the AGU meeting in Baltimore, MD, USA in May, 1997.

Travel support of scientists in need:

In 1996 IAMAS has, through its support of Commission meetings and SPARC, funneled \$14 500 in support of travel grants to scientists from developing and hardship countries. This represents 50% of its 1996 annual budget.

Alliance:

The main initiative taken by IAMAS is the proposal to the informal IUGG Executive Meeting in Copenhagen in June to form an ALLIANCE between the national Meteorological and Hydrological Services, NMHSs, (as represented by the World Meteorological Organization, WMO), the Universities of the world teaching Meteorology and related fields (as represented (not formal yet) by UCAR, the US University Corporation for Atmospheric Research) and the scientists at large (as represented by IAMAS). This proposal has been supported in particular by IAHS, IAPSO and IAGA. The proposal had already been discussed with major players in WMO and, in the meantime, has been fleshed out in discussions with the key partners.

The aims of the ALLIANCE are to enhance collaboration in scientific, operational and organizational aspects between the different segments, to provide easy and fast cross links between and among different segments of the ALLIANCE, making full use of the Internet and its capabilities. The provision of information is Step I. It is established by making known and available already existing Web sites and organizing them in a user-friendly fashion. One of the applications addresses the interchange of available educational and training modules. Another segment would make scientific and applications software accessible on a down-loading basis. In Step II questionnaires are to establish the needs of the Services and Universities so that Internet units can be setup to address the high priority questions and provide teams to provide advice and assistance (Step III). The status of the ALLIANCE can be reviewed on <http://iamas.org/alliance>. The ALLIANCE will be particularly successful if the communities involved will be able to provide their own Web pages, which can then be linked. It is hoped, that the "system" is fully operational by the time most Universities in the developing world are also on the net. It is planned to have a IUGG proposal for collaboration submitted to the Executive Council of WMO in June 1997. By that time an official agreement by UCAR should also be available, in addition to some financial resources (which may be forthcoming).

Administrative matters:

An internal upgrading of communications has been achieved by linking IAMAS to its members by a home page: <http://iamas.org>. This page contains information about membership of the EC of IAMAS and its Commissions, Statutes, forthcoming Conferences and meetings, Reports by the President and SG on special meetings and events, etc. The home page involves ongoing updating and is never finished. The plan however, is that many of the information providers, such as the Commissions, produce their own Web pages (which gives them full control), Web pages which can then be linked to the IAMAS page.

One of the weak points in the IAMAS secretariat is the nearly complete lack of information on the National Representatives to IAMAS. Improvement will get top priority after the Melbourne IAMAS/IAPSO Joint Assembly in July 1997. Operation of IAMAS would not be possible without the use of e-mail. Unfortunately, often e-mail addresses are not activated or fax machines are not switched on.

International Association of Hydrological Sciences (IAHS)

Publication record:

Hydrological Sciences Journal:

The 1996 volume of Hydrological Sciences Journal comprised a total of 988 pages in six volumes. The series included the very successful Special Issue on Remote Sensing and Data Transmission, August 1996. Edited by Albert Rango and Jerry Ritchie of the International Committee on Remote Sensing and Data Transmission, the issue contains twelve papers by experts covering a range of applications of remote sensing technologies to hydrology. Special Issue, HSJ, Vol. 41, No. 4, (August 1996).

Red Books in 1996:

Application of Geographic Information Systems in Hydrology and Water Resources Management: Edited by K. Kovar & H. P. Nachtnabel. IAHS Publication No. 235 (published April 1996) in the IAHS Series of Proceedings and Reports ISBN 0-947571-84-1 ; 712+xii pp. ; price £58.00.

In April 1993 the highly successful first HydroGIS conference (IAHS Publ. No. 211) was held in Vienna. This new publication is the proceedings of the second HydroGIS conference which was held three years later in Vienna. The main goal of HydroGIS'96 was to track the progress in the methodology of GIS and in sophisticated applications in water-related areas from 1993 to 1996. The 83 papers included in this volume document the experiences and especially the progress in GIS applications in the hydrologic sciences. The papers are divided between the following topics:

GIS Functions and Hydrological Modelling;

Methodological Aspects;

Coupling GIS with Hydrologic Models;

Digital Terrain Models in GIS;

Application of GIS in Water and Environmental Management;

Application of GIS in Surface Water Systems;

Application of GIS in Groundwater Systems;

Remote Sensing and GIS;

GIS in Relation to Decision Support and Expert Systems.

The conference was a contribution to UNESCO's IHP-V programme (1996-2001): Hydrology and water resources development in a vulnerable environment.

Erosion and Sediment Yield : Global and Regional Perspectives: Edited by D.E. Walling & B.W. Webb IAHS Publication No. 236 (published July 1996) in the IAHS Series of Proceedings and Reports. ISBN 0-947571-89-2 ; 586 + xiv pp. ; price £ 55.00.

The 61 papers published in this proceedings volume were presented at the "International Symposium on Erosion and Sediment Yield: Global and Regional Perspectives", held at Exeter, UK, in July 1996. The Symposium drew together information currently available on global and regional patterns of erosion and sediment yield and their sensitivity to environmental change, to examine the trends and patterns involved and to identify key areas for future research and international collaboration.

The papers were grouped together into six main themes. The papers on Global patterns and Regional and national patterns are primarily concerned with sediment yields and provide a valuable synthesis of existing information both at the global scale and from specific areas of the world. They are complemented by a group of papers dealing more specifically with Soil erosion perspectives which emphasize the significance of soil erosion in many parts of the globe. Any attempt to explain global and regional patterns of erosion and sediment yield must clearly take account of contrasts in the erosional and sediment conveyance systems operating in different morphoclimatic zones, and a further group of papers therefore focuses on Sediment dynamics in contrasting environments. Attention is also given to the sensitivity of erosion and sediment yields to environmental change in a section devoted to Trends in sediment yield. The wider environmental and economic significance of increased sediment loads in rivers and associated management issues are emphasized by the final group of papers dealing with Sedimentation problems and sediment management.

The Symposium was a contribution to Projects 2.1 and 2.2 of UNESCO's International Hydrological Programme (IHP-V) which focus on vegetation, land use and erosion processes and on sedimentation processes in reservoirs and deltas.

Calibration and Reliability in Groundwater Modelling: Edited by Karl Kovar & Paul van der Heijde. IAHS Publication No. 237 (published September 1996) in the IAHS Series of Proceedings and Reports. ISBN 0-947571-94-9 ; 606+x pp. ; price £ 55.00.

In recent years, significant research has been conducted resulting in a variety of approaches that can be used to incorporate information about errors relating to model formulation into the modelling process and to establish the level of uncertainty in model-based decision-making. Increasingly, these new techniques are being applied to a variety of problems and sites.

As at the previous conference in the series, ModelCARE 90, (held in The Netherlands, 1990), the major objectives of the ModelCARE96 Conference (held in September 1996 at Golden, Colorado, USA) were to provide an international forum for state-of-the-art presentations on relevant methodologies and techniques, and to identify the needs for future developments. In addition, the conference was intended to illustrate the practicality of various techniques through advanced case studies on calibration and reliability assessment.

This new proceedings volume contains 59 papers spread over the six topics into which the conference was organized.

(The proceedings of ModelCARE 90 were published as IAHS Publ. No. 195 in the same series as this new proceedings volume. The price is £ 35.50 and the publication is available from IAHS press)

L'hydrologie tropicale: géoscience et outil pour le développement (Tropical Hydrology : A Geoscience and a Tool for Sustainability). Mélanges à la mémoire de Jean Rodier (Dedicated to the memory of Jean Rodier). Edited by P. Chevallier & B. Pouyaud. IAHS Publication No. 238 (published December 1996) in the IAHS Series of Proceedings and Reports. ISBN 0-947571-99-X ; 436 + xii pp. ; price £ 48.50.

Jean Rodier devoted his professional life to tropical regions and developing countries. One year after his death the 11th "Journées Hydrologiques de l'Orstom" provided an opportunity to pay him homage - an international conference dedicated to his memory was organized and held in Paris from 3 to 4 May 1995. The title of this conference was "L'hydrologie tropicale : géoscience et outil pour le développement (Tropical hydrology : a geoscience and a tool for sustainability)" reflecting perfectly the framework and the objectives of Jean Rodier's work. The 30 principal papers presented at this conference are brought together in this publication.

At a time when water is a major challenge in the relationships between societies, this book demonstrates the interest of scientific specialists concerned with the tropical world. It is concerned with the improvements of knowledge, methods and techniques, and how these can be applied in the developing countries of the tropics.

While recalling Jean Rodier's approach and teachings, this book also considers the state of the art and the prospects for the future. The titles and abstracts of all the papers are provided in both French and English and the papers are arranged in five sections:

Remembering tropical hydrology;
Rainfall and climate in tropical milieu;
Tropical hydrological regimes;
Tropical hydrological processes;
Data processing and hydrological modelling in the tropics.
Calendar of meetings organized/sponsored by IAHS in 1996:

International Conference on Ecohydrology of High Mountain Areas and Regional Workshop on Hydrology of Hindu Kush-Himalayan Region; Kathmandu, Nepal 23-28 March 96;
HYDROGIS '96 : International Conference on Application of Geographic Information Systems in Hydrology and Water Resources Management; Vienna, Austria 16-19 April 96;
International Conference on the Impact of Nuclear Power Plants and Other Radiation-hazardous Objects on the Hydrological Cycle and Water Resources; Obninsk, Russia 23-27 May 96;
Destructive Water: Natural Disasters Due to Water: their Abatement and Control; Anaheim, California, USA 24-28 June 96;
Interceltic Colloquium on Hydrology and Water Management; Rennes, Brittany 8-11 July 96;
International Symposium on Erosion and Sediment Yield: Global and Regional Perspectives; Exeter, UK 15-19 July 96;
International Conference on Reservoir Sedimentation; Fort Collins, Colorado, USA 9-13 Sept. 96;
Third Kovacs Colloquium on "Risk, reliability, uncertainty and robustness of water resources systems"; Unesco, Paris 19-21 Sept. 96;
MODEL CARE'96: International Conference on Calibration and Reliability in Groundwater Modelling; Golden, Colorado, USA 25-27 Sept. 96;
3rd Snowmelt Runoff Model (SRM) Workshop; Berne, Switzerland 7-11 Oct. 96;
International Conference on Water Resources and Environment Research: towards the 21st Century; Kyoto, Japan 29-31 Oct. 96;
International Symposium on Hydrology in the Humid Tropic Region; Kingston, Jamaica 17-22 Nov. 96.

The recipient of the 1996 International Hydrology Prize, awarded jointly with UNESCO and the WMO, was Professor Desmond Midgley of South Africa. The citation for Professor Midgley, appearing in the January 1997 issue of the IAHS Newsletter ends, appropriately with the following: "Professor Midgley has been an exemplary exponent of applying basic hydrological principles to address real-world issues in a water-scarce environment such as that of southern Africa. He has a gift for reconciling the requirements of a site-specific hydrological study with regional hydrological patterns and trends. His vision that the immense spatial variability of rainfall-runoff conditions in the catchments of the southern African subcontinent can and must be overcome, has inspired the many post-graduate students, researchers and young water engineers who has benefited from his mentorship during the past four decades."

IAHS produces a Newsletter three times a year which is widely distributed among more than 2 000 individual members and maintains a Homepage:

www.wlu.ca/~wwwiahs/index.php

International Association for the Physical Sciences of the Ocean (IAPSO)

During this time period, the IAPSO Secretary General established a Web page at www.olympus.net/IAPSO/ which will be a valuable resource to the international oceanographic community. This Web page provides information on IAPSO and its activities and also provides direct links to IUGG, ICSU, various other scientific organizations of interest to oceanographers, universities, institutes, laboratories, government agencies, data sources, and other Web pages of interest. In addition to the Web page, direct responses were provided to various inquiries received by letters, e-mail, and fax.

Activities continued to formulate the IAPSO Program for the upcoming IAMAS/IAPSO Joint Assembly to be held in July 1997 in Melbourne, Australia. The Joint Assembly has a Web page at www.dar.csiro.au/pub/events/assemblies/info.htm

The IAPSO Commission on Sea Ice has organized a symposium and a separate workshop at this Assembly, and the Commission on Natural Marine Hazards and the jointly sponsored Tsunami Commission have also organized symposia. The final program was advertised and abstracts of proposed papers were accepted.

An initial solicitation for proposals was issued for IAPSO symposia to be held at the upcoming 1999 IUGG General Assembly to be held in Birmingham, England, UK. Formulation of a proposed program is now in progress.

The IAPSO President continues to serve as IAPSO's representative to ICSU's Scientific Committee on Ocean Research (SCOR). In that capacity he attended SCOR's meeting in Southampton, England, UK.

The IAPSO Commission on Natural Marine Hazards co-sponsored and was a primary organizer of three scientific meetings. These were: Hazards '96 held in Toronto, Canada, in July 1996 as a continuation of a series of international meetings on hazards; Coastal Zone Canada '96 held in Rimouski, Quebec, in August 1996; and Natural and Technological Coastal Hazards held in Tirupati, India, in December 1996. The meeting in India was part of an initiative to hold scientific meetings in countries in need, recognizing that scientists in those countries often have difficulty in obtaining travel funds to attend meetings outside their immediate geographic area.

The IAPSO Commission on Mean Sea Level and Tides, and IAPSO's Permanent Service on Mean Sea Level, provided scientific support and co-sponsorship of a meeting, Tidal Science, at the Royal Society in London, England, UK, in October 1996. The Permanent Service on Mean Sea Level continues to provide data and provides the GLOSS Bulletin which is available on the World Wide Web.

The IAPSO Commission for Cooperation with Developing Countries completed a draft of an IAPSO publication on Oceanography in Developing Countries. Present Plans are to publish that in cooperation with a university in India. The publication incorporates papers presented at the IUGG General Assembly in 1991 and the IAPSO General Assembly in 1995.

The IAPSO Standard Sea Water Service continues to serve the international oceanographic community.

The Tsunami Commission is now jointly sponsored by IAPSO, IASPEI, and IAVCEI. The IAVCEI sponsorship was added in 1996. That Commission will report separately to IUGG.

BRIEF REPORT ON USE OF 1996 ICSU GRANT AND UNESCO SUBVENTION

Seismic and Other Geophysical Instrumentation

The CDC/IDNDR Workshop on Seismic and Other Geophysical Instrumentation was held in

Hyderabad, India, 9-20 December 1996 - The workshop was attended by an expert panel and 16 participants from developing and earthquake-prone countries. The emphasis was mainly on seismic, geodetic (GPS), magneto-telluric, gravity and magnetic instrumentation. In addition to theory lectures, arrangements were made for direct handling of the instruments in real field conditions. Manufacturers of geophysical instruments displayed and demonstrated their latest products.

The grant (US \$ 8,200) was used for bringing scientists from developing countries to the meeting, also for training and teaching, and for planning/co-ordination.

A more complete report is given as annex 1. Intermagnet Program

The grant (US \$ 7 800) was used, like the ones in previous years, to support the world-wide network of high quality geomagnetic data observatory, and specifically on that year for: data publication and documentation; planning/co-ordination and travel expenses to meetings for some members of the Intermagnet four-member Executive Council and of the ten-member Operations Committee. As part of the outcome, the Istanbul - Kandilli observatory is upgrading to meet Intermagnet standards.

A more complete report is given as annex 2. Modelling solute leaching due to fingering in non-structured soil

The grant (US \$7,900) was used to support research leading to one Doctoral dissertation and one IAHS special publication. The dissertation was completed and the publication is in press. The presentation of the results will be made in Rabat (Morocco) at IAHS Scientific Assembly.

CONCLUSION AND FUTURE PLANS

Dates and places of the G.A.s of the Associations

IAG: September 3-9, 1997, Rio de Janeiro (Brazil)

IASPEI: August 18-29, 1997, Thessaloniki (Greece)

IAVCEI: January 19-24, 1997, Puerto-Vallarta (Mexico)

IAGA: August 4-15, 1997, Uppsala (Sweden)

IAHS: April 23-May 3, 1997, Rabat (Morocco)

IAMAS, IAPSO: July 1-9, 1997, Melbourne (Australia)

Date and place of the 22nd Union General Assembly

July 19-30, 1999, Birmingham (United Kingdom)

ANNEX 1

A REPORT ON CDC/IDNDR WORKSHOP ON "SEISMIC AND OTHER GEOPHYSICAL INSTRUMENTATION"

The CDC/IDNDR workshop on "Seismic and other Geophysical Instrumentation" was successfully conducted at the National Geophysical Research Institute (NGRI), Hyderabad, India during 9-20 December, 1996 as per schedule. The workshop was attended by 16 participants from various developing and earthquake-prone countries. A list of participants is given in Annexure 1. The expert panel consisted of Dr. R.D. Adams from ISC, Newbury, Prof. A. Nikolaev from the Institute of Physics of the Earth, Moscow and scientists from NGRI (Annexure 2). The participants arrived Hyderabad mostly between 7 and 9 December.

There was a short informal inaugural function in the morning of 9 December. Dr. Adams presided over the function. Dr. H.K. Gupta welcomed the participants and gave the background of the workshop. The first lecture, immediately after the inaugural function, was delivered by Dr. Adams on "Development of International Seismology", which was followed by a series of lectures by various NGRI experts.

As the name of the workshop indicates, the emphasis was laid mainly on seismic instrumentation. Global Positioning Systems, Magneto-Tellurics, Gravity and Magnetic instrumentation were the other subjects covered in this workshop. In addition to theory lectures, arrangements were made for direct handling of the instruments by the participants in real field conditions. A detailed scientific program of the workshop is given in Annexure 3. A complete volume of the lecture notes is given in Annexure 4.

During the weekend, two excursions were arranged: one, a dawn to dusk trip to the Nagarjunasagar seismic observatory and dam, situated about 160 km from Hyderabad, and the other, a tour to various places of interest in and around the twin cities.

Manufacturers of various geophysical instruments, namely Teledyne, Micronics, Geosys, Nanometrics, IGS, Reftek and some others, were invited to display their latest products and demonstrate their working to the participants. Two full days were allotted for this purpose. The representatives of these companies also gave lectures on the working principles and special features of their products.

During the last three days (18-20 Dec.) of the Workshop participants took part in the annual convention of the Indian Geophysical Union (IGU) and the Seminar on "Geophysical Instrumentation". Four of the participants presented five papers in different sessions (please see Annexure 5).

An informal valedictory function was held in the afternoon of 19 December in which certificates (please see Annexure 6) were distributed to the participants by Prof. Nikolaev. The participants were invited to give their feedback. Most of the participants expressed complete satisfaction. However, some of them felt that hands-on exercises on computers should have been given more emphasis. The organizers appreciated their views.

The Workshop ended on 20 December along with the conclusion of the IGU convention.

ANNEX 2

Support for INTERMAGNET

INTERMAGNET stands for International Real-Time Magnetic Observatory Network. Under the INTERMAGNET program, high quality geomagnetic data from a world-wide network of observatories are sent in near-real-time via satellite and electronic connections between computers to collection and dissemination centres called Geomagnetic Information Nodes (GINs). There are currently over sixty observatories from twenty-two nations (including former East bloc countries and LDCs) participating in INTERMAGNET, with six GINs operating in North America, Europe, and Asia. The number of participants is still growing. Data are disseminated to users in a timely manner, via electronic means, via floppy diskettes, and via CD-ROMS of definitive-quality data which are published annually. In 1996, the CD-ROM for the 1994 data-year was published and that for the 1995 data-year was finalized for publication. A Technical Reference Manual has been published, with the latest version having been produced during 1996. This manual is distributed widely to participating institutes of INTERMAGNET and to prospective participants. The geomagnetic data are fundamental to much geophysical and space science research, particularly concerning our near-earth environment.

ICSU grants have in the past provided a key to the success of and the growth of INTERMAGNET. The 1996 grant has been used: for data publication and documentation; for planning/coordination and travel expenses to meetings for some members of the INTERMAGNET four-member Executive Council and of the ten-member Operations Committee. The Council and Committee, along with resource scientists, serve to: coordinate the effective worldwide operation of

INTERMAGNET; establish quality standards and data transmission procedures and schedules; organize the efficient exchange of data within INTERMAGNET and to the world-wide user community; establish policies consistent with efficient operation and with any national constraints that may exist; seek ways to aid observatories that have funding, staffing, or technical problems (particularly those in LDCs and former Eastern bloc countries). The Council and Committee most recently convened meetings in September 1996 at the Niemegk Observatory, in Germany. Young, women, LDC, and former Eastern bloc scientists play important roles in these INTERMAGNET activities. Eighty per cent of the costs of these meetings are borne by the participating nations but without the ICSU and UNESCO funding that is generously made available, some key members would not be able to contribute their expertise to the growth of INTERMAGNET, and some observatories in critical areas of the world would have been closed down.

Richard L. Coles for INTERMAGNET Executive Council
Geological Survey of Canada
1 Observatory Crescent
Ottawa, Canada K1A 0Y3
Tel: 1 613 837 4561
Fax: 1 613 824 9803
Email: coles@geolab.nrcan.gc.ca