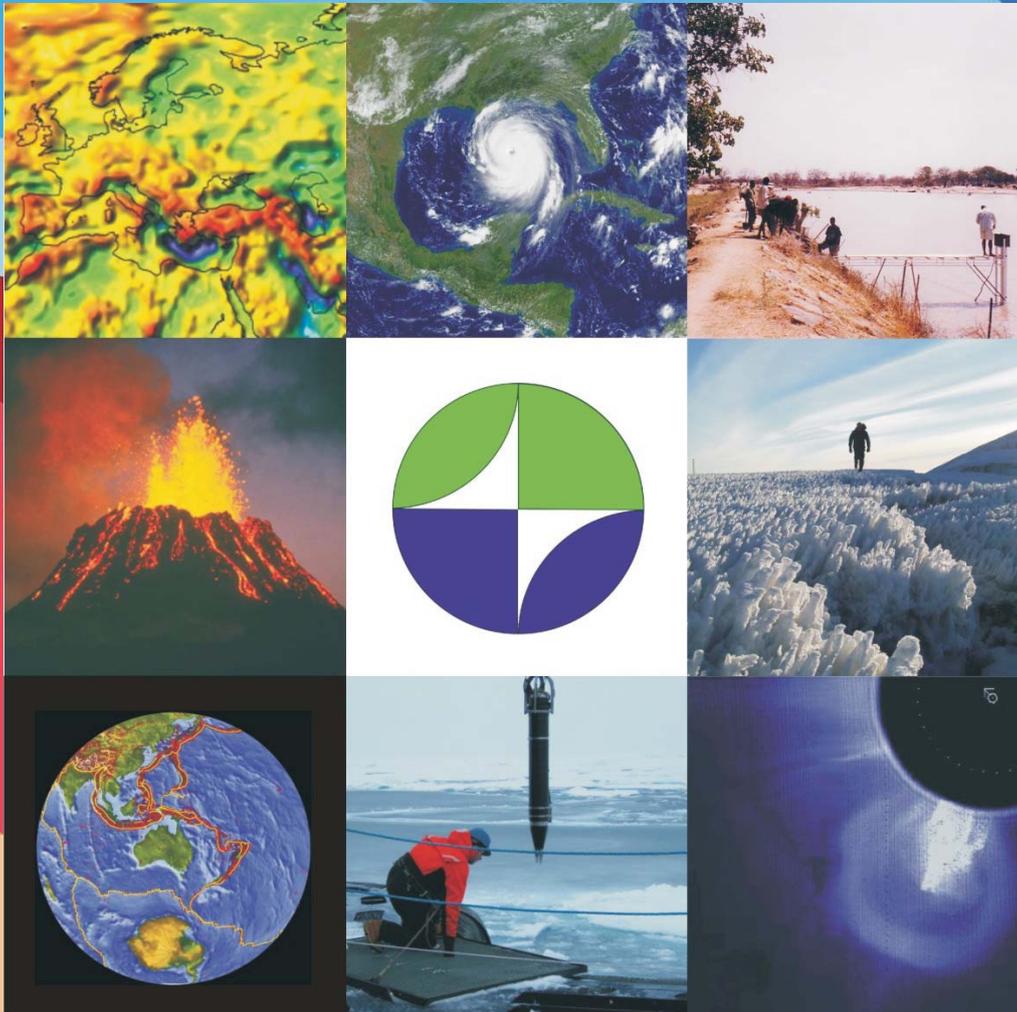




International Union of Geodesy and Geophysics (IUGG)
Union Géodésique et Géophysique Internationale (UGGI)

ANNUAL REPORT 2015





**INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE**

**IUGG Annual Report
2015**

**Published by Secretary General
Alik Ismail-Zadeh**

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IUGG Annual Report 2015

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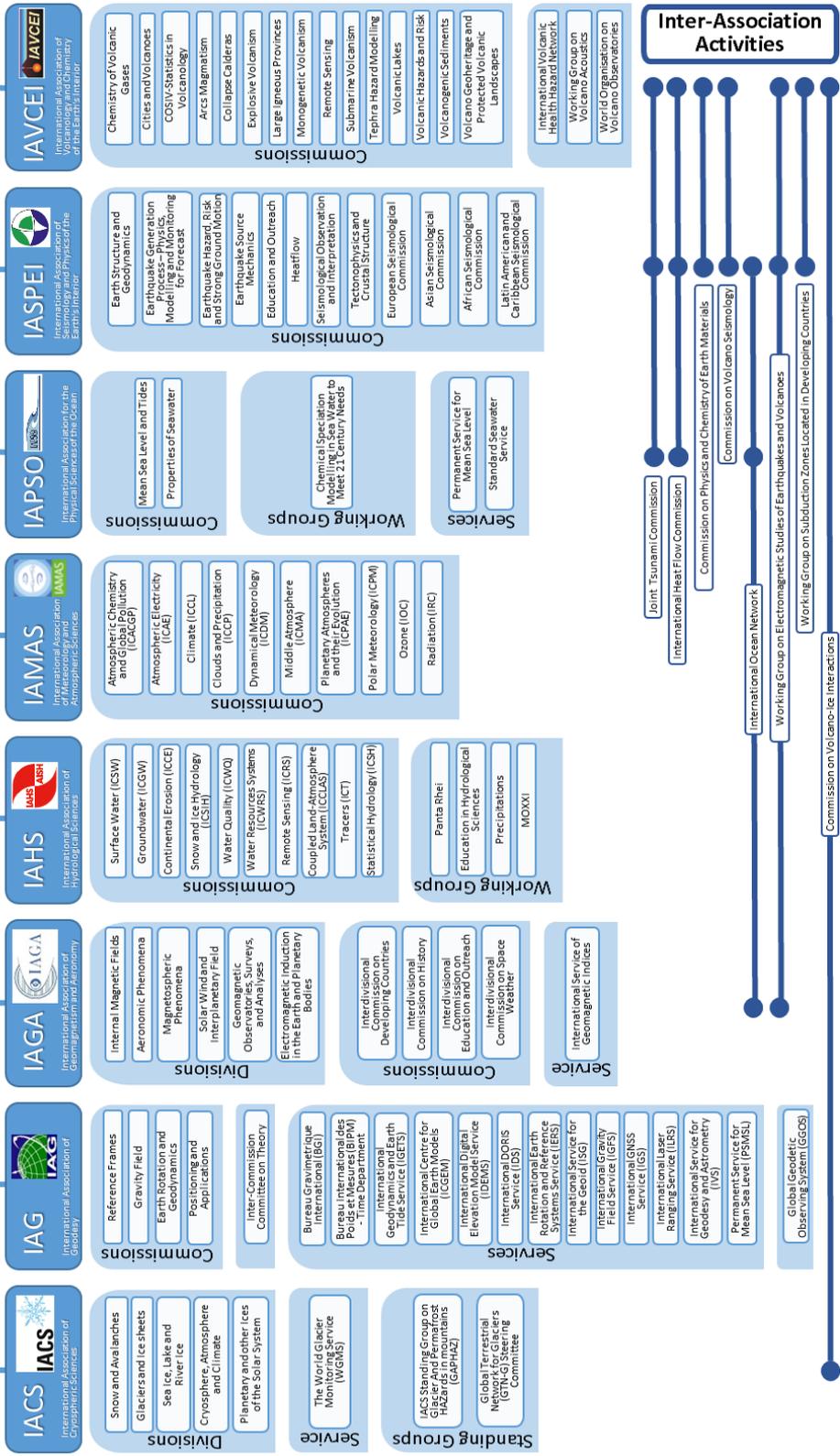
INTRODUCTION

Established in 1919, the International Union of Geodesy and Geophysics (IUGG) is the international, non-governmental, non-profit organization dedicated to advancing, promoting, and communicating knowledge of the Earth system, its space environment, and the dynamical processes causing change. Through its constituent associations, commissions, and services, IUGG convenes international assemblies and workshops, undertakes research, assembles observations, gains insights, coordinates activities, liaises with other scientific bodies, plays an advocacy role, contributes to education, and works to expand capabilities and participation worldwide. Data, information, and knowledge gained are made openly available for the benefit of society – to provide the information necessary for the discovery and responsible use of natural resources, sustainable management of the environment, reducing the impact of natural hazards, and to satisfy our need to understand the Earth's natural environment and the consequences of human activities. IUGG Associations and Union Commissions encourage scientific investigation of Earth science and especially interdisciplinary aspects. Each Association establishes working groups and commissions that can be accessed by using the links on our website (see also the IUGG chart on the following page).

IUGG is one of 32 scientific unions adhering to the International Council for Science (ICSU). ICSU provides a global forum for scientists to exchange ideas and information and to develop standard methods and procedures for all fields of research. IUGG brings expertise on Earth studies from researchers in its International and Inter-Association Commissions. As a member of ICSU, IUGG strongly supports its policy of non-discrimination by affirming the rights and freedom of scientists throughout the world to engage in international scientific activity without limitation by such factors as citizenship, religion, creed, political stance, ethnic origin, race, color, language, age or gender.

International Union of Geodesy and Geophysics (IUGG)

Associations



Union Commissions and Working Group



IUGG has initiated and/or vigorously supported collaborative efforts that have led to highly productive world-wide interdisciplinary programmes and projects, such as the International Geophysical Year (1957-58), the Upper Mantle Project (1964-70), the International Hydrological Decade (1965-74), the Geodynamics Project (1972-79), the Global Atmospheric Research Programme (1967-80), the International Lithosphere Programme, the World Climate Research Programme, the International Decade for Natural Disaster Reduction, Integrated Research on Risk Disasters, the International Heliophysical Year (2007-2009), the Electronic Geophysical Year (2007-2008), the International Year of Planet Earth (2007-2009), the International Polar Year (2007-2008), Extreme Natural Hazards and Societal Implications (2010-2014), International Year of Deltas (2013-2014), and the International Geosphere-Biosphere Programme (1987-2015). These programs have set a model for international, interdisciplinary cooperation. Representing all geophysical disciplines, IUGG is involved in the projects and programs related to climate change, global warming, and related environmental impacts.

Programmes and Projects initiated and/or supported by IUGG	
Current	Past
<ul style="list-style-type: none"> • International Lithosphere Programme (ILP, a joint IUGS-IUGG activity) • Global Geodetic Observing System (GGOS, an IAG program) • World Climate Research Programme (WCRP) • Integrated Research on Disaster Risk (IRDR) • International Year of Global Understanding (YIGU) • Mathematics of Planet Earth (MPE) • World Data System (WDS) 	<ul style="list-style-type: none"> • International Geosphere-Biosphere Programme (IGBP, 1987-2015) • International Year of Deltas (IYD, 2013-2014) • Extreme Natural Hazards and Societal Implications (ENHANS, 2010-2014) • International Year of Planet Earth (IYPE, 2007-2010) • Electronic Geophysical Year (eGY, 2007-2008) • International Polar Year (IPY, 2007-2008) • International Heliophysical Year (IHY, 2007-2008) • International Decade for Natural Disaster Reduction (IDNDR, 1990-1999) • Geodynamics Project (1972-1979) • Global Atmospheric Research Programme (1967-1980) • International Hydrological Decade (1965-1974) • Upper Mantle Project (1964-1970) • International Geophysical Year (IGY, 1957-1958)

IUGG supported and supports initiatives by ICSU, especially those in which Earth sciences have a role to play. IUGG cooperates with the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the study of hydrological (through IAHS) and oceanographic (through IAPSO) research; with the World Meteorological Organization (WMO) to promote studies in atmospheric sciences and meteorology (through IAMAS) as well as in hydrology (through IAHS). Together with the International Civil Aviation Organization (ICAO) and WMO, IUGG promotes the studies, the monitoring and the modelling of volcanic ashes (through IAMAS and IAVCEI). IUGG also cooperates with the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in the studies related to seismology (through IASPEI), hydroacoustics, atmospheric transport modelling, and meteorology. In addition, IUGG places particular emphasis on the scientific problems of economically less-developed countries by sponsoring activities relevant to their scientific needs, e.g. Geosciences in Africa, eGY in Africa, Water Resources, Health and Well-Being etc.

The website, available in English and French, can be found at www.iugg.org/.

GENERAL INFORMATION

MEMBERSHIP

By their very nature, geodetic and geophysical studies require a high degree of international co-operation. IUGG is critically dependent on the scientific and financial support of its member Adhering Bodies. The list of present and past IUGG Adhering Bodies is published in the IUGG Yearbook and posted on the website. Each Adhering Body establishes a National Committee for IUGG, and names Correspondents to each Association (as appropriate). During 2015, the Union had 70 Member Adhering Bodies. Several members were in observer status because they were in arrears of dues payment. Eleven Adhering Bodies were in Associate Member status. New member country applications are being actively encouraged.

STRUCTURE

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 by the Adhering Body of their respective countries as their representatives for each Council meeting. The Council is convened at each quadrennial General Assembly. A Bureau, an Executive Committee and a Finance Committee administer IUGG affairs between Council meetings. The Executive Committee has the particular responsibility of overseeing the scientific programs of the Union. There is a permanent IUGG Secretariat located at the German Research Centre for Geosciences (GFZ) in Potsdam, Germany.

Associations

The Union brings together eight 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. The Associations convene their own assemblies and sponsor scientific symposia, often in partnership with one another. Within its own discipline each Association is responsible for determining its own program of investigations and for supporting the activities of its own component parts. All Earth scientists, worldwide, are eligible to participate in IUGG and Association assemblies, workshops, and symposia, although only scientists from member countries with dues paid may serve as officers.

The eight International Associations are listed below, and short reports on their 2014 activities are included here. Additional information about each Association is given on their web sites, which can be accessed from the IUGG website.

- International Association of Cryospheric Sciences (IACS)
- International Association of Geodesy (IAG)
- International Association of Geomagnetism and Aeronomy (IAGA)
- International Association of Hydrological Sciences (IAHS)
- International Association of Meteorology and Atmospheric Sciences (IAMAS)
- International Association for the Physical Sciences of the Oceans (IAPSO)
- International Association of Seismology and Physics of the Earth's Interior (IASPEI)
- International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

Union Commissions

Owing to the interactive nature of the subject fields addressed by the Union's Associations, a number of Union Commissions have been established that promote the study of particular interdisciplinary problems. In 2015, the following bodies were active:

- Commission on Climatic and Environmental Changes (CCEC)
- Commission on Mathematical Geophysics (CMG)
- Commission on Geophysical Risk and Sustainability (GRC)
- Commission on the Study of the Earth's Deep Interior (SEDI)
- Commission for Data and Information (UCDI)
- Commission on Planetary Sciences (UCPS)
- Working Group on History (WGH)

Inter-Unions Commission

The International Lithosphere Program, guided by the Scientific Committee on the Lithosphere (SCL), was established in 1980 as the Inter-Unions Commission on the Lithosphere (ICL) by the International Council for Science (ICSU), at the request of IUGG and the International Union of Geological Sciences (IUGS). The name was formally changed to the Scientific Committee on the Lithosphere in 1999. According to Decision 8.4 from the 2005 ICSU General Assembly, ICSU decided "to withdraw ICSU sponsorship from SCL/ILP and to recommend that responsibility would then shift to IUGG and IUGS". Since that time, IUGG and IUGS have reaffirmed the ILP mission and have collaborated to re-define ILP as an Inter-Unions body.

GENERAL ASSEMBLIES OF THE UNION

General Assemblies have been held since 1922 and, since 1963, at 4-year intervals. These assemblies provide an extraordinary opportunity for Earth scientists from around the world to gather and share expertise, research data, and results. Past IUGG General Assemblies are listed in the IUGG Yearbook and on the website. The most recent General Assembly was held in Prague, Czech Republic, 22 June-2 July 2015. The next IUGG General Assembly will take place in Montreal, Canada, 8-19 July 2019.

OTHER SCIENTIFIC MEETINGS

Each Association organizes its own scientific assembly in the 4-year interval between Union General Assemblies in order to report scientific progress and conduct Association business. Associations sometimes meet jointly with the purpose of promoting interdisciplinary science. Topical and regional symposia and workshops are organized on other occasions by the Associations to provide opportunity for geodesists and geophysicists worldwide to discuss their respective methodologies, results and hypotheses and to plan collaborative research projects. The symposia, often held in less-visited, geophysically interesting locales, are intended to be attractive to the younger scientists from the developing countries of the world.

PUBLICATIONS

The IUGG publishes an annual Yearbook that lists the organizational structure and officers of each body within the Union. The Yearbook is posted on the IUGG website: www.iugg.org/publications/yearbooks/. The Union also distributes an electronic newsletter (the IUGG E-Journal) monthly to Adhering Bodies and National Committees. Each Association manages its own publications.

IUGG OFFICERS FOR 2015-2019

IUGG Bureau

President:	Michael Sideris	CANADA
Vice-President:	Kathryn Whaler	UK
Secretary General:	Alik Ismail-Zadeh	GERMANY/RUSSIA
Treasurer:	Aksel Hansen	DENMARK
Members:	Isabelle Ansonge	SOUTH AFRICA
	Pierre Hubert	FRANCE
	Chris Rizos	AUSTRALIA

IUGG Executive Committee

IUGG Bureau members

Immediate Past President:	Harsh Gupta	INDIA
IACS President:	Charles Fierz	SWITZERLAND
IAG President:	Harald Schuh	GERMANY
IAGA President:	Eduard Petrovsky	CZECH REPUBLIC
IAHS President:	Hubert Savenije	THE NETHERLANDS
IAMAS President:	John Turner	UK
IAPSO President:	Denise Smythe-Wright	UK
IASPEI President:	Thorne Lay	USA
IAVCEI President:	Donald Dingwell	GERMANY

IUGG Finance Committee

Chair:	David Collins	UK
Members:	Jan Krynski	POLAND
	Corina Risso	ARGENTINA
	Virendra Tiwari	INDIA

Association Presidents and Secretaries General

International Association of Cryospheric Sciences

President:	Charles Fierz	SWITZERLAND
Secretary General:	Andrew Mackintosh	NEW ZEALAND

International Association of Geodesy

President:	Harald Schuh	GERMANY
Secretary General:	Hermann Drewes	GERMANY

International Association of Geomagnetism and Aeronomy

President:	Eduard Petrovsky	CZECH REPUBLIC
Secretary General:	Mioara Mandea	FRANCE

International Association of Hydrological Sciences

President:	Hubert Savenije	THE NETHERLANDS
Secretary General:	Christophe Cudennec	FRANCE

International Association of Meteorology and Atmospheric Sciences

President:	John Turner	UK
Secretary General:	Teruyuki Nakajima	JAPAN

International Association for the Physical Sciences of the Oceans

President: Denise Smythe-Wright UK
Secretary General: Stefania Sparnocchia ITALY

International Association of Seismology and Physics of the Earth's Interior

President: Thorne Lay USA
Secretary General: Johannes Schweitzer NORWAY

International Association of Volcanology and Chemistry of the Earth's Interior

President: Donald Dingwell GERMANY
Secretary General: Roberto Sulpizio ITALY

Union Commission and Working Group Officers

Union Commission on Climatic and Environmental Changes (CCEC)

Chair: Tom Beer AUSTRALIA
Secretary: Keith Alverson USA

Union Commission on Mathematical Geophysics (CMG)

Chair: Yehuda Ben-Zion USA
Secretary: Ilya Zaliapin USA

Union Commission on Geophysical Risk and Sustainability (GRC)

Chair: Joan Marti SPAIN
Secretary: Paula Dunbar USA

Union Commission on Studies of Earth's Deep Interior (SEDI)

Chair: Jonathan Aurnou USA
Secretary: Michael Bergman USA

Union Commission for Data and Information (UCDI)

Chair: Peter Fox USA
Secretary: Adelina Geyer Traver SPAIN

Union Commission on Planetary Sciences (UCPS)

Chair: Shuanggen Jin CHINA
Secretary: Scot Rafkin USA

Working Group on History (WGH)

Chair: Hans Volkert GERMANY
Vice-Chair: Claude Boucher FRANCE

Inter-Unions Commission: International Lithosphere Program (ILP)

President: Sierd Cloetingh THE NETHERLANDS
Secretary: Magdalena Scheck-Wenderoth GERMANY

IUGG BUSINESS MEETINGS

The IUGG Bureau and Executive Committee meetings were held during the XXVI IUGG General Assembly in Prague, Czech Republic. The IUGG Bureau and Executive Committee for the term 2011-2015 met on 21 June, 24 June, and 28 June 2015. Meetings of the Bureau and the Executive Committee for the term 2015-2019 took place on 2 July 2015. The next IUGG Bureau and Executive Committee meeting will take place in Paris, France, from 16-18 June 2016.

MESSAGE FROM THE PRESIDENT



2015 was a very important year for IUGG. Not only because it was the year of the very successful 26th General Assembly (GA), held in Prague from June 22 to July 2, but also because of the decisions made by the Council that will improve the efficiency, inclusiveness and decision making procedures of the Union. Discussions on such issues had, of course, started much earlier and, in order to reach concrete proposals for the Council to consider at the GA, an extraordinary meeting of the IUGG Executive Committee was held in Vienna on April 18, 2015. The IUGG Statutes & Bylaws (S&BL) Committee proposed several S&BL changes, the EC debated the merits and drawbacks of individual membership, and in addition a draft Strategic Plan for 2016-2023 was presented.

At the GA in Prague, the Council approved all proposed changes to the S&BL. I am highlighting three of them here: (i) the term of Council Delegates is the full four-year period between two consecutive GAs; (ii) the Council can vote electronically, if needed, at any time during its four-year term; and (iii) individual scientists, even from non-member countries, are eligible for election. (i) and (ii) will make the decision making process much more agile, and will allow the Union to respond quickly to new challenges as soon as they arise. (iii) will make the Union much more attractive and inclusive, as scientists from any country are now eligible to hold various positions within IUGG and its Associations, with the exception of Bureau member, Finance Committee member, and Association President, which can only be held by scientists from Member Countries. Also, seven resolutions were passed, primarily in support of new infrastructure and research in Earth observation, ranging from new satellite systems to global and regional environmental risk monitoring.

The science aspects of the 26th GA in Prague were equally important and even more rewarding. The GA was attended by over 4300 participants from 90 countries, who made over 5300 oral and poster presentations. There were 11 Union Symposia, and 9 Union lectures were given by invited world-leading experts in the fields of geodesy and geophysics. The past President, Prof. Harsh Gupta, presented the Union awards to the Gold Medalist, 6 elected Fellows, and 10 Early Career Scientists at the Opening Ceremony on June 23, and to the conferred Fellows at the Closing Ceremony on July 1. For me, being still the Vice-President at the time of the GA, it was a great pleasure to organize and convene Union Symposium 11: Early Career Scientists. There was a wide array of topics in Earth and space sciences, expertly presented by the Early Career Scientist Awardees of the Union. After attending that symposium I am even more optimistic that our sciences and our Union are in very good hands and have a bright future indeed! Overall, it is no exaggeration to say that the 26th GA was a great success. The Czech Academy of Sciences and its Institute of Geophysics, the Local Organizing Committee and C-IN professional conference organizers are sincerely thanked for their expert organization of the assembly.

In 2015, IUGG established a new Commission on Planetary Sciences, and continued to sponsor scientific meetings and programmes of the International Council for Science (ICSU) and other major scientific organizations. In addition, IUGG scientists and present and past officers contributed to Earth and space science education and to science policy issues related to disaster risk reduction and climate change. As an example, the Conference on Future Earth & Space Science and Education took place at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, 2-6 November, 2015. The conference was attended by participants from 29 countries, and Harsh Gupta, myself, Kathy Whaler and Alik Ismail-Zadeh, who also co-organized the conference, gave invited lectures. The participants also issued a declaration on strengthening of basic scientific research and science education, especially in the developing world. During the same conference, there was a meeting of the Steering Committee of ICSU's GeoUnions, and IUGG and ICTP renewed officially their agreement for continuous collaboration.

In closing, I would like to thank all colleagues in the new Bureau and Executive Committee of the IUGG for their support and collaboration in 2015, and the Secretary General and the Secretariat of IUGG for their unwavering commitment to the Union.

Michael G. Sideris

MESSAGE FROM THE SECRETARY GENERAL



The International Union of Geodesy and Geophysics (IUGG) is dedicated to initiating, promoting and coordinating international scientific studies of the Earth and its environment in space. The year 2015 was remarkable in the IUGG history and in the history of science-policy-society.

The 26th IUGG General Assembly was held in Prague, Czech Republic from 22 June to 2 July, bringing together more than 4200 Earth and space scientists from 88 countries. Delegates from 43 IUGG Adhering Bodies attended the Union Council Meeting. They approved Regular, Associate, and Affiliate membership; proposed changes to the Statutes and By-Laws, particularly, introducing a permanent Council of the Union and allowing scientists from any country to hold various positions within the IUGG family (except the positions in the Union Executive and the Finance Committees, which can only be held by scientists from IUGG Member Countries). The

Delegates approved a draft Strategic Plan for 2016-2023. It will be developed further together with an implementation plan. They elected IUGG and Association officers, and approved a list of official IUGG liaisons to various intergovernmental and international bodies. They adopted the quadrennial budget, and selected Montréal, Canada, as the venue for the 27th IUGG General Assembly in 2019.

The Union was involved in various other activities during the last year and showed its strength in international cooperation and science promotion. A few major activities and events in the life of the Union for this year are highlighted below

- IUGG was involved in the programs of the International Council for Science (ICSU) related to disaster risks, environment, health and well-being, and scientific data. Particularly, IUGG contributed to the ICSU's synthesis paper on disaster risk reduction (www.icsu.org/science-for-policy/disaster-risk/documents/DRRsynthesisPaper_2015.pdf).
- IUGG continued to strengthen cooperation with the Scientific Unions and interdisciplinary bodies of the ICSU as well as some other international and intergovernmental organizations and professional geosciences societies.
- IUGG and the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, signed an agreement to continue their cooperation in geophysical and geodetic education and science collaboration for 2016-2019.
- IUGG co-sponsored seven geoscience education events in 2015.
- IUGG organized together with ICTP a conference "Future Earth and Space Science and Education" (2-6 November, Trieste, Italy), where representatives of ICSU GeoUnions and interdisciplinary bodies presented their views on future science and science education. Leaders of GeoUnions met on 6-7 November to discuss joint activities.
- Sir Brian J. Hoskins (UK) received the IUGG Gold Medal. 74 distinguished members of the Union were elected/confirmed as IUGG Fellows, and ten researchers received the IUGG Early Career Scientist Award.
- A Union Commission on Planetary Sciences was launched, and the IUGG Outreach Committee was established.
- The IUGG Bureau and Executive Committee met in Vienna in April and in Prague in June and July to discuss Union activities.

I thank the Adhering Bodies and National Committees, Union Associations and Commissions as well as all individuals who helped making the year 2015 exciting and productive in strengthening international cooperation in Earth and space sciences for the benefit of humanity.

Alik Ismail-Zadeh

IUGG ACTIVITIES

IUGG SECRETARIAT

Since 2013 the IUGG Secretariat is located at the German Research Centre for Geosciences in Potsdam (GFZ, www.gfz-potsdam.de/en/centre/international/iugg-secretariat/). The Secretariat is managed by the IUGG Secretary General Dr. A. Ismail-Zadeh and the Assistant Secretary General / Executive Secretary Dr. F. Kuglitsch, with a support from Mrs. K. Gundrum. IUGG thanks the GFZ for the arrangement and financial support of the Secretariat. The German Research Foundation (DFG) supports the position of the Assistant to Secretary General and business trips of the Secretary General. IUGG is very thankful for this generous support from DFG.

IUGG Yearbook

The Secretariat maintains the data related to the IUGG and its Association and produce annually a Yearbook which is available at the IUGG website electronically in PDF format (www.iugg.org/publications/yearbooks). The IUGG website maintains the directory of Union and Association officials and the archive of IUGG memberships and General Assemblies.

IUGG Annual Report

The IUGG Annual Report summarizes the activities of the Union, IUGG Associations and Union and Inter-Unions Commissions. The Annual Report 2014 has been posted on the website: www.iugg.org/publications/reports/report2014.pdf. The Annual Report was printed together with the 2015 IUGG Yearbook and mailed to the Adhering Organizations, National Committees, international partners, and major libraries in May 2015.

IUGG Website

The IUGG web site www.iugg.org, in English and French, was maintained by Dr. D. Krupsky, IUGG webmaster, and permanently updated in 2015.

IUGG on Facebook

To learn more about IUGG and to keep individuals updated on Union's activities, the IUGG Secretariat maintains a Facebook page. Everyone is welcome to join IUGG on www.facebook.com/InternationalUnionGeodesyGeophysics. More than 2,700 people are following IUGG on Facebook.

IUGG Electronic Journal

The E-Journal, an informal newsletter, was published and distributed monthly keeping IUGG Member National Committees informed about the activities of IUGG, its Associations and Commissions, and the actions of the IUGG Secretariat. Also the journal publishes feature articles, news from the International Council for Science (ICSU) and the GeoUnions, news and reports related to IUGG scientific programs and co-sponsored scientific meetings, and a calendar of scientific meetings (www.iugg.org/publications/ejournals/).

IUGG Central Electronic Library (CEL)

A web-based IUGG Central Electronic Library (CEL) for stimulating the exchange of scientific knowledge through (i) archiving, (ii) presenting, and (iii) publishing IUGG-related documents at one single platform is under construction. IUGG-related documents include reports, yearbooks, e-journals, newsletters, conference abstracts, oral/poster presentations etc. originating from the IUGG and its

Union Associations, Union Commissions, Committees, Liaisons, Research Programs, and Science Education Events. An IUGG CEL should increase the visibility of IUGG activities and will offer a new platform to present and publish scientific output.

IUGG Web-Conferencing Software

The Secretariat adopted a web-conferencing software for the IUGG, which supports real-time communication among IUGG Bureau and Executive Committee Members across geographically dispersed locations through: text-based instant messages, voice and video chat, online presentations, web conferences, and desktop sharing enables participants to increase communication, reduce travel expenses and conserve time, increase productivity, and accelerate the decision-making process.

THE 26TH GENERAL ASSEMBLY

The 26th General Assembly of the International Union of Geodesy and Geophysics held from 22 June to 2 July 2015 in the beautiful city of Prague (Czech Republic) was a big success. The IUGG Executive Committee thanks the Czech Academy of Sciences and its Institute of Geophysics for hosting the event as well as the Prague Local Organizing Committee and C-IN professional conference organizers for excellent management and hospitality provided to more than 4300 participants of the assembly. The IUGG General Assembly consisted of three important parts: (i) an open Scientific Assembly, (ii) a meeting of the duly accredited Delegates of the IUGG Member Countries and guests invited in accordance with the By-Laws (referred to as the Council Meeting); and (iii) business meetings of the IUGG, Union Associations, and their scientific groupings.

Scientific Assembly

The Scientific Program of the General Assembly consisted of 202 symposia and workshops and 639 sessions in total. Among more than 5300 presentations at the General Assembly were 9 Union lectures, 476 invited presentations, 2682 oral presentations, and 2211 poster presentations. The nine Union lectures were delivered on 24 June, 26 June and 29 June:

- *“Transformation of Human Society for Sustainable Future”* by *Yuan T. Lee (China-Taipei)*,
- *“The Whole System Approach to Extreme Space Weather”* by *Janet U. Kozyra (USA)*,
- *“Challenges of Educating Hydrologists for the Global South; the Case of southern Africa”* by *Dominic Mazvimavi (South Africa)*,



Yuan T. Lee



Janet U. Kozyra



Dominic Mazvimavi

- “Sea Level Change in the Anthropocene” by Jonathan Gregory (UK),
- “Earthquake Dynamics and Seismic Radiation” by Raul Madariaga (France),
- “Volcanic Ash and Aviation Safety” by Thomas J. Casadevall (USA),



Jonathan Gregory



Raul Madariaga



Thomas J. Casadevall

- “Contributions of Geodesy to Monitoring Natural Hazards and Global Change” by Harald Schuh (Germany),
- “Atmospheric Chemistry in the Anthropocene” by Laura Gallardo (Chile), and
- “The Global Ocean Carbon Sink: Recent Trends and Variability” by Nicolas Gruber (Switzerland).



Harald Schuh

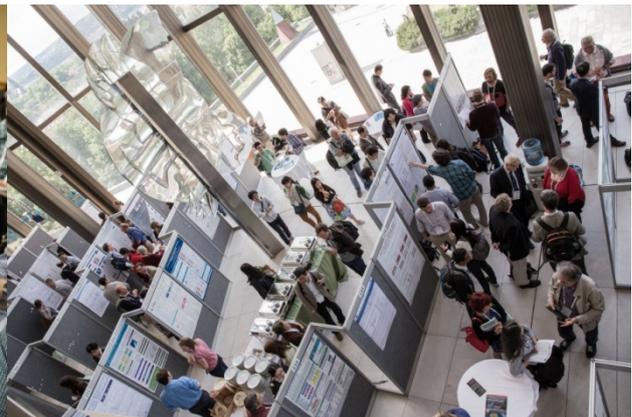


Laura Gallardo



Nicolas Gruber

The following photos capture some moments of the General Assembly.



At oral and poster sessions



Delicious Czech meal and famous beer!



Between sessions (all photos: courtesy of IUGG & C-IN)

Council Meeting

The Council Meeting was held in Prague, Czech Republic, from 22 to 29 June 2015. At three sessions of the meeting, the Council delegates representing 49 Member countries discussed important topics and approved the following decisions:

- All matters of membership were ratified: admission of the Kingdom of Saudi Arabia and Nicaragua as Regular National Members; admission of six international organizations as Affiliate Members; transfer of Albania, Armenia and Bosnia & Herzegovina to Associate Members; transfer of Costa Rica from Associate to Regular membership.
- All proposed changes to the Statutes and By-Laws were approved. Among them, (i) permanent delegates to IUGG Council, and (ii) individual scientists and their eligibility for election. The Adhering Bodies of Member Counties shall appoint Delegates to Council for the period between General Assemblies, so that the Council can vote electronically to make decisions as soon as the need arises. This will make IUGG more vibrant in terms of decision making. Scientists from any country are now eligible to hold various positions within IUGG family with the following exceptions: positions in the Bureau and the Finance Committee, and the positions of Presidents of the Associations, which can only be held by scientists from Member Countries.
- The Union Strategic Plan for 2016-2023 was endorsed. It will be developed further together with an implementation plan to be approved by the Council in the nearest future.
- New IUGG and Association Officers were elected (see item 2).
- Official IUGG Liaisons to various intergovernmental and international scientific bodies were appointed (see item 5).
- The budget for 2016-2019 was approved.
- Montréal, Canada, was selected as the venue for the 27th IUGG General Assembly in 2019.
- Eight resolutions have been passed.



At the third session of the 2015 Council Meeting: Adoption of resolutions



After the Council meeting on 29 June 2015, Prague, Czech Republic

The Council elected Bureau and Finance Committee Members for 2015-2019

IUGG Bureau

President: Michael Sideris (Canada)
Vice President: Kathryn Whaler (UK)
Secretary General: Alik Ismail-Zadeh (Germany/Russia)
Treasurer: Aksel W. Hansen (Denmark)
Members: Isabelle J. Ansorge (South Africa)
Pierre Hubert (France)
Chris Rizos (Australia)

IUGG Finance Committee

David Collins (U.K.), Jan Krynski (Poland), Corinna Risso (Argentina), and Virendra Tiwari (India).
The Committee selected David Collins as their Chair.

Association Presidents and Secretaries General for 2015-2019

International Association of Cryospheric Sciences

President: Charles Fierz (Switzerland)
President-Elect: Regine Hock (USA)
Secretary General: Andrew Mackintosh (New Zealand)

International Association of Geodesy

President: Harald Schuh (Germany)
Secretary General: Hermann Drewes (Germany)

International Association of Geomagnetism and Aeronomy

President: Eduard Petrovsky (Czech Republic)
Secretary General: Mioara Manda (France)

International Association of Hydrological Sciences

President: Hubert Savenije (The Netherlands)
President-Elect: Günter Blöschl (Austria)
Secretary General: Christophe Cudennec (France)

International Association of Meteorology and Atmospheric Sciences

President: John Turner (UK)
Secretary General: Teruyuki Nakajima (Japan)

International Association for the Physical Sciences of the Oceans

President: Denise Smythe-Wright (UK)
Secretary General: Stefania Sparnocchia (Italy)

International Association of Seismology and Physics of the Earth's Interior

President: Thorne Lay (USA)
Secretary General: Johannes Schweitzer (Norway)

International Association of Volcanology and Chemistry of the Earth's Interior

President: Donald B. Dingwell (Germany)
Secretary General: Roberto Sulpizio (Italy)

Officers of Union Commissions and the Working Group on History for 2015-2019

Union Commission on Climatic and Environmental Changes (CCEC)

Chair: Tom Beer (Australia)
Secretary: Keith Alverson (USA/Kenya)

Union Commission on Mathematical Geophysics (CMG)

Chair: Yehuda Ben Zion (USA)
Secretary: Ilya Zaliapin (USA)

Union Commission on Geophysical Risk and Sustainability (GRC)

Chair: Joan Marti (Spain)
Secretary: Paula Dunbar (USA)

Union Commission on Studies of Earth's Deep Interior (SEDI)

Chair: Jonathan Aurnou (USA)
Secretary: Michael Bergman (USA)

Union Commission on Data and Information (UCDI)
Chair: Peter Fox (USA)
Secretary: Adelina Geyer Traver (Spain)

Union Commission on Planetary Sciences (UCPS)
Chair: Shuanggen Jin (China)
Secretary: Scot Rafkin (USA)

Union Working Group on History (WGH)
Chair: Hans Volkert (Germany)
Vice Chair: Claude Boucher (France)

Union Budget for 2016-2019

The activities of IUGG are based on payment of membership dues plus other direct and indirect contributions. IUGG has 70 members, 60 of them are Regular members and paying dues. The annual amount of dues is about US\$ 500K (the budget is in US\$; K means thousands). Expected balance on 1 January 2016 is ~500K. Income in the period of 2016-2019 is estimated to be 2,178K, therefore, ~2,678K in total. Planned expenditures is 2,201K, and hence an expected balance on 31 December 2019 would be ~477K. A half of IUGG funds goes to Union Associations (1,059K), the remaining part to Union commissions (164K), IUGG Grants Programme and support of scientific meetings (140K), International programs and relations (160K), Outreach and Education Program (80K), administration (492K), and travel grants (100K).

Location of the 2019 IUGG General Assembly

The IUGG Council selected *Montréal (Canada)* as the site of the 2019 IUGG General Assembly. The exact dates of the 27th IUGG General Assembly will be announced soon.



Liaison Officers (2015-2019) to the international and intergovernmental organizations

The Council approved the following Liaison officers (Principal Liaisons are marked **bold**)

Organization	Liaison (country)
ICSU Committee on Data for Science and Technology (CODATA)	Alexei D. GVISHIANI (Russia) Bernd RICHTER (Germany)
ICSU Committee on Space Research (COSPAR)	Andrew W. YAU (Canada) Geoffrey BLEWITT (USA)
ICSU Regional Office for Africa (ROA)	Isabelle ANSORGE (South Africa)
ICSU Regional Office for Asia and the Pacific (ROAP)	Sukanta ROY (India)
ICSU Regional Office for Latin America and the Caribbean (ROLAC)	Jaime U. FUCUGAUCHI (Mexico)
ICSU Scientific Committee on Antarctic Research (SCAR)	Ian ALLISON (Australia) John TURNER (UK)
ICSU Scientific Committee on Oceanic Research (SCOR)	Denise SMYTHE-WRIGHT (UK) John TURNER (UK)
ICSU Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)	Vladimir KUZNETSOV (Russia)
ICSU World Data System (WDS)	Aude CHAMBODUT (France) Ruth E. NEILAN (USA)
The United Nations Geospatial Information Section (formerly Cartographic Section)	Hermann DREWES (Germany)
UNESCO International Hydrological Program (UNESCO-IHP)	Christophe CUDENNEC (France) Georg KASER (Austria)
UNESCO Intergovernmental Oceanographic Commission (UNESCO-IOC)	Stefania SPARNOCCHIA (Italy) Eugene MOROZOV (Russia)
International Civil Aviation Organization (ICAO)	John EICHELBERGER (USA) Arnau FOLCH (SPAIN)
ICSU-ISSC-UNISDR Scientific Committee on Integrated Research on Disaster Risk (IRDR)	Harsh GUPTA (India)
WMO-ICSU-IOC World Climate Research Programme (WCRP)	Tom BEER (Australia) Richard ESSERY (UK)
Consultative Committee for Time and Frequency (CCTF)	Richard BIANCALE (France) Claude BOUCHER (France)
Pan American Institute of Geography and History (PAIGH)	Laura SANCHEZ (Germany)
World Meteorological Organization (WMO), incl. the Global Framework for Climate Services (GFCS)	Arthur ASKEW (Switzerland) Xiao CUNDE (China) Alan THOMSON (UK) Christophe CUDENNEC (France) Joyce E. PENNER (USA) Arnau FOLCH (SPAIN)

Group on Earth Observations (GEO)	Alik ISMAIL-ZADEH (Germany) Claude BOUCHER (France) Mioara MANDEA (France) Peter FOX (USA) Hansjörg KUTTERER (Germany) Göran EKSTRÖM (USA)
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Resolutions

The Council approved 8 Resolutions as listed below. The text of the Resolutions will be posted on the IUGG website as soon as possible.

- Role of Ocean in Climate
- Future Satellite Gravity and Magnetic Mission Constellations
- Global Geodetic Reference Frame
- Real-time GNSS Augmentation of the Tsunami Early Warning System
- Geo-energy Resources
- Geoscience co-operation
- International Scientific Activities and Cooperation
- A Resolution of Thanks

IUGG General Assembly highlighted in EOS

Several articles have been published after the IUGG General Assembly by Randy Showstack, Senior Editor of EOS, Earth & Space Science News of the American Geophysical Union, who attended the assembly in Prague. The articles are as follows:

New Commission Aims to Protect Volcanic Geoheritage. Volcanic landscapes and regions provide valuable opportunities for scientific research, education, and sustainable geotourism, in addition to iconic scenery. The full article can be found at: <https://eos.org/articles/new-commission-aims-to-protect-volcanic-geoheritage>.

Global Research Push Urged on Environmental Disruption, Extremes. Seven resolutions by the International Union of Geodesy and Geophysics call for increased scientific contributions in areas ranging from environmental threats to energy resources to satellite systems. The full article can be found at: <https://eos.org/articles/global-research-push-urged-on-environmental-disruption-extremes>.

Weak Shaking Lessened Nepal Earthquake Impact. Modest ground motion for such a big quake and some prior training in earthquake preparedness averted worse death and destruction, earthquake scientists say. The full article can be found at: <https://eos.org/articles/weak-shaking-lessened-nepal-earthquake-impact>.

Geoscientists: Focus More on Societal Concerns. The unprecedented toll from a powerful tsunami shocked a theoretical geophysicist, now an international geoscience organization leader, into action and advocacy to use science to aid society. The full article can be found at: <https://eos.org/articles/geoscientists-focus-more-on-societal-concerns>.

IUGG CONFERENCE “FUTURE EARTH & SPACE SCIENCE AND EDUCATION”

The Conference on Future Earth & Space Science and Education (Future ESSE) took place at the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy from 2 to 6 November 2015. The Future ESSE conference addressed the future of geosciences, science education, and determination of strategic priority areas where the creation of new knowledge would make a significant impact on society. The brainstorming conference discussed advances in geophysics, geodesy, geology, geography, and other fields of Earth and space sciences, and was dedicated to the challenging problems of disaster risks, climate variability, Earth and planetary issues, and sustainable development. Also, it considered the interactions between the geosciences community and international organizations and programs, and analyzed geoscience education, in general, and that in developing countries, particularly.

Representatives of several major international geosciences organizations and research programs lectured at the conference. They addressed major questions of the Conference:

- What are the challenging problems in your scientific discipline?
- Do we need a science team to solve challenging problems?
- Should an Earth and space scientist develop a partnership with a social scientist and/or engineer from others university departments?
- What opportunities and resources would help the Earth and space science community develop ideas and foster collaborations?
- What are the major challenges that faculty and students have when learning in your discipline?
- Should we transform the mentality that “scientific research is where you apply your intellect, and science teaching is a rote skill”?
- How to build capacity and to promote geoscience education in developing countries?



Future ESSE Conference group photo

The conference participants came from 29 countries (Algeria, Belgium, Cameroon, Canada, China, Czech Republic, Egypt, Ethiopia, Gambia, Germany, France, India, Indonesia, Iran, Italy, Morocco, The Netherlands, Nigeria, Pakistan, Russia, South Africa, Spain, Switzerland, Togo, Tunisia, Turkey, UK, USA, and Vietnam) and issued a declaration that is presented below.

Declaration on Future Earth & Space Science and Education

The following declaration aims to highlight the importance of Earth and space science education in future scientific progress and to reinforce the link between the scientific community, national governments and the public to contribute to sustainable development of society through scientific

awareness and actions related to challenging problems of society. The declaration was adopted on 6 December 2015 by the participants of the International Conference “Future Earth and Space Science and Education” co-sponsored by the Abdus Salam International Centre for Theoretical Physics (ICTP) and the International Union of Geodesy and Geophysics (IUGG) and held in ICTP, Trieste, Italy on 2-6 November 2015.

The responsibility of Earth and space scientists is to help humanity. Seismologists and volcanologists attempt to save lives by evacuating before eruptions or by mitigating the effects of earthquakes. Geodesists quantify the shape of the Earth so that cities can be built and airplanes flown. Geologists help to restore the complicated history of our planet, and space physicists provide a window into the nearly unknown world, in which our satellites are sent and spacecraft launched. Hydrologists, oceanographers and atmospheric scientists may have the heaviest burden of all as they help guide the planet through climate change and natural hazards. In order to push knowledge forward, intellectual and financial resources should be invested in basic science and science education at a level commensurate with the applied fields. At the same time the need for a scientifically literate populace is increasingly recognized as critical in many countries, as they face the consequences of increasing population pressures, limited resources and environmental degradation (c.f., ICSU ad-hoc panel report on science education). Basic science literacy, coupled with scientific “ways of knowing” – namely drawing conclusions based on observation, experiment and analysis – provides citizens with the tools needed for rational debate and sound decision-making based on scientific knowledge. There is a consensus that in many places around the world, science education is facing serious challenges. Those seeking to improve science education face numerous, and sometimes coupled, problems. In many places, the lack of resources – both educational and financial – is linked with a dearth of adequately trained teachers and the growing popularity of non-scientific-based belief systems. It is clear that developing countries face greater challenges in science education than economically developed countries due to lack of teaching materials including books, computing and communications technologies, community-based science centers, laboratory facilities and equipment, as well as a shortage of skilled teachers. Given this global scenario, and the needs of society, there is an urgent need to improve the preparation of the scientists of tomorrow, not only through widespread access to quality instruction, facilities and research opportunities for all students, but also to improve the motivation and interest of students so that the best of them move toward scientific careers.

The participants of the ICTP-IUGG Conference “Future Earth and Space Science and Education” representing several international organizations (*in alphabetic order*)

- The Abdus Salam International Centre for Theoretical Physics, Earth System Physics Section (ICTP/ESP)
- International Astronomical Union (IAU);
- International Association for Geoethics (IAGETH);
- International Cartographic Association (ICA);
- International Council for Science, Regional Office for Africa (ICSU-ROA);
- International Geographical Union (IGU);
- International Union for Quaternary Science (INQUA);
- International Society for Photogrammetry and Remote Sensing (ISPRS);
- International Union of Geodesy and Geophysics (IUGG);
- International Union of Geological Sciences (IUGS);
- International Union of Radio Sciences (URSI)
- Integrated Research on Disaster Risks Programme (IRDR);
- World Climate Research Program (WCRP)

Acknowledging the long-standing and ongoing contributions of the International Council for Science (ICSU); the International Social Sciences Council (ISSC); the United Nations Educational, Scientific and Cultural Organization (UNESCO); other United Nations, intergovernmental, international and national organizations dealing with science education;

Recalling one of the Sustainable Development Goals is “to ensure inclusive and equitable quality education and to promote learning opportunity for all”

Considering the challenging problems of society (e.g. climate change, natural hazards and disaster risk, depletion of mineral and water resources) requires a transdisciplinary research approach and co-productive work of scientists with policymakers and end-users; and the responsibilities of scientists to help society to tackle challenging problems;

Realizing, that science education at all levels needs long-term planning, coordination and implementation;

Call for a strengthening of basic scientific research and science education especially in the developing world; namely,

1. promoting educational programs having a sound disciplinary base in the fundamentals needed for the physical sciences comprising mathematics, physics, chemistry, and biology. This is required for all multi-disciplinary Earth and space sciences disciplines and in countries having both developed and emerging economies;
2. promoting comprehensive holistic inter- and trans-disciplinary approaches in Earth and space sciences and science education, which have to integrate knowledge from natural and social sciences, mathematics, engineering, and other relevant stakeholders;
3. cooperation between Earth and space scientists with policymakers and industry to improve science education at schools / universities and within life-learning education programs;
4. networking within education programs and between existing and new regional science educational centers, especially in Africa, Latin America and Caribbean, and Asia and Oceania;
5. promoting integrated and transdisciplinary curricula, particularly in the emerging and challenging scientific fields like disaster science and climate science, via a science team approach;
6. improving geoscience education infrastructure and increasing the number of university chairs in both multidisciplinary and transdisciplinary education;
7. promoting online geoscience education courses and hands-on science education workshops on challenging societal problems as well as science Olympiads and festivals; recognition of best science educators;
8. promoting dialogue between science educators on curricula and curriculum delivery development, and sharing of best practice;
9. citizen science education and involvement to raise awareness of the public to major societal and ethical problems.

IUGG BUSINESS MEETINGS

Extraordinary Executive Committee meeting

To analyze several urgent issues related to modernization of the Union, IUGG President Harsh Gupta called for an extraordinary Executive Committee (EC) meeting, which was held in Vienna (Austria) on 18 April 2015. The meeting agenda included the following important topics: IUGG and Association individual membership; participation of scientists from non-Member countries in the IUGG/Associations governance; strengthening a linkage between National Correspondents and the IUGG Associations; draft Strategic Plan for 2016-2023; operations of IUGG and the Union Associations, and some other topics.

The discussion on individual membership was based on the overview of the opinions of all IUGG Associations and 27 National Members of the Union (which submitted their response on the request of the IUGG President). The opinions showed two common points: (i) no support for introducing an IUGG individual membership, but support for allowing Associations to introduce an individual membership (note that three Union Associations introduced their own individual membership some

time ago); and (ii) IUGG key officer positions should be only eligible to individuals from IUGG member countries. The proposal for changes of the IUGG Statutes and By-Laws recently submitted to the IUGG Council Delegates (in advance of the Council meeting) was discussed and enthusiastically endorsed by the EC. Among the changes proposed are permanent delegates to IUGG Council, electronic voting, definition of National Committees, gender criterion, individual scientists and their eligibility for election, and permission for Associate Members to speak at Council Meetings.

Although the relationship between National Correspondents and IUGG Associations have been developing well, some concerns were expressed about the linkage between the some National Correspondents and the Associations. Particularly, Association Presidents mentioned that sometimes their inquiries for help in identifying a National Correspondent to Union Associations failed to get a response from National Committees. Another issue mentioned was that sometimes the National Correspondent to an Association appointed by a Member country does not belong to the field of that association and hence does not participate in the activities of that association. The EC agreed that IUGG Associations and National Committee should strengthen the existing links. Association officers expressed their readiness to provide advice to IUGG National Committees related to national experts actively participating in the life of their Associations and who could be an ideal correspondent between Associations and National Committees.

A draft IUGG Strategic Plan for 2016-2023 was presented by Chris Rizos, Chair of the Visioning Committee, and was commented on by the EC members. A revised draft Strategic Plan will be considered by the IUGG Council at its meeting in Prague in June 2015. Also the EC discussed principal operational activities (including administration and outreach) of the Associations and the IUGG, and agreed that Associations should continue their operations under the umbrella of the Union, which provides inter-, multi-, and trans-disciplinary links between Associations and the Union and between the Union and other international and inter-governmental organizations.

The EC meeting was hosted by the Department of Geodesy and Geoinformation, Vienna University of Technology, and the IUGG EC expressed its sincere gratitude to the host organization for a hospitality.

UNION COMMISSION ON PLANETARY SCIENCES

In the last half-century, with the advances in space exploration and ground based studies, planetary science has become a major interdisciplinary field of research that requires broad international collaboration and attracts Earth and space scientists from around the world. Several Associations of IUGG deal with planetary issues, but mostly independently. IACS has a division on Planetary and other Ices of the Solar System. IAG had an Inter-Commission Committee on Planetary Geodesy and a Joint Project on Geodetic Planetology. IAGA welcomes scientists to join in research in magnetism and aeronomy of other bodies of the solar system. IAMAS has a commission devoted to planetary atmospheres – the International Commission on Planetary Atmospheres and Evolution (ICPAE). IASPEI and IAVCEI have been working on planetary interior structure and evolution, planetary seismology and volcanology. With lakes and oceans being explored on outer planet moons such as Titan, Europa, Enceladus, and missions such as MESSENGER and BepiColombo, Lunar Reconnaissance Orbiter investigating the interior structure of rocky bodies like Mercury and the Moon, there is a need for a comprehensive home for planetary sciences within IUGG.

The IUGG Union Commission on Planetary Sciences (UCPS) was set up by a decision of the IUGG Executive Committee in June 2015 to promote and coordinate scientific (physical, chemical, and mathematical) studies of planets in the solar system and around other stars. UCPS intends to promote the advancement of scientific understanding of planetary science and exploration of the solar system origin, formation and evolution including a search for life beyond Earth. The UCPS together with the IUGG associations will share knowledge of and insights into planetary formation and origin through scientific research and comparative studies between planetary objects and the Earth in the fields of atmosphere, surface and interiors research. The UCPS objectives are:

- to promote the study of all scientific problems in planetary science and to encourage planetary research;
- to promote and coordinate international cooperation in planetary science, and to promote planetary science activities in developing countries;
- to provide, on an international basis, for discussion and publication of the results of the studies, research and work indicated above;
- to contribute to coordinating activity for possible future space missions.

The Executive Committee of the Commission is comprised of Chair Shuanggen Jin (IAG, China), two Vice Chairs Athena Coustenis (IAMAS, France) and Jörn Helbert (IASPEI, Germany), Secretary Scot Rafkin (IAMAS, USA), and 5 Members Christine Schøtt Hvidberg (IACS, Denmark), Michael Purucker (IAGA, USA), Fabrizio Capaccioni (IAHS, Italy), Philippe Lognonné (IASPEI, France), and Josè Luis Macias-Vasquez (IAVCEI, Mexico). More information about the Commission: www.iugg.org/about/commissions/ucps.php

IUGG OUTREACH COMMITTEE

The ad-hoc Outreach Committee was established by the IUGG Executive Committee in July 2015 in Prague, and its membership was approved by the Bureau in January 2016. The Committee is set up to organize and manage IUGG's communication, promotion, public information and general outreach activities. Namely:

- To promote the recognition and demonstrate the utility of Earth and space sciences in general, and IUGG in particular, to other organizations, industry, governments and the public at large, with special attention to the younger generations.
- To develop liaisons with relevant national and international unions and associations, professional societies, and other international and intergovernmental bodies.
- To help develop lasting relations with industry and national and regional geo/space agencies by developing joint R&D and other programs and projects.
- To provide advice to the Union on options and actions by which IUGG could become more attractive to, and increase the participation of, young scientists.

Appropriate strategies will be developed for targeting students, early career scientists, scientists in developing countries, government agencies, private companies, decision makers, and international organizations. This can be achieved through:

- Promoting collaborations with industry partners, as well as their participation in IUGG activities.
- Promoting and supporting the activities of the IUGG early career scientists' network.
- Soliciting support from potential sponsors (private industry, system manufacturers, government agencies, foundations, etc.) for promotional projects and activities.
- Providing advice on the development of the Union's newsletter, web site, stands, banners, brochures, leaflets, videos and other promotional materials for exhibitions, conferences and for wider distribution.
- Identifying, collecting, evaluating and disseminating information on available internet resources useful for promotion of, and education in, geodesy and geophysics.
- Identifying opportunities for developing and participating in joint outreach activities with sister societies and international scientific and professional organizations.

The IUGG President Michael Sideris appointed the following people to the Outreach Committee:

Kathy Whaler, CHAIR, IUGG Vice President (UK)
 Val Byfield (UK)
 Julia Keller (Germany)
 Franz Kuglitsch, ex-officio (Germany)
 Sanjay Limaye (USA/India)
 Karoly Nemeth (New Zealand)
 Greig Paterson (China)

SCIENTIFIC MEETING REPORTS

Deform2015

The project “Active Deformation, Faults and Earthquakes: from Measurements to Models” aimed to link researchers at the forefront of their fields together with PhD students, post-doctoral fellows and other early career scientists to address questions related to earthquake physics and crustal deformation. This was a project of the International Association of Geodesy (IAG) supported by the International Association of Seismology and Physics of the Earth’s Interior (IASPEI) and the IUGG Union Commission on Geophysical Risk and Sustainability (IUGG-GRC), and co-sponsored by IUGG.

The project’s main event was Deform2015 thematic school, which was held on 7-13 February 2015 in Barcelonnette, France. The school attracted 65 attendees from various institutions across the world. Most of the attendees were PhD students, with a few master students and more advanced people, either post-doctoral fellows or researchers. The demand was high and more than 30 people were registered on the waiting list when we reached our maximum capacity, showing the real need of the community for this kind of short focus course. Deform2015 focused on various aspects related to deformation of the crust of the Earth due to earthquake activity. The days were organized with three sessions per day (9:00-13:00, 16:00-19:00, and 20:30-22:30). The topics addressed during the school covered:

- Space geodesy with a full session on GPS, from theory to know-how. A lecture was given about InSAR, its theoretical background and its applications. A session was devoted to the emerging techniques of optical images correlation and all its potential applications in Earth sciences. Finally, a full session was devoted to the specific problems of inversion of geodetic data.
- Source seismology and fracture mechanics were introduced in one day, covering some basics of source seismology and fracture mechanics and some of their applications in Earth sciences. An evening seminar was organized to present rock-mechanic experiments geared toward understanding of earthquake processes.
- A full day was dedicated to the introduction of field observation techniques, basic concepts of neotectonics and paleoseismology, and dating techniques, to see how one could expand the time window of observations to improve understanding of the earthquake cycles. An evening session presented analogue experiments dedicated to landscape evolution studies related to tectonic deformation.
- A one-day field-trip was organized to show students the real observations in the local geologic environment that would relate to Quaternary deformation, pertinent to the core topic of the school.
- One and half days were devoted to various approaches in modeling of tectonic deformation, to the introduction of theoretical concepts and to the limitations of each approach (e.g., visco-elasticity, rate-and-state, etc.)
- The last session concerned the implementation of all this knowledge into seismic hazard and risk assessment.



Deform2015 group photo

Every day (except the two days with evening sessions) the time after dinner was used for 5-min flash talks and for a poster session. These short presentations were very successful and allowed everyone to share and discuss their research results. Also they have facilitated communication between the attendees; a research network was created during the school. The feedback forms collected at the end of the school underlined that the attendees have learnt a lot in different fields and would like to join similar event, maybe with a slightly lighter daily schedule, in future. (Yann Klinger, a Deform2015 organizer.)

Report on the ILP Conference “Celebrating Excellence in Solid Earth Sciences”

The International Lithosphere Program (ILP) seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere through international, multidisciplinary geoscience research projects and coordinating committees. The ILP is charged with promoting multidisciplinary research projects of interest to both the geological (International Union of Geological Sciences - IUGS) and geophysical (IUGG) communities.

The ILP Conference “Celebrating Excellence in Solid Earth Sciences” was held in Potsdam, Germany, from 21-23 September 2015 to celebrate the ILP’s 35th birthday. Together with more than 50 scientists, members of the ILP Task Forces and Coordinating Committees, the ILP Bureau and ILP’s office gathered together to discuss the research findings, science plans, and new projects. Hans Thybo, President of the European Geosciences Unions (EGU), Harsh Gupta, IUGG Immediate Past President, and Roland Oberhänsli, IUGS President, delivered keynote lectures at the conference.



ILP conference group photo

The ILP Bureau held a meeting on the occasion of the conference. Eight of ten proposals for ILP Task Forces were accepted by the Bureau. The Bureau nominated Hans Thybo as the next ILP President to take office from 2017, and Alessandro Tibaldi as New Chair of National Representatives to succeed Victoria Pease. The IUGG and IUGS should approve the nominations. (M. Scheck-Wenderoth, ILP Secretary General & A. Rudloff, ILP Executive Secretary.)

SIRGAS School on Reference Systems and the Symposium SIRGAS 2015

The current activities, advances, and new challenges of SIRGAS are reported, discussed, and re-oriented (if required) in the annual SIRGAS Meetings, which have been held since 1993. In this series, the *Symposium SIRGAS2015* took place in Santo Domingo, Dominican Republic, November 18 to 20, 2015. In the days prior to the Symposium (November 16 and 17), a new edition of the *SIRGAS School on Reference Systems* was held. Both events were hosted by the *Universidad Nacional Pedro Henríquez Ureña* (UNPHU) and they were developed in the frame of the project *Monitoring crustal deformation and the ionosphere by GPS in the Caribbean* granted by the *International Union of Geodesy and Geophysics* (IUGG) in agreement with the *International Association of Seismology and Physics of the Earth’s Interior* (IASPEI), the *International Association of Geodesy* (IAG), and the *International Association of Geomagnetism and Aeronomy* (IAGA).

The SIRGAS School was attended by 60 participants from 19 countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Germany, Guatemala, Haiti, Honduras, Mexico, Monserrat (UK), Panama, Puerto Rico (USA), Uruguay, USA, and Venezuela. The subject of the school concentrated on strengthening the basic concepts needed for the appropriate generation and use of fundamental geodetic and geophysical data in the Caribbean Region, especially for studying, understanding and modelling deformations of the Earth's surface and features of the ionosphere and its influence on navigation systems used for civil aviation.



*Attendees of the VII SIRGAS School on Reference Systems.
Santo Domingo, Dominican Republic, November 16-17, 2015.*



*Attendees of the Symposium SIRGAS2015.
Santo Domingo, Dominican Republic, November 18-20, 2015.*

The Symposium SIRGAS2015 was attended by 148 participants from the same 19 countries. In 54 oral presentations and 15 posters, the following topics were presented: SIRGAS advances and new challenges, maintenance and new perspectives for the continental reference frame, national reference frames, geodetic estimation of geophysical parameters, height systems, gravimetry and geoid, geodetic analysis of the Earth's crust deformation, and practical applications and use of reference frames. Presentations are available at the SIRGAS web site (www.sirgas.org).

In the frame of this Symposium, the SIRGAS Directing Council elected our colleagues William Martínez-Díaz (Colombia) and Virginia Mackern (Argentina) as the new SIRGAS President and Vice-president. They will coordinate the SIRGAS activities for the next four years.

Thanks to the support of the IUGG, the IAG, and the Pan-American Institute of Geography and History (PAIGH), it was possible to provide 20 SIRGAS colleagues from 9 countries with partial travel grants. SIRGAS deeply acknowledges this support. (*Claudio Brunini and Laura Sánchez, School and Symposium co-organizers.*)

REPORTS OF IUGG LIAISON OFFICERS

36th Session of the WCRP Joint Scientific Committee

The World Climate Research Programme (WCRP) was established in 1980 under the joint sponsorship of the International Council for Science (ICSU) and the World Meteorological Organization (WMO) as a follow-up to the Global Atmospheric Research Programme. Since 1993, it has also been sponsored by the Intergovernmental Oceanographic Commission (IOC) of UNESCO. Its main objectives are to determine the predictability of climate and to determine the effect of human activities on climate.

Scientific guidance of the WCRP is provided by its Joint Scientific Committee (JSC), which is composed of 18 individual scientists. It meets annually, but very rarely if ever has it met in Geneva, Switzerland, even though its Planning Office is hosted by the WMO Secretariat. JCS-36 was held on 8-10 April 2015 and attended by most of the 18 members plus some 50 individuals: representatives of the component activities of the WCRP, sponsors and secretariat members. The session was chaired by Guy Brasseur of the Max-Planck Institute in Hamburg, Germany, who has only recently become the Chair of JSC. IUGG was represented by Tom Beer, the IUGG liaison to WCRP. However, as he was able to attend only for the first day, and because the meeting was being held at WMO, Arthur Askew kindly also volunteered to attend.

WCRP embraces five Core Project: CliC (cryosphere), CLIVAR (atmosphere-ocean interface), GEWEX (energy-water exchange), SPARC (stratosphere-troposphere) and CORDEX (regional downscaling), plus a number of other activities. Each of these projects operates through an extensive network of panels and working groups. Each has its own project office, staff and systems of funding. In recent years, WCRP has also established six “Grand Challenges”. Each component of this extensive and complex programme was given an opportunity to report on the status of its work and its plans for the future. This made for a very tight agenda, especially because it had been decided to limit the session to just three days. As a result, there was little opportunity to discuss anything in detail.

No reference to either IUGG or any of its Associations was made while we were present, even though many scientists who work within the WCRP community are also involved in IUGG activities. There exists some overlap and even duplication between the various Core Projects and between these and the Grand Challenges, especially as they are all competing for the same limited funds and for the limited time of the same personnel. Nevertheless, there appears to be a good sense of common interest and personal relations are excellent.

The WCRP is concerned at a drop in funding in recent years and discussed how to improve its public image and communications. As an example of the problems they face, it was noted that members of the WCRP community rarely mention the WCRP in their published papers and yet CMIP (Coupled Model Intercomparison Project) is widely known and quoted without any mention of the fact that it is a WCRP activity.

Half of all comments after the presentations called for links to be established between various entities within the WCRP. When mention was also made of potential links to activities outside the WCRP, the number increased exponentially. When the speakers were pushed on the matter, it became clear that a host of formal and informal links do exist that were not mentioned through lack of time. Nevertheless, this is an increasingly serious problem because if all the potential links that were mentioned were in fact established, the communities would be occupied full-time in maintaining links and have no time to do real science.

The CliC presentation stressed the problems faced because of the poor measurement of snowfall and also mentioned the importance of records of glacial mass balance studies. This led us to intervene and mention the work on these topics of IAHS and IACS respectively. The GEWEX presentation was of considerable interest, not the least because it referred to many challenges in hydrology, most of which are also of interest to IAHS. When queried on the subject, GEWEX Co-Chair, Sonia Seneviratne,

stated that they had no contact with IAHS. This problem has persisted from the very start of GEWEX, which was launched without any contact being made with the hydrological community because the Director of the Joint Planning Office at the time was of the opinion that hydrologists knew very little about hydrology. This unfortunate history is well behind us and Sonia explained that they had made no contact with IAHS because they believed that IAHS works only at the basin level. This is not altogether true and, with their work on downscaling, GEWEX is now also working at the basin level. Sonia invited IAHS to nominate experts who might be interested to work with GEWEX in future. Discussion of activities on climate and urbanization made frequent references to water and so Arthur recommended that WCRP make contact with those undertaking the many large projects on water in urban areas before launching into any specific new activities.

WCRP has an existing Model Development Prize, shared with World Weather Research Programme. The idea of a parallel prize for data emerged from this JSC meeting and requires more thought, including a scan to learn what already exists. A recommendation is expected to be put to the next JSC meeting.

A young student from the Netherlands, who is working with the Joint Planning Staff for four months, presented an interesting paper comparing the carbon footprints of holding the next meeting of the JSC in Geneva, New Zealand, Abu-Dhabi and as a teleconference linking four regional centres.
(Tom Beer, IUGG Liaison to WCRP, and Arthur Askew, IUGG Liaison to WMO)

17th Congress of the World Meteorological Organization

The 17th Congress of the World Meteorological Organization (WMO) met in Geneva, Switzerland, from 25 May to 12 June 2015. Many topics relevant to IUGG expertise have been discussed.

Good progress with the Global Framework for Climate Services (GFCS) was reported and it is now accepted as an established part of WMO's programme. One issue that arose during the discussion of the GFCS was related to data exchange. Back in 1995 WMO adopted a resolution promoting the free and open exchange of meteorological data. Four years later, a similar resolution on the exchange of hydrological data was adopted. Neither of these resolutions makes specific reference to climatological and related data. Much effort has been put into drafting a third resolution to fill this gap. A resolution on the subject was eventually adopted after long (and difficult) negotiations. The UN Secretary-General has called for proposals for a data revolution in support of sustainable development. This is seen as referring to "big data", namely crowd-sourced data, social media and the like. The WMO Congress showed considerable interest in the subject and has asked its Executive Council to look into the matter.

There was good support for the Global Cryosphere Watch (GCW) itself and it was interesting to see Indonesia and Kenya stressing the importance to them of having their high-altitude stations included in the GCW. However, there was obvious disagreement over how to fund the GCW Project Office. Finally Congress "*requested the Secretary-General to establish a GCW Project Office to support all GCW activities, including coordination with partners, monitoring of its implementation, reporting and follow-up actions and to provide support for the Office through a combination of regular and matching extra-budgetary resources.*"

The presentation of the World Climate Research Programme (WCRP) included a number of references to their plans to strengthen their work in hydrology. When it was first established in the 1970s, one element of the World Climate Programme was the World Climate Impact Studies Programme. For many years UNEP left this dormant but more recently they have sought to fill the gap with their new initiative entitled the Global Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA). It aims to act as an interface between the research community, decision makers and other stakeholders to improve policy-relevant research and its dissemination.

Guy Brasseur, Chair of the WCRP Joint Scientific Committee, presented the planned new WCRP climate research efforts that aim to address the most pressing questions posed by society on climate change: How much warmer will the planet be by the end of the century? How frequent and how intense will extreme events (droughts, flooding etc...) be? How will water availability change under a changed climate? How fast will sea levels rise in different parts of the world and how vulnerable are coastal cities and their populations? How fast will the Arctic sea ice melt and how will it affect other regions of the world? How can we improve our seasonal-to-decadal predictions? To respond to these questions, the international WCRP community has identified six climate Grand Challenges that will be the research foci for WCRP for the next 5-10 years: (i) Clouds, circulation and climate sensitivity; (ii) Understanding and prediction of weather and climate extremes; (iii) Water availability; (iv) Sea-level rise and regional impacts; (v) The Cryosphere in a changing climate; and (vi) Decadal climate information and prediction. All the challenges fit a paradigm of global processes with regional and local impact.

David Carlson, WCRP Director, placed particular emphasis on the successful international collaboration for CMIP5 (Coupled Modeling Intercomparison Project phase 5) products and processes. CMIP5 outcomes provided the fundamental modeling basis for the entire IPCC 5th Assessment Report (AR5), permeated many chapters of the Working Group I report and continue to enable a very wide range of climate research and analysis. WCRP's planning efforts for phase 6 of CMIP is well underway. The CMIP6 process is composed of a research-driven set of climate diagnosis, evaluation and characterization experiments accompanied by standardization, coordination, infrastructure, and documentation functions to allow all simulations and their main characteristics performed under CMIP to be made available to a broader community. The WMO Congress also expressed appreciation for WCRP's continued, positive and effective relationships with its co-sponsoring organizations, the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Council for Science (ICSU).

During the Congress, the topic of space weather was discussed. Jérôme Lafeuille, the WMO staff member in charge of the topic, pointed out that their four-year plan makes reference to IAGA as a "scientific organization involved in particular aspects" of space weather. Jérôme Lafeuille was keen to emphasize that WMO is taking on an increasing operational role, whereas they see IAGA as a source of scientific expertise.

The WMO Secretariat presented a budget for 2016-2019 which represented a 7.4% increase over that for the current financial period. The difficult financial situation currently faced by many countries, added to the recent rise in value of the Swiss Franc, made it difficult to find support for the Secretariat's proposals. Despite these circumstances, the Congress approved a budget which is 2% above the current level.

While it is not of great significance to our relations with WMO, it is important to note that David Grimes (Canada), Antonio Moura (Brazil), Mieczyslaw Ostojski (Poland) and Abdalah Mokssit (Morocco) were re-elected unopposed to the posts of President and First, Second and Third Vice-Presidents respectively. More important is the fact that Michel Jarraud (France) will come to the end of his 12 years as Secretary General of WMO at the end of 2015. He cannot be re-elected and so an election was held in which, on the final round of voting, *Petteri Taalas* (Finland) gained 75% of the vote and Elena Manaenkova (Russia) 25%. This was the first time that a woman had stood for election to the post. Michel Jarraud's 12-years as Secretary General was the first for which a limited duration had been imposed by WMO. However, other UN agencies have long had limits as to how many years a Secretary General may serve. In view of this, Congress has now reduced the maximum duration for WMO from 12 to 8 years.

Finally IUGG has very good and broad ranging relations with WMO. These links stretch back to the 1950s as regards IAMAS and IAHS, those with IAVCEI, IACS, IAGA and IAPSO, being added recently. (*Arthur Askew, IUGG Principal Liaison Officer to WMO*)

GEO Plenary XII

The XII Plenary of the Group on Earth Observations (GEO) was held on 11-12 November 2015 in Mexico City, Mexico. The following topics were considered at the meeting: (i) GEO recognized Vietnam, Ecuador, Zimbabwe, Somalia, and Kenya as new Members; (ii) GEO approved the Mexico City Declaration; (iii) GEOSS implementation 2005-2015 and Report of the Sixth and Summative Evaluation of GEOSS Implementation; (iv) the lessons learned from GEO's First Decade; (v) the GEO Strategic Plan for 2016-2025; (vi) new Programme Board appointments; (vii) revised criteria for Observers and Participating Organizations; (viii) GEO engagement with stakeholders; (ix) Work Programme for 2016; (x) updates to Rules of Procedure; and (xi) the budget for 2016. The Russian Federation will host the GEO-XIII Plenary in St. Petersburg, 9-10 November 2016. More information on the GEO Strategic Plan for 2016-2025 and the 2016 Work Programme can be found at the GEO website: https://www.earthobservations.org/geoss_wp.php

The GEO Executive Committee appointed Members of the newly established Programme Board based on the nominations received from Member Countries and Participating Organizations. Nominated by IUGG, President Michael Sideris was selected to be a Member of the Board.

COOPERATION WITH INTERNATIONAL AND INTERGOVERNMENTAL ORGANIZATIONS

The United Nations General Assembly urges sharing of geospatial data

On 26 February 2015 the General Assembly of the United Nations (U.N.) adopted the first geospatial resolution “A Global Geodetic Reference Frame for Sustainable Development” (www.un.org/ga/search/view_doc.asp?symbol=A/69/L.53). The Press Release published on this occasion by the U.N. states:

“The science that supports the precise pinpointing of people and places should be shared more widely, according to the United Nations General Assembly as it adopted its first resolution recognizing the importance of a globally-coordinated approach to geodesy – the discipline focused on accurately measuring the shape, rotation and gravitational field of planet Earth. Geodesy plays an increasing role in people's lives, from finding disaster victims to finding directions using a smart phone.

The General Assembly resolution, A Global Geodetic Reference Frame for Sustainable Development, outlines the value of ground-based observations and remote satellite sensing when tracking changes in populations, ice caps, oceans and the atmosphere over time. Such geospatial measurements can support sustainable development policymaking, climate change monitoring and natural disaster management, and also have a wide range of applications for transport, agriculture and construction. Emphasizing that “no one country can do this alone,” the General Assembly called for greater multilateral cooperation on geodesy, including the open sharing of geospatial data, further capacity-building in developing countries and the creation of international standards and conventions. Co-sponsored by 52 Member States, the resolution was originally put forward by Fiji. Ambassador Peter Thomson, Fiji's Permanent Representative to the United Nations, explained that, as a Small Island Developing State, Fiji is vulnerable to increasingly severe natural disasters, sea-level rise and other problems triggered by climate change, but uses geodesy data to plan as best as it can. “We fully realize the importance of critical geospatial infrastructure and information in helping countries and decision-makers make more informed, evidence-based decisions on mitigation and preparedness,” Ambassador Thomson stated. Fiji also highlighted the power of precise positioning for United Nations peacekeeping, for which it contributes troops. “We believe that additional accurate geospatial data will help the blue helmets take decisions in an often volatile operational context, leading to greater effectiveness of UN missions,” Ambassador Thomson added.

Wu Hongbo, the United Nations Under-Secretary-General for Economic and Social Affairs, praised Member States' efforts to “discuss, deliberate and decide on issues relevant to positioning geospatial

information” and, noting that geodesy is fundamental for monitoring changes to the Earth, “stressed the significance of the global geodetic reference frame in supporting sustainable development.” 2015 is a crucial year in which world leaders will be called upon to determine the global course of action to improve people’s lives and protect the planet. With key finance, sustainable development and climate change conferences approaching, the focus on practical solutions and international cooperation in the resolution sets the right tone.”

This U.N. resolution recognizes the achievements of the International Association of Geodesy of IUGG in measuring and monitoring changes in the Earth’s system, including the development of the now adopted International Terrestrial Reference Frame. For more information: Committee of Experts on Global Geospatial Information Management (<http://ggim.un.org>).

The United Nations World Conference on Disaster Risk Reduction

The United National (UN) Third World Conference on Disaster Risk Reduction (WCDRR) was held in Sendai, Japan, from 14 to 18 March 2015. Policymakers gathered for a ten-yearly meeting on disaster risk reduction with hopes high that the conference held in the earthquake-tsunami-hit region of Japan might provide a springboard for efforts to tackle disasters related to natural events. “What we are discussing here ... is very real for millions of people in the world,” UN Secretary General Ban Ki Moon said in a speech at the Opening Ceremony of the conference. He stated that annual economic losses now exceed US\$ 300 billion annually. “We can watch that number grow as more people suffer. Or we can dramatically lower that figure and invest the savings in development. Six billion dollars allocated each year can result in savings of up to US\$360 billion by 2030, the Secretary-General said. He praised the existing global agreement on disaster risk reduction, the Hyogo Framework for Action (HFA), which was adopted ten years ago in Kobe, Japan. He said it “has saved thousands of lives. Now we must respond to the world’s growing needs by empowering individuals, supporting communities and backing promises with resources.”



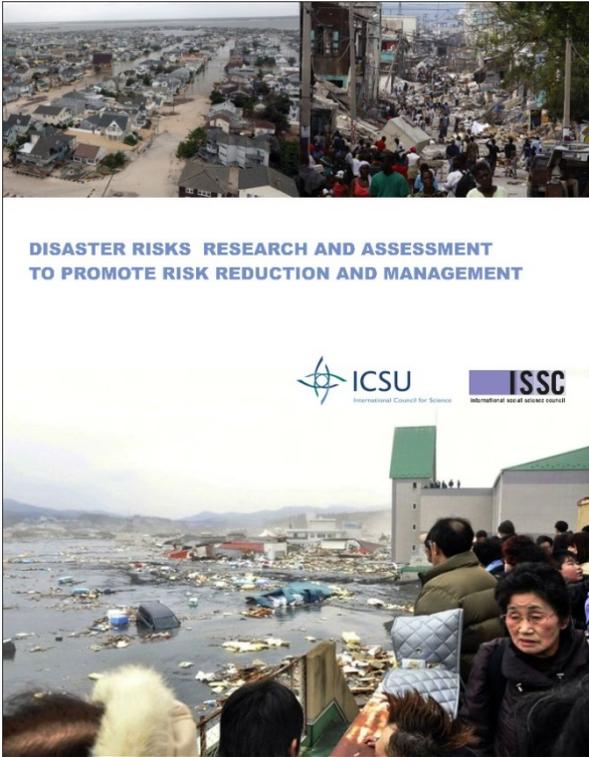
Mr. Ban Ki Moon, UN Secretary General (left) and Mr. Shinzo Abe, the Japanese Prime Minister

The Japanese Prime Minister, Mr. Shinzo Abe, pledged \$US 4 billion to support implementation of the “Sendai Cooperation Initiative for Disaster Risk Reduction” over the next four years. Speaking at the Opening ceremony Mr. Abe said: “Disaster risk reduction is the most important challenge for both developed and developing countries. For developing countries in particular, where 90% of disaster victims are concentrated.” The financial package will focus on the development of disaster-proof infrastructure, the promotion of global and regional cooperation and the training of 40,000 government officials and local leaders to play a leading role in national efforts for disaster risk reduction. Japan will make its expertise and knowledge available.

On the occasion of the WCDRR, the International Council for Science (ICSU) and the International Social Sciences Council released a synthesis paper “Disaster risks research and assessment to promote risk reduction and management”, which aims to highlight potential contributions of science to disaster risk reduction (www.icsu.org/news-centre/news/disaster-risks-research-and-assessment-to-promote-risk-reduction-and-management). The paper can be assessed at the webpage of ICSU www.icsu.org/science-for-policy/disaster-risk/documents/DRRsynthesisPaper_2015.pdf.

Several IUGG experts took part in writing the paper, namely, Daniel Baker, Harsh Gupta, Alik Ismail-Zadeh, David Johnston, Gordon McBean, Kuniyoshi Takeuchi, and Guoxiong Wu. A summary for policymaker of the synthesis paper was distributed among the WCDRR National Delegates by the UNISDR Secretariat at the request of the Russian Federation.

On 18 March, representatives from 187 UN member States adopted the major agreement of the Post-2015 development agenda, *the Sendai Framework for Disaster Risk Reduction 2015-2030 – the new international framework for disaster risk reduction*, a far reaching new framework for disaster risk reduction with seven targets and four priorities for action. Margareta Wahlström, the Secretary-General’s Special Representative for Disaster Risk Reduction and the Head of the UN Office for Disaster Risk Reduction, said: “The adoption of this new framework for disaster risk reduction opens a major new chapter in sustainable development as it outlines clear targets and priorities for action which will lead to a substantial reduction of disaster risk and losses in lives, livelihoods and health”.



Margareta Wahlström, the Secretary-General’s Special Representative for Disaster Risk Reduction and Head of the UN Office for Disaster Risk Reduction (above)

From the conference promotion material (left)

The framework outlines seven global targets to be achieved over the next 15 years: a substantial reduction in global disaster mortality; a substantial reduction in numbers of affected people; a reduction in economic losses in relation to global GDP; substantial reduction in disaster damage to critical infrastructure and disruption of basic services, including health and education facilities; an increase in the number of countries with national and local disaster risk reduction strategies by 2020; enhanced international cooperation; and increased access to multi-hazard early warning systems and disaster risk information and assessments.

The World Conference was attended by over 6,500 participants including 2,800 government representatives from 187 governments. IUGG, as a non-governmental organization, was represented by Secretary General A. Ismail-Zadeh, IAVCEI Secretary General J. Marti, and IUGG GeoRisk Commission Chair K. Takeushi although many experts of IUGG attended the conference in various capacities. The Public Forum had 143,000 visitors over the five days of the conference making it one of the largest UN gatherings ever held in Japan. For more details visit www.wcdrr.org.

Sendai Partnerships for 2015-2025

Many scientific and academic institutions and governmental and non-governmental organizations proposed that the Sendai Partnerships 2015-2025 for Global Promotion of Understanding and Reducing Landslide Disaster Risk be established. These partnerships will engage major stakeholders concerned with the challenge of understanding and reducing disaster risk, including relevant international, national, local, governmental, and non-governmental institutions, programs and initiatives, in order to mobilize and coordinate their efforts to pursue prevention, to provide practical solutions, education, communication, and public outreach in reduction of landslide disaster risk. The Partnerships will focus on delivering tangible and practical results that are directly related to the implementation of the goals and targets of the post-2015 Framework for Disaster Risk Reduction.

IUGG was invited to join the Partnership in promoting scientific understanding of the processes leading to landslide disasters. The ceremony of signing the Sendai Partnerships 2015-2025 for Global Promotion of Understanding and Reducing Landslide Disaster Risk was held in Sendai, Japan on 16 March 2015.



During the ceremony

The document was signed by *Kyoji Sassa*, Executive Director of the International Consortium on Landslides; *Margareta Wahlström*, Special Representative of the UN Secretary General for Disaster Risk Reduction and Head of UN Office for Disaster risk Reduction (UNISDR); *Qunli Han*, Director, Division of Ecological and Earth Sciences of UNESCO; *Dominique Burgeon*, Director Emergency and Rehabilitation Division Food and Agriculture Organization of the United Nations; *Kazuhiko Takeuchi*, Senior Vice-Rector, United Nations University; *Gordon McBean*, ICSU President; *Toshimitsu Komatsu*, Vice President, World Federation of Engineering Organizations; *Roland Oberhänsli*, IUGS President; *Alik Ismail-Zadeh*, IUGG Secretary General; *Kaoru Saito*, Director, Disaster Preparedness and International Cooperation Division, Disaster Management Bureau, Cabinet Office, Government of Japan; *Hideaki Maruyama*, Director, Office for Disaster Reduction Research, Ministry of Education, Culture, Sports, Science and Technology, Japan; *Takashi Onishi*, President, Science Council of Japan; *Kayo Inaba*, Executive Vice President of Kyoto University; *Franco Gabrielli*, Head, National Civil Protection Department Italian Presidency of the Council of Ministers, Government of Italy; and *Jadran Perinic*, Director General, National Protection and Rescue Directorate, Republic of Croatia. The text of the Sendai Partnership declaration can be found at www.iugg.org/about/special.php.

UNESCO water programmes: 50 years for sustainable development

UNESCO celebrated the 50th anniversary of its water programmes. In 1965, UNESCO and the World Meteorological Organization (WMO) began the first worldwide programme of studies of the

hydrological cycle – the International Hydrological Decade (IHD) – complemented by a major effort in the field of hydrological education and training. Conscious of the need to expand upon the efforts of the IHD, UNESCO launched the International Hydrology Programme (IHP) in 1975 to follow the Decade. The International Hydrological Programme is the only intergovernmental programme of the UN system devoted to providing policy advice, mobilizing international cooperation, and developing institutional and human capacities. Over the past 50 years, UNESCO’s water programmes have evolved from an internationally coordinated hydrological research programme into an encompassing, holistic programme to facilitate education and capacity building, and enhance water resources management and governance. Today in its Eighth Phase (IHP-VIII), IHP facilitates an interdisciplinary and integrated approach to watershed and aquifer management, which incorporates the social dimension of water resources, promotes and develops international research in hydrological and freshwater sciences to meet current water challenges at national, regional and global level, especially through the worldwide network of the UNESCO Water Family.

The international water community, including experts of the International Association of Hydrological Sciences (IAHS) of IUGG, has been contributing to the IHP toward building a more prosperous water future for humanity. It was “long recognized the importance of water for human rights and dignity, for sustainable development, for lasting peace” told Irina Bokova, UNESCO Director General. “There is no road ahead other than water, it is the most important resource humanity has. It is not only a prerequisite for life, but an essential component for social, environmental and economic development and a fundamental factor in peace, social cohesion and poverty reduction. This is why water has been a centrepiece of UNESCO’s initiatives for fifty years – a period that has borne witness to significant outcomes which are a source of pride and celebration”, mentioned David Korenfeld Federman, chairperson of the IHP Intergovernmental Council.

A special volume “Water, People and Cooperation: 50 Years of Water Programmes for Sustainable Development at UNESCO” was published as part of the celebrations marking the fortieth anniversary of the creation of the IHP and the fiftieth of the launch of UNESCO’s studies in water resources. It was released on 2 December 2015 during Water and Climate Day at the 2015 Paris Climate Conference (COP21). This book summarizes the past achievements, current activities as well as present options for the desired future of IHP in an illustrated colorful publication in English, French, and Spanish. More information on the book can be found at the UNESCO webpage: <http://en.unesco.org/50-years-unesco-water-programmes/publication>

GEOSCIENCE EDUCATION

In 2015 IUGG awarded seven grants (US\$20,000 in total) to support workshops and training schools organized by the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste, Italy) as recommended by the IUGG Committee on Capacity Building and Education and in accordance with the Memorandum of Understanding between IUGG and ICTP signed in 2011. The list of the events co-sponsored by IUGG is as follows:

- Workshop on Ionospheric effects on SBAS and GBAS applications at Low Latitudes, 2-13 March, ICTP, Italy;
- School on Ocean Climate Modelling: Physical and Biogeochemical Dynamics of Semi-enclosed Seas, 7-15 September, Ankara, Turkey;
- Workshop on Earthquakes in the Zagros-Makran region: from Mechanics to Mitigation, 21-31 May, Tehran, Iran;
- Third Workshop on Water Resources in Developing Countries: Planning and Management in Face of Hydro-climatological Extremes and Variability, 27 April – 8 May, ICTP, Italy;
- Workshop on Modelling of Wildfires and their Environmental Impacts, 22-26 June, ICTP, Italy;
- Workshop on Uncertainty Quantification in Climate Modeling and Projection, 13-17 July, ICTP, Italy; and
- International School on Geothermal Exploration, 7-12 December, ICTP, Italy.

Founded in 1964 by the late Nobel Laureate Abdus Salam and co-sponsored by UNESCO, IAEA, and the Italian government, the Abdus Salam International Centre for Theoretical Physics - ICTP (www.ictp.it) seeks to accomplish its mandate by providing scientists from developing countries with the continuing education and skills that they need to enjoy long and productive careers. ICTP has been a major force in stemming the scientific brain drain from the developing world. The impact of ICTP extends well beyond the Centre's facilities to virtually every corner of the Earth. The Earth System Physics (ESP) Section of ICTP studies a wide spectrum of the Earth system, from its fluid components (oceans and the atmosphere) to the planet's interior.

IUGG and ICTP decided to enhance geophysical and geodetic education and science collaboration and signed a Memorandum of Understanding to promote educational programs related to geodesy and geophysics for the next quadrennium (2012-2015). Among other points, the agreement encourages collaboration in the organization of advanced schools/workshops in geodesy and geophysics in ICTP or in economically less developed countries; in the development of diploma courses related to Earth and space sciences; and in the dissemination of information on educational and scientific meetings.

The International Union of Geodesy and Geophysics (IUGG) and the Abdus Salam International Centre for Theoretical Physics (ICTP) will continue cooperation in geosciences education. On 6 November 2015, ICTP Director Fernando Quevedo and IUGG President Michael Sideris signed a Memorandum of Understanding to promote educational programs related to geodesy and geophysics for 2016-2019. The agreement encourages collaboration in the organization of advanced schools/workshops in geodesy and geophysics in ICTP or in economically less developed countries.



IUGG President M. Sideris (left) and ICTP Director F. Quevedo after the MoU signing

Report on the ICTP education events in 2014 co-sponsored by IUGG

Workshop on the Theory and Use of Regional Climate Models

Regional climate models (RCMs) are widely used tools to produce high resolution climate simulations at regional scales. The ICTP regional climate modeling system, RegCM, is one of the most used RCMs worldwide, with applications ranging from regional process studies to paleoclimate, climate change, chemistry - climate and biosphere - atmosphere interactions. A new version of the model, RegCM4, has been completed and released in 2012, but new features are being included for release during this workshop, such as the CLM4.5 land surface scheme, a new cloud microphysics scheme and coupling with the MIT Ocean model.

The workshop was held on 12-23 May 2014, ICTP, Trieste, Italy and directed by F. Giorgi and E. Coppola (both ICTP, Italy), X. Gao (China), and S. K. Dash (India). This event provided lectures and extensive hands-on sessions on the theory of regional climate change and regional climate modeling as

well as on the use of the RegCM4 modeling system. The focus of the present workshop was on the application of the RegCM4 within the international program CORDEX (COordinated Regional Downscaling EXperiment). The primary aim of CORDEX was to produce a new generation of large multi-model ensembles of regional climate change projections over domains covering all continental areas of the world for use in impact assessment and adaptation studies. The RegCM community contributes to CORDEX through the completion of numerical experiments over different CORDEX domains. The workshop was thus intended to provide a forum to assess and inter-compare these experiments within the context of the goals of CORDEX.



Workshop on the Theory and Use of Regional Climate Models – group photo

The workshop provided a forum for current and future model users to discuss relevant issues and formulate needs and priorities for further model development and dissemination. A limited number of participants was envisioned, with proven experience in climate modeling and a strong interest in using the RegCM4 system for regional climate studies. IUGG funds supported participation of three female scientists from Vietnam, Ghana, and Cote D'Ivoire. For detailed information on the event see ICTP agenda page link at http://cdsagenda5.ictp.it/full_display.php?ida=a13197

Summer School on Attribution and Prediction of Extreme Events

The Summer School on *Attribution and Prediction of Extreme Events* co-sponsored by the Abdus Salam International Centre for Theoretical Physics (ICTP), the World Climate Research Programme (WCRP), the International Union of Geodesy and Geophysics (IUGG), the International Council for Science (ICSU), the Asia-Pacific Network for Global Change Research (APN), the Australian Research Council's Centre of Excellence for Climate System Science (ARC), the US National Oceanic and Atmospheric Administration (NOAA), the US Department of Energy (DoE), the International and US Climate Variability, Predictability and Change Projects (CLIVAR, US CLIVAR) and the Institut Pierre Simon Laplace (IPSL) took place in Trieste, Italy between 21 July and 01 August 2014. The school website, with list of participants, agenda, reading and research project material, lecture videos and photos can be found here: www.wcrp-climate.org/ictp2014-about.

The 35 participants, Ph.D., postdoctoral researchers and early career scientists selected from 236 applicants, represented all regions of the world and were carefully selected to form tight, high-quality participant groups for the research component of the course. They were taught and mentored by 11 leaders of the international research community, as well as 7 teaching assistants that worked in support of their faculty colleagues. The purpose of the school was to train students with outstanding research potential in emerging analytic techniques required to better understand observed and future changes in extremes, addressing prominent and important societal and scientific questions about extreme events that are receiving increasingly intense attention from the public and policy makers. The school was based around three broad topic areas: (i) Statistical theory underpinning extreme value analysis; (ii) Detection and attribution of observed changes in the frequency and/or intensity of extremes, and (iii)

Event attribution, and the physical mechanisms that are involved in amplifying and/or extending the duration of some specific extreme events such as heat waves.

In addition, the school trained students in the development of some of the key data resources that are used to place current extremes into a historical context, and provided insights into some of the emerging thinking on the near term prediction of the likelihood of extreme events, where by “near term” we intend up to seasonal time scales. The school also taught the importance of understanding the physical mechanisms that produce many of the most impactful extreme events, with lectures on "complex" hydrologic extremes such as drought and the role of coupled land-atmosphere feedback mechanisms in amplifying extreme temperature events.

The material covered in the lectures was consolidated through structured tutorials, and its practical application was accomplished through a suite of research problems that formed the core of the school and are an important part of the school's long term legacy. The participants worked in teams lead by the faculty and advisors throughout the two weeks, presenting their progress mid-way and at the end of the course. The teams have continued to work on their research projects since the summer school, with the support of their mentors.

A core objective of the school was to enable the participants to continue to pursue new research avenues based on the training acquired through the school. The course material is freely available on the website, also for the benefit of those who could not attend. The lectures were all professionally filmed. All data processed for the research projects is freely available and the analysis tools were purposely developed with open source software. Another key aspect was to foster lasting relationships with the faculty and other participants. The research component of the school created close, informal conditions to develop ideas and relationships, and various social events that were organized, including a closing dinner paired with a mentor-led discussion on career development. The IUGG funds were used to support students and young scientists from developing countries in their travel and daily expenses.

Second TOSCA Training School: Solar Variability and Climate Response

COST Action ES1005 TOSCA (Towards a more complete assessment of the impact of solar variability on the Earth's climate, www.tosca-cost.eu), the FP7 collaborative project SOLID (<https://projects.pmodwrc.ch/solid/>), and ICTP, organized the Second TOSCA training school on “Solar variability and climate response” at ICTP, Trieste, Italy, from 13 to 17 October 2014. The school provided participants with a global understanding of the role of solar variability in climate change. Various topics were covered, including the basics properties (solar, heliospheric, and atmospheric physics), diagnostic techniques, errors and uncertainties, needed research, and socio-economic aspects.

The school was open to young scientists (PhD, young post-doc and 2nd year master students) from all countries. Travel, accommodation, and subsistence expenses of the participants were covered with funding by the institutions supporting the school (COST, ICTP, SCOSTEP, IUGG, and INAF). Most of budget was available to support the attendance by students coming from countries that are participating in the COST Action TOSCA, and those that are members of the United Nations and UNESCO or IAEA. Some funds were also available for participants that are nationals of, and working in, a developing country. 85 applications were received in response to the school announcement and a severe selection was applied to identify the invited participants on the basis of their qualification and the likely benefit to their research from attending the school. 28 students attended the school, coming from 16 countries.



Second TOSCA Training School group photo

The program was run from Monday to Friday with 3 main modules consisting of lectures, computer classes, and team work. All activities were led by internationally recognized and expertized scientists from the solar physics, space physics and atmospheric physics communities. All of them are involved in the COST action TOSCA. The educational material employed by the lecturers and tutors was made available to the participants via a dedicated folder in dropbox before or just after the relevant activity.

During the lectures, as well as all other school activities, the students were invited to actively participate in them, by asking the speakers for details and clarifications. The lectures addressed various aspects of the Sun-climate connection, with a focus on fundamental physical issues, key questions, and practical aspects. The various subjects discussed during the school are displayed in the following word graph, the more frequently a subject was discussed, the larger it is shown. The computer classes were held in a laboratory equipped with 24 PCs and several software packages. This practical activity introduced the participant to data handling with different languages.

With the school announcement, and with a reminder sent out two weeks before the school, the participants were informed of the team work expected to be carried out during the school and of the details of this activity. The students were divided into three teams. In the first part of the week, each team was asked to concentrate on a specific subject, and work under guidance of a tutor. During the second part of the week, each team was asked to prepare a research proposal, and defend it in front of a panel of scientists. The team work activity was aimed at training the participants in the identification of an interesting research topic, stimulating their team work skills, letting them practice with data and methods employed in research, training them to the outline of a research project.

During the school, each day from Monday to Wednesday before the lunch break, there was also some time devoted to each participant for an individual presentation of his/her research field and expertise. Each participant was invited before the school to arrange a presentation with up to three slides to be run in less than 5 minutes. The school program included an ice-breaker on the evening of the first school day and a dinner downtown the last school evening. Both events were very pleasant. More information on the event can be found at <http://tosca.sciencesconf.org>.

Advanced School on Megathrust Earthquakes and Tsunamis

The ICTP advanced school on megathrust earthquakes and tsunami held at ICTP from the 12 to the 25 of October 2014 was attended by 83 participants spanning 31 different countries. The participants were graduate students, post-doctoral fellows and early career scientists. The school was co-funded by Regione Friuli Venezia Giulia (LG 19) and the IUGG.



Advanced School on Megathrust Earthquakes and Tsunamis group photo

The school covered a full spectrum of complementary fields like seismology, geodesy, mechanics of megathrust earthquakes and related time-dependent deformations as well as the physics of tsunami. The school consisted in intensive and interactive teaching with hands-on computer exercises together with long-lasting panel and group discussion sessions. The school tackled very recent science developments and results related to the destructive Japan and Chile megathrust seismic events and related tsunami. More information on the event can be found at the following web site: <http://indico.ictp.it/event/a13230>

Workshop on Geophysical Monitoring and Modeling for Sustainable Energy and Geohazard Solutions

The Workshop was held in Kigali, Rwanda, from 15 to 25 September 2014 in the University of Rwanda's College of Business and Economics and organized by M.-C. Gasingirwa (MINEDUC Rwanda), C. Ebinger (University of Rochester USA); A. Ayele (University of Addis Ababa Ethiopia), and A. Aoudia (ICTP Italy).

The training workshop in Sub-Saharan Africa was designed to build capacity in the detection, understanding, and mitigation of natural geohazards, and in the development of alternative energy solutions. The 10-day training course for African geoscientists provided intensive teaching on consolidated techniques in the field of earthquake and volcano monitoring as well as in renewable energy. Real case studies were based on lessons learned from natural hazards and sustainable energy exploration in sub-Saharan Africa.



Group photo of the Kigali workshop

The event was attended by 77 participants from 19 different countries. IUGG funds supported participation of 3 female (including young) scientists from Sudan, Malawi, and Uganda. For detailed information on the event, see ICTP agenda page link: <http://indico.ictp.it/event/a13244/>

African School on the Impact of the Sun on Ionosphere: Physics and Applications

The School took place in the University of Rwanda, in Kigali, Rwanda, from 30th June to 11th July 2014. The School was jointly organized by ICTP, the Institute of Scientific Research of Boston College (B.C, USA) and the University of Rwanda (UR) College of Science and Technology (CST). The Organizers of the School were C. Amory (LPP-CNES), P. Doherty (ISR-Boston College), S. M. Radicella, B. Nava (both ICTP); J. Uwamahoro (Rwanda).

The school obtained financial support from various institutions and space science programs including the IUGG award, which was directed to support young and female scientists. The school gathered 15 Lecturers and 48 students from different countries with the majority of students coming from Rwanda and the East-African Region. The School covered topics related to the physical phenomena of the solar -magnetosphere - ionospheric interactions and their effects on technological systems. In detail the technical sessions were devoted to the following topics: (i) Solar Phenomena; (ii) The ionosphere; (iii) Space Weather and Magnetometers; (iv) GNSS Calculations; (v) Integrated GNSS Techniques and Tools; and (vi) Results of Students Research Projects.



A group of students during their Research Project activity

The school created an opportunity for senior and young space scientists to interact and share knowledge in space science. Also the school strengthened the vision and understanding of the importance of research in space science with particular focus on space weather and its impact on everyday life. In addition to the scientific understanding of the physical phenomena, the students were able to acquire knowledge on how solar activity can influence the functioning and reliability of space-borne and ground-based systems and services. Services that can be disrupted by extreme solar phenomena include telecommunications and Global Navigation Satellite Systems (GNSS) related applications.

The school included hands-on exercises in data analysis. In addition the students were divided in groups in order to analyze different space weather events as small “research projects”. Each group reported their finding in a special session of the School. It should be noted that during this workshop, one space research instrument was donated and installed at the College of Education, University of Rwanda. The instrument is now fully functioning and will be operated by local space scientists to monitor solar bursts and thereby be able to predict their potential influence on the near-Earth environment. The closing ceremony of the School was honored by the presence of the Honorable Minister of Education of the Republic of Rwanda. (Photos, courtesy by ICTP.)

IUGG IN THE INTERNATIONAL COUNCIL FOR SCIENCE (ICSU)

GeoUnions

The GeoUnions (GUs) is a network of representatives of the international scientific unions of the International Council for Sciences (ICSU) dealing with Earth and space sciences. The GUs established a Steering Committee in 2004 (in Paris, France) to promote the sciences worldwide, to communicate and to coordinate scientific activities of individual unions, and to speak on behalf of GUs members to ICSU Executive Board, ICSU Members and its interdisciplinary bodies and at international level, especially to the United Nations organizations and other global stakeholders. The current Members of the GUs are:

- the International Astronomical Union (IAU),
- the International Cartographical Association (ICA),
- the International Geographical Union (IGU),
- the International Union for Quaternary Research (INQUA),
- the International Society for Photogrammetry and Remote Sensing (ISPRS),
- the International Union of Geodesy and Geophysics (IUGG),
- the International Union of Geological Sciences (IUGS),
- the International Union of Soil Sciences (IUSS), and
- the International Union of Radio Science (URSI).

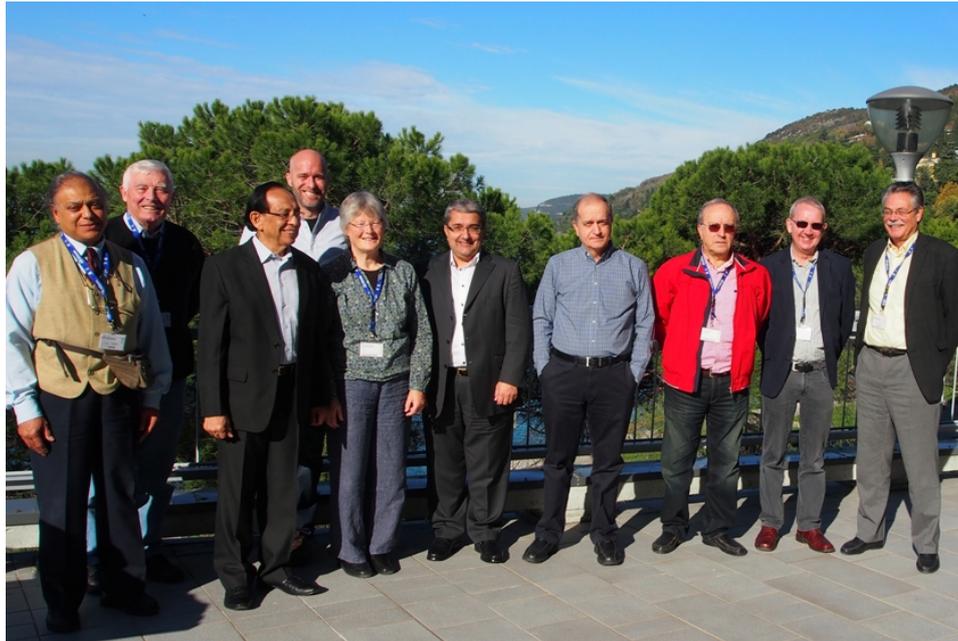
More information on GeoUnions can be found at: www.icsu-geounions.org

GeoUnions Steering Committee Meeting

The Steering Committee of GeoUnions was hosted by the Abdus Salam International Centre for Theoretical Physics, Trieste, Italy and met on 6-7 November 2015. Representatives of eight Unions reported on the progress made since the last business meeting in Auckland, New Zealand (August 2014). They considered a relationship with the International Council for Science (ICSU), particularly discussed the information flow within ICSU and interactions with ICSU Executive Board and Secretariat. The GeoUnions urge close cooperation between the ICSU scientific programs (such as Future Earth) and the GeoUnions programs. In the light of ICSU revising its Grants Programme, GeoUnions leaders agreed to develop a joint grant application for a long-term project on Earth and space science education. GeoUnions discussed their interaction with ICSU Regional Offices and logistical assistance of the Offices in organizing various scientific, education and outreach events. Edith Madela-Mntla, Director of the ICSU Regional Office for Africa, mentioned that GeoUnions have developed very good cooperation in the Africa region, and the Regional Office remains committed to assisting with the activities of Unions.

Alik Ismail-Zadeh (IUGG) reported on the efforts made by the GeoUnions to prepare a synthesis paper on disaster risk science and risk assessment for the U.N. Third World Conference on Disaster Risk Reduction held in Sendai, Japan, March 2015. A summary for policymakers was distributed to the representatives of national governments attending the U.N. conference in Sendai. Orhan Altan (ISPRS) mentioned the successful disaster risk management projects of ISPRS with GeoUnions and UNOOSA.

Joos Droogleever Fortuijn (IGU) reported on the recent development related to the International Year of Global Understanding (IYGU). IYGU addresses global sustainability of local actions and the culturally different pathways to a sustainable world. Sustainable development is a global challenge, but solving it requires transforming the local. After the UNESCO General Assembly endorsed the International Year to become a United Nations Year, ICSU, the International Social Science Council (ISSC), and International Council for Philosophy and Human Sciences (CIPSH) jointly announced that 2016 would be the International Year of Global Understanding (IYGU). The opening ceremony will be held in Jena, Germany, on 2 February 2016.



Group photo of the participants of the GeoUnions meeting on 7 November 2015 (left-to-right): Madhu Chandra (URSI representative), Allan Ashworth (INQUA President), Harsh Gupta (IUGG Past President), Brian Chase (INQUA Secretary General), Joos Droogleever Fortuijn (IGU Vice President), Alik Ismail-Zadeh (IUGG Secretary General), Michael Sideris (IUGG President), Orhan Altan (ISPRS First Vice President), Paul Cannon (URSI President), and Roland Oberhänsli (IUGS President).

Roland Oberhänsli (IUGS) informed the meeting about the recent paper “Geosciences for Future Earth Research” written by experts of several international organizations including GeoUnions. This paper is a commentary on the contents of the three themes, nine subthemes and 62 research priorities as distinguished in the Future Earth’s Strategic Research Agenda 2014. The comments in this paper also point to the issues where solid Earth science expertise may help to improve the scientific quality of the potential outcomes of the research agenda, in line with the Future Earth 2025 Vision that aims to link disciplines and knowledge systems to achieve its goals.

A few administration issues were resolved: Alik Ismail-Zadeh will continue as Chair of the GeoUnions Steering Committee, and Allan Ashworth (INQUA) was elected Vice Chair for the next two years. As the ICSU Scientific Unions Meeting will be held in Paris, France, on 11-12 April 2016, the next Steering Committee meeting will be held on 10-11 April in Paris.

ACTIVITIES OF THE UNION ASSOCIATIONS

The following reports, prepared by the Secretaries General of the eight Associations of IUGG:

International Association of Cryospheric Sciences (IACS)

International Association of Geodesy (IAG)

International Association of Geomagnetism & Agronomy (IAGA)

International Association of Hydrological Sciences (IAHS)

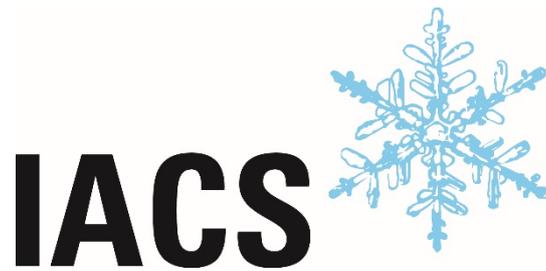
International Association of Meteorology & Atmospheric Sciences (IAMAS)

International Association of the Physical Sciences of the Oceans (IAPSO)

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

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

The reports illustrate the impressive range of activities within each Association as well as their dedication to supporting science within developing countries.



International Association of Cryospheric Sciences (IACS)

www.cryosphericciences.org

INTRODUCTION

The International Association for Cryospheric Sciences (IACS) is the Association of the International Union of Geodesy and Geophysics (IUGG) that is concerned with snow and ice science and which provides expert advice on cryospheric issues to governmental and non-governmental organisations. The objectives of IACS are to:

- Promote studies of cryospheric subsystems of the Earth and solar system.
- Encourage research in the above subjects by members of the cryospheric community, national and international institutions and programmes, and individual countries through collaboration and international co-ordination.
- Provide an opportunity on an international basis for discussion and publication of the results of the above research.
- Promote education and public awareness on the cryosphere, and facilitate the standardisation of measurement or collection of data on cryospheric systems and of the analysis, archiving and publication of such data.

ADMINISTRATION

A Bureau of 11 elected officers manages the business of IACS. The current IACS Bureau was elected at the IACS Plenary Administrative Meeting during the 26th IUGG General Assembly in Prague. In Prague, IACS also held two closed bureau meetings and an open bureau meeting for IACS partners and stakeholders. In attendance were Charles Fierz (IACS President), Regine Hock (new to Bureau, President Elect), Andrew Mackintosh (Secretary General), Olga Solomina (Vice President), Cunde Xiao (Vice President), Ian Allison (newly elected Vice President), Hiroyuki Enomoto (Head, Marine and Freshwater ice), Christine Schott Hvidberg (new to Bureau, Head, Planetary and other ices of the solar system), and Liss Andreassen (new to Bureau, Head, Glaciers and Ice Sheets). In addition, outgoing IACS bureau member Ralf Greve attended our first bureau meeting in Prague.

In other business, new IACS correspondents have been appointed to Italy (Barbara Stenni), Denmark (Andreas Ahlstrøm) and Netherlands (Michiel van den Broeke). We have also made minor adjustments to our by-laws in accordance with the new IUGG statute 10d but also to allow for electronic voting, to provide more flexibility in achieving a quorum at Bureau meetings, and to allow heads of IACS divisions to appoint a deputy. We also renamed our Division III (formerly 'Marine and Freshwater Ice') to 'Sea Ice, Lake and River Ice' in order to improve its clarity and recognition.

Finally, IACS bureau members have recently been nominated to IUGG committees for the 2016-19 period; IACS President Charles Fierz is to chair the IUGG Statutes and By-Laws Committee, IACS Vice-President Dr Olga Solomina is to join the IUGG Honours and Recognition Committee, and IACS Secretary General Andrew Mackintosh will join the IUGG Visioning Committee. In addition,

Christine Schøtt Hvidberg, Head, Planetary and other ices of the solar system, will represent IACS in the newly created Union Commission on Planetary Sciences.

ACTIVITIES

IACS facilitates the transfer of research methods and explores new avenues in cryospheric science through Standing Groups and Working Groups devoted to a theme or subject and composed of experts in the particular field of study. The currently active Working Groups (WG) of IACS are the ‘Randolph Glacier Inventory and infrastructure for glacier monitoring’ (2014 – 2018), ‘Glacier ice thickness estimation’ (2014-2018) and ‘MicroSnow’ (2012-2016). All three of these working groups are very active and held meetings at IUGG Prague. Information about the current working group activities can be found at www.cryosphericciences.org/workingGroups.html.

The current Standing Groups (SG) are the Joint commission on Volcano-Ice Interactions (with the International Association of Volcanology and Chemistry of the Earth's Interior - IAVCEI), the SG on Glacier and Permafrost Hazards in Mountains (GAPHAZ, a joint SG with the International Permafrost Association IPA) and the Steering Committee of the Global Terrestrial Network for Glaciers (GTN-G). The latter was recently strengthened through the addition of Ben Marzeion (University of Bremen) and Stephen Briggs (European Space Agency).

IUGG Prague was a successful meeting for IACS, with well-attended sessions and associated side meetings by IACS Working Groups and Standing Groups. Of particular note for IACS in Prague was the award of the first IACS Early Career Scientist Prize to Dr Mathieu Morlighem from University of California, Irvine, for his paper ‘Deeply incised submarine glacial valleys beneath the Greenland ice sheet’ (Nature Geoscience 7, 418–422 (2014)). In this paper, Dr Morlighem and his colleagues showed that outlet glaciers of Greenland are potentially more vulnerable to ocean warming than previously thought.

IACS also elected three honorary members in Prague; Professors Liz Morris, Georg Kaser and Atsumu Omura, who have each made fundamental contributions to the cryospheric sciences, and the development of IACS (see photograph below). The full citations for the three awardees can be found at www.cryosphericciences.org/honoraryMembers.html.



IACS Honorary Members elected at IUGG Prague (from right to left) Professors Atsumu Ohmura, Elizabeth (Liz) Morris), Georg Kaser (Georg also became an IUGG conferred fellow at IUGG Prague, along with Professor Ian Allison and Manfred Lange, not shown). Professor Gerald (Gerry) Jones (right) was elected as an IACS Honorary Member in 2011, and an IUGG Elected Fellow at IUGG Prague (photo A. Mackintosh).

Sponsorship of meetings and symposia

During 2015, IACS supported the following meetings and symposia.

- International Glaciology Society International Symposium on Glaciology in High Mountain Asia. Secretary General Andrew Mackintosh evaluated student talks and posters and presented awards to two early career scientists.
- IACS supported 4 Early Career Scientists from India, Russia, Turkey, and Hungary to attend the first APECS World Summit: The Future of Polar Research, Sofia, 6-8 June 2015.
- IACS co-sponsored the 1st Snow Science Winter School, Sodankylä, Finland, 8-14 Feb. 2015.

Representation at international scientific meetings and IACS liaisons to other organizations

- President Charles Fierz represented IACS at the XVII WMO Congress and participated in a round table on 'WMO Polar and High Mountain Activities'. He also participated actively in two Global Cryosphere Watch meetings as well as in the sixth session of the Panel of Experts on Polar and High Mountain Observations, Research and Services.
- Hiroyuki Enomoto, Head, Sea Ice, Lake and River Ice, represented IACS at the Council Meeting and other activities of the International Arctic Scientific Committee in Toyama, Japan, April 2015.

FUTURE ACTIVITIES

International Symposium on the Cryosphere in a Changing Climate: Wellington, 2017

A joint IACS-IGS-CliC Symposium on International Symposium on the Cryosphere in a Changing Climate, 12th-17th February 2017 in Wellington, New Zealand (www.cryosphericosciences.org/downloads/iacs2017_firstCircWeb.pdf). This meeting will bring together three of the leading international associations focusing on the cryosphere; the International Association of Cryospheric Sciences (IACS), the International Glaciological Society (IGS) and the World Climate Research Programme Climate and Cryosphere Project (WCRP CliC). The conference will be hosted by Andrew Mackintosh, and based at his home institution, Victoria University, in the beautiful harbour-side city of Wellington. A strong international scientific committee has been established for this conference, chaired by IACS Immediate Past President Ian Allison. We hope to see many of you in Wellington during the height of the southern hemisphere summer, where there will also be a chance to visit the Tongariro volcanic world heritage area, and Aoraki Mount Cook, on the pre- and post-conference field trips.

IACS Early Career Award

The 2nd IACS Early Career Award is currently being judged by a committee chaired by IACS President Elect Regine Hock. We have received a good number of high quality applications. The place and time the award will be presented is not fixed yet.

IACS sponsorship of forthcoming meetings

IACS will co-sponsor the following scientific meetings in 2016:

- 2nd Snow Science Winter School, Preda, Switzerland, 14-20 February 2016. This event will also benefit from an IUGG grant.
- World Glacier Monitoring Service Training Course for Glacier Mass Balance Measurements and Analysis, Bolivia, 10-16 July 2016.
- International Summer School in Glaciology, McCarthy, AK, USA, June 2016. This event will also benefit from an IUGG grant.
- 6th Int. Conference on Mars Polar Science and Exploration, Reykjavik, Iceland, 5-9 Sep. 2016.

Submitted by
Andrew Mackintosh, IACS Secretary General



International Association of Geodesy (IAG)

www.iag-aig.org

INTRODUCTION

The fundamentals of geodesy are the measurement and representation of the geometry, gravity field and spatial orientation of the Earth including their temporal variations, i.e. crustal deformation, mass displacements and variations of Earth rotation. The mission of the IAG is the advancement of geodesy by furthering geodetic theory through research and teaching, collecting, analysing, modelling and interpreting observational data, stimulating technological development, and providing consistent, time-dependent parameters of the Earth's geometry and gravity field for global change research.

The IAG is structured in four Commissions, the Inter-Commission Committee on Theory (ICCT), thirteen International Scientific Services, the Global Geodetic Observing System (GGOS), and the Communication and Outreach Branch (COB). The Commissions are divided into Sub-commissions, Study Groups and Working Groups. The ICCT investigates geodetic science problems in close cooperation with the Commissions. The Services generate scientific products by means of Operations, Data and Analysis Centres. One of the roles of GGOS is the coordination of the different IAG components, relating in particular to the maintenance of the global reference frame for measuring and consistently interpreting key global change processes, and to promote its use to the scientific community, policy makers and the public. The COB provides communication, public information and outreach links, in particular via the IAG Website and the monthly Newsletters.

IAG's administration is supervised by the Council and conducted by the Executive Committee, the Bureau and the Office. The Council is composed by the delegates appointed by the national adhering bodies; the Bureau comprises the IAG President, Vice-President and Secretary General; the Executive Committee consists of the Bureau and other members elected by the Council; and the Office assists the Secretary General. The detailed programme of the IAG is published in the quadrennial Geodesist's Handbook, and reports are published in the bi-annual IAG Reports (Travaux de l'AIG).

ADMINISTRATION

IAG Council

The IAG Council meets regularly at the IUGG General Assemblies, so in Prague, Czech Republic, on June 24 and 30, 2015. Main topics were the election of the members of the IAG Executive Committee (done by e-mail voting before the Assembly), the periodic (every eight years) review of the IAG Statutes and Bylaws, the preparation of the General Assembly 2015, and the decision on the venue of

the next IAG Scientific Assembly 2017, which was assigned to Kobe, Japan, as a joint Assembly with the International Association of Seismology and Physics of the Earth's Interior (IASPEI).

IAG Executive Committee (EC)

The EC 2011-2015 met three times during the General Assembly in Prague, Czech Republic (June 23, 26 and 29, 2015), and the EC 2015-2019 met in Prague (July 2, 2015) and in San Francisco, CA/USA (December 12, 2015). Important topics were the assessment of the IAG Services, the activity reports of all the EC members and the editors of the Journal of Geodesy and the IAG Series (published by Springer), the preparation of the Symposia at the General Assembly, and the new structure for 2015-2019. The meeting summaries are regularly published in the IAG Website (www.iag-aig.org).

IAG Bureau

The IAG Bureau met before each of the EC meetings and held monthly teleconferences to facilitate day-to-day decisions. It decided on 65 travel award applications of young scientists and granted 59.

IAG Office

Main activity of the IAG Office was the organisation of the IAG General Assembly held together with the IUGG General Assembly, and the handling of the IAG budget. EC, Bureau and Council meetings were organised; minutes were written for internal use, the IAG Homepage and the Journal of Geodesy. The individual IAG membership (actually 216 paid-up and student members) was managed.

ACTIVITIES

Commissions, Inter-Commission Committee, and Services

The four IAG Commissions (Reference Frames, Gravity Field, Earth Rotation and Geodynamics, Positioning and Applications), the Inter-Commission Committee on Theory (ICCT), and the thirteen Services maintain their individual Webpages (all accessible via the IAG Homepage). Several Services and sub-components (Sub-Commissions, Working and Study Groups) held administrative meetings (Coordinating, Directing or Governing Board), and organised symposia and workshops (see below).

Global Geodetic Observing System (GGOS)

The GGOS is implementing its new structure and updated the Terms of Reference accordingly. The vision is advancing our understanding of the dynamic Earth System by quantifying our planet's changes in space and time. GGOS works with the IAG Services and Commissions to comply its mission. GGOS is representing the IAG in the Group on Earth Observation (GEO) and prepared a draft for the establishment of the United Nation's Global Geodetic Reference Frame (GGRF).

Communication and Outreach Branch (COB)

Main activities of the COB were the publication of the monthly Newsletters (online and in the Journal of Geodesy), and the maintenance of the IAG Homepage. The IAG Newsletter is sent to the IAG officers and individual members, to the Presidents and Secretaries General of the IUGG and its Associations, and to the members of the Joint Board of Geospatial Information Societies (JBGIS).

Important Meetings of IAG Components and IAG Sponsored Meetings in 2015

- Eighth International VLBI Service for Geodesy and Astrometry (IVS) Technical Operations Workshop (TOW 2015), Westford, MA, USA, 4-7 May 2015.
- 8th Workshop on GNSS Reflectometry (GNSS+R 2015), Potsdam, Germany, 11-13 May 2015.
- 22nd Meeting of the European VLBI Group for Geodesy and Astrometry (EVGA) Ponta Delgada, Azores, Portugal, 17-21 May 2015.

- Latin American Reference System (SIRGAS) Workshop on Vertical Reference Frames, Curitiba, Brazil, 18-22 May 2015.
- GIA Modeling 2015, Fairbanks, Alaska, May 26-29, 2015.
- European Reference Frame (EUREF) Symposium, Leipzig, Germany, 3-5 June 2015.
- IAG General Assembly together with the XXVI IUGG General Assembly, Prague, Czech Republic, 22 June – 02 July 2015.
- International DORIS Service (IDS) Analysis Working Group Meeting, Greenbelt, MD, USA, 15-16 October 2015.
- International Laser Ranging Service (ILRS) Analysis Working Group Meeting, Matera, Italy, 24 October 2015.
- International Laser Ranging Service (ILRS) Technical Workshop 2015, Matera, Italy, 26-30 October 2015.
- Latin American Reference System (SIRGAS) Symposium, Santo Domingo, Dominican Republic, 18-20 November 2015.
- 9th International Symposium on Mobile Mapping Technology (MMT2015), Sydney, Australia, 9-11 December 2015.



Participants of the IAG Opening Session, IUGG General Assembly, Prague, Czech Republic, 25 June 2015



Scholars of the SIRGAS School on Reference Systems, Santo Domingo, Dominican Republic, 16-17 November 2015

Schools organised by the IAG and sponsored by IUGG

- VII SIRGAS School on Reference Systems, Santo Domingo, Dominican Republic, 16-17 November 2015.

Cooperation with other Organisations

IAG maintains close cooperation with several organisations outside IUGG: Advisory Board on the Law of the Sea (ABLOS, presently with IAG presidency), Group on Earth Observation (GEO), ICSU Commission on Space Research (COSPAR, Sub-commission B2 and PSD), International Astronomical Union (IAU, Commission A2), International Standards Organisation (ISO, TC211 Geographic Information / Geomatics), Joint Board of Geospatial Information Societies (JBGIS), United Nations Initiative on Global Information Management (UN-GGIM), United Nations Offices for Outer Space Affairs (UNOOSA, with Space-based Information for Disaster Management and Emergency Response, UN-SPIDER), and International Committee on Global Navigation Satellite Systems, ICG).

Publications

The main publications in 2015 were the monthly issues of the Journal of Geodesy, the IAG Symposia Series (Vols. 141 “Gravity, Geoid and Height Systems and 142 “VIII Hotine-Marussi Symposium on Mathematical Geodesy”) and the IAG Reports Vol. 39 (Travaux de l’AIG 2011-2015).

Awards, Anniversaries, Obituaries

Four Awards were granted at the IUGG General Assembly 2015: (1) The Levallois Medal for distinguished service to IAG and the science of geodesy in general to Reiner Rummel, Germany, (2) the Guy Bomford Prize for outstanding contributions to geodetic studies to Yoshiyuki Tanaka, Japan, (3) the Young Authors Award for the best paper in 2013 to Krzysztof Sośnica, and (4) in 2014 to Alvaro Santamaría, France. Three obituaries were written for former IAG officers and associates.

PLANNED FUTURE ACTIVITIES

In 2016, the new structure of IAG Commissions and Inter-commission Committee will be set up and be implemented by projects, study groups and working groups. The IAG Scientific Assembly 2017 will be organised together with IASPEI in Kobe, Japan. An IAG strategy plan will be discussed and designed, and the assessment of the IAG Services will be continued and may eventually lead to a restructuring. All GGOS sub-components will fully be implemented.

Submitted by
Hermann Drewes, IAG Secretary General



International Association of Geomagnetism and Aeronomy (IAGA)

www.iugg.org/IAGA

INTRODUCTION

IAGA, the International Association of Geomagnetism and Aeronomy (AIGA - Association Internationale de Géomagnétisme et d'Aéronomie) is one of the eight Associations of the International Union of Geodesy and Geophysics (IUGG). It is a non-governmental body funded through the subscriptions paid to IUGG by its Member Countries. IAGA has a long history and can trace its origins to the Commission for Terrestrial Magnetism and Atmospheric Electricity, part of the International Meteorological Organisation, which was established in 1873.

IAGA is the premier international scientific association promoting the study of terrestrial and planetary magnetism, and space physics. IAGA is concerned with the understanding and knowledge that result from studies of the magnetic and electrical properties of:

- the Earth's core, mantle and crust
- the middle and upper atmosphere
- the ionosphere and the magnetosphere
- the Sun, the solar wind, the planets and interplanetary bodies.

ADMINISTRATION

Since 2015, IAGA is organised in six Divisions and four Inter-divisional Commissions, each led by a Chair and a Co-Chair. Each Division/Commission may form Working Groups in given specialised topics and elects officers to run the business of the Working Groups. During the XXVI IUGG General Assembly in Prague (2015), IAGA renewed its officers. The links below lead directly to lists of the Division/Commission leadership and the Working Group names and officers:

www.iugg.org/IAGA/iaga_pages/science/sci_structure.htm

IAGA is administered by an Executive Committee on behalf of IUGG Member Countries in accordance with the Association's Statutes and By-Laws. The election process was conducted by Jan Lastovicka on behalf of the Nominations Committee Chair, Charles Barton, and approved by the Conference of Delegates. The newly elected Executive Committee members are:

President: Eduard Petrovsky (Czech Republic)

Vice-President: Monika Korte (Germany)

Members: Inez Batista (Brazil), Archana Bhattacharyya (India), Brian J. Fraser (Australia), Pieter Kotze (South Africa), Renata Lukianova (Russia), Alan Thomson (UK), and Andrew Yau (Canada).

IAGA communicates with Member Countries through National Correspondents nominated by appropriate national bodies. Member Countries are represented at IAGA Assemblies by accredited Chief Delegates who may vote on matters, according to the voting rules set out in the Statutes and By-Laws, at meetings of the Conference of Delegates. Information on the EC members and National Correspondents are found at: www.iugg.org/IAGA/iaga_pages/science/sci_structure.htm.

ACTIVITIES

The highlights of the IAGA year have to be the excellent General Assembly in Prague, the second IAGA summer school, and new results of the 2-year ESA's Swarm constellation measurements.

The IUGG 2015 General Assembly

The Scientific Program of IUGG 2015 involved more than 4300 participants from 90 countries. Almost 5400 contributions out of more than 5700 submissions were presented, in a total of 202 symposia and workshops. The IAGA presence was remarkable, as IAGA scientists were involved in organising 7 from the total of 11 Union symposia, and led 6 Inter- Association symposia; the IAGA only part of the meeting consisted of 43 symposia, sub-divided into several parts, spanning the full range of IAGA science interests.

The IAGA programme efficiently run in over the first part of the meeting, held in a conference centre which provided an excellent space for poster viewing and the exhibition, as well as plenty of varied sized rooms for oral presentations. This gave us the chance to catch up with latest developments in our own research, as well as take in some of the more inter-disciplinary topics. The meeting provided many opportunities for scientists to discuss different topics, over breaks, poster sessions, and the IAGA special dinner.

In Prague, it was a pleasure to recognise the achievements of IAGA scientists at all stages of their careers at the Open and Awards ceremony and IAGA dinner. The Shen Kuo Medal for Interdisciplinary Achievements was awarded Dan Baker (US), the IAGA Long Service Medal honoured Hans-Joachim Linthe (Germany) and John Riddick (UK), and the IAGA Young Scientist Award was given to Erin Dawkins (UK), Remi Thieblemont (Germany), Israel Silber (Israel), Maria Mendakiewicz (Poland). Vaclav Bucha (Czech Republic), Eigil Friis-Christensen (Denmark) and Michel Menvielle (France) were elected as Honorary Members of IAGA, by virtue of their respective outstanding scientific contributions to geomagnetism and aeronomy as well as their long-time outstanding contributions to IAGA.

Conference of Delegates of the IAGA

Two meetings of the Conference of Delegates of the IAGA were held during the IAGA Scientific meeting, the first on Tuesday 23 June 2015 and the second on Saturday 27 June 2015. A very brief summary of the topics discussed and decisions and recommendations made can be found in IAGA Newsletters no 52.



IUGG Opening Ceremony, with Vladimir Cermak (Chair, LOC IUGG 2015), Alik T. Ismail-Zadeh (IUGG Secretary-General) and Harsh Gupta (IUGG President).



Award Ceremony (Mioara Manda – IAGA Secretary General), Dan Baker (Shen Kuo Medallist), Kathy Whaler (IAGA President).



Conference of Delegates of the IAGA



2nd IAGA school: Students and lectures

2nd IAGA Summer School

The second IAGA School took place also in Prague, June 15-21. The Summer School was very successful, based on feedback received to date. Twenty-two students from 14 countries (of 13 nationalities) participated; most were nominated by Division and Working Group Chairs. Seven lectures, followed by practical and computational exercises, by distinguished experts covered a large variety of IAGA topics. The students stayed in same hotel; this greatly prompted friendship and networking among them.

The whole event took place in a very informal and friendly - though hard-working! - atmosphere. Not only the students, but also the lecturers enjoyed the event very much. All the students became highly visible during the IUGG General Assembly. The Summer School's success depended on Monika Korte's efforts to ensure it went ahead.

Swarm

ESA selected Swarm as the fifth explorer mission in ESA's Living Planet Programme. The mission consisting of three spacecraft was successfully launched on November 22, 2013. This constellation, which comprises three satellites at low Earth polar orbits, with two spacecraft flying side-by-side at low altitude (about 460km), and one flying at a slightly higher altitude (510km), provides high-precision and high-resolution measurements of the strength, direction and variation of the magnetic field, complemented by precise navigation, accelerometer and electric field measurements. These, and the constellation configuration, make it possible to separate and model the various sources of the geomagnetic field and investigate the in situ behaviour of the ionosphere.

During 2015, the three Swarm satellites have provided data used in many studies. Interesting results have been published in a special GRL issue (series of papers presenting the mission, some of its innovating instruments and the very first results and conclusions derived from the first year of Swarm in space), or presented at the 26th General Assembly of IUGG, EGU 2015, AGU 2015 meetings, and during the 5th meeting of the QWG (Quality Working Group) at IPGP, Paris.

Sponsored Topical Meetings

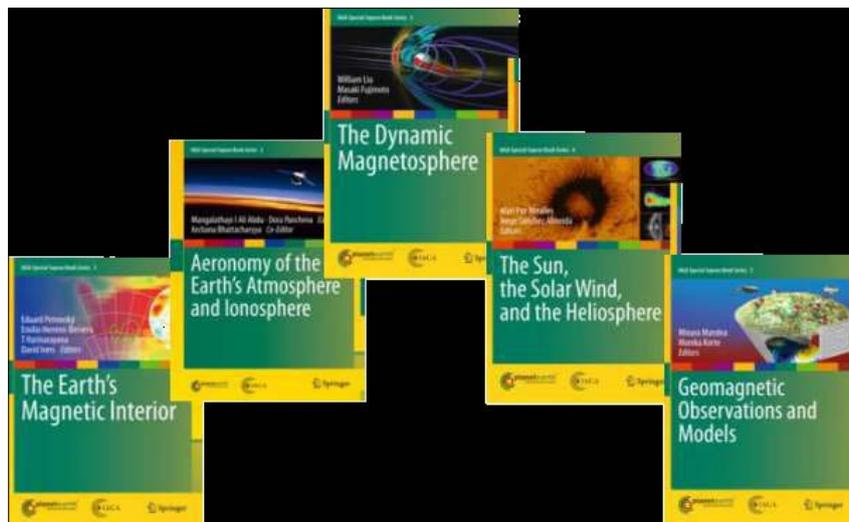
IAGA sponsored a topical meeting during 2015:

- International Workshop and School on Solar system plasma turbulence, intermittency and multifractals, 6-13 September, 2015, Mamaia, Romania

Publications

IAGA books

One of the most important achievements of IAGA was to publish, with Springer, a series of five books, summarizing the state of the science of the IAGA five divisions. As well as providing useful reference texts, the income to IAGA from Springer for this venture was used to support scientists attending the last Scientific Assembly in Sopron, Hungary.

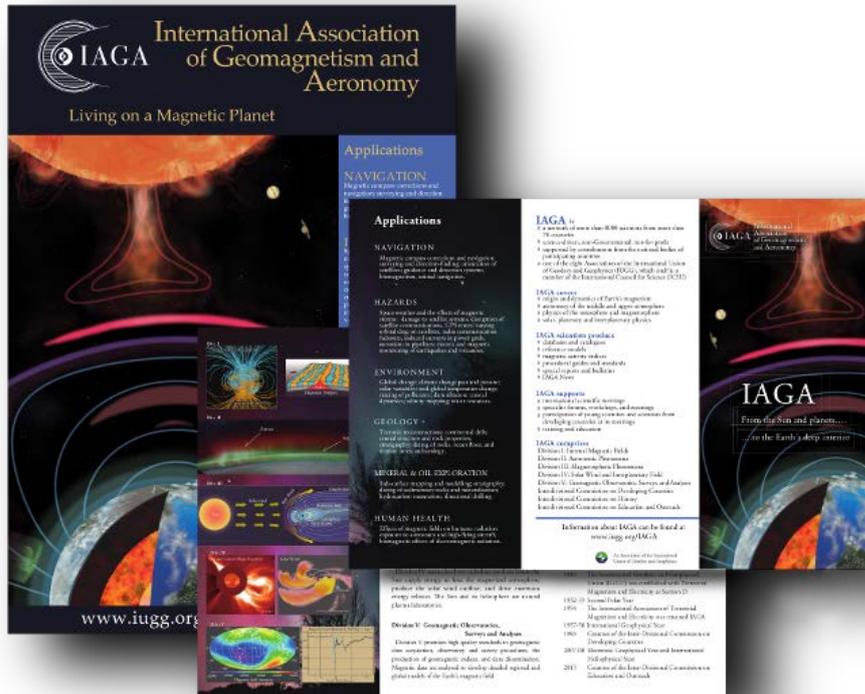


IAGA Newsletters 52

The last issue of IAGA Newsletters was distributed at the end of December 2015. It can be downloaded from the IAGA web site www.iugg.org/IAGA. Among other things, reports from EC and CoD meetings can be found there.

New Flyer and Poster

A new version of the IAGA flyer was agreed upon by the EC.



FUTURE ACTIVITIES

Preparations for IAGA 2017

A joint Scientific Assembly with IAMAS and IAPSO will be organised in Cape Town in 2017. The organisation will be complex and challenging, but the potential benefits to our science are enormous. It will be the first time IAGA has held an Assembly in Africa.

Submitted by
Mioara Mandea, IAGA Secretary General



International Association of Hydrological Sciences (IAHS)

www.iahs.info

INTRODUCTION

IAHS promotes the study of all aspects of hydrology through discussion, comparison, and publication of research results and through the initiation of research that requires international cooperation. IAHS Press publishes the Hydrological Sciences Journal, the Red Book Series, the Benchmark Paper series, and other specialised publications. IAHS maintains strong connections with the International Hydrological Programme of UNESCO and with the Hydrology and Water Resources Programme of the World Meteorological Organisation (WMO).

ADMINISTRATION

The following International Commissions of IAHS initiate and conduct conferences, symposia, workshops, courses, and research programmes:

- International Commission on Continental Erosion (ICCE)
- International Commission on the Coupled Land-Atmosphere System (ICCLAS)
- International Commission on Groundwater (ICGW)
- International Commission on Remote Sensing (ICRS)
- International Commission on Snow and Ice Hydrology (ICSIH)
- International Commission on Statistical Hydrology (ICSH)
- International Commission on Surface Water (ICSW)
- International Commission on Tracers (ICT)
- International Commission on Water Quality (ICWQ)
- International Commission on Water Resources Systems (ICWRS)

ACTIVITIES

The main event of 2015 has been the IUGG Prague General Assembly, where IAHS organized 21 Symposia and Workshops and co-convoked several inter-association and union events. WMO and UNESCO co-convoked two of these symposia. Three PIAHS volumes have been pre-published as proceedings of three symposia. The association General Assembly and Plenary meeting that we held in the first week of the Assembly were well attended. Reports on past activities were presented. Pierre Hubert (France) and Mary Hill (USA) have been awarded the IAHS-UNESCO-WMO International Hydrology Prize, respectively the Volker and Dooge medals. Antonino Maltese and Fulvio Capodici (Italy) received the Tison Award for young scientists. Funds from IUGG, WMO, as well as from Taylor and Francis, allowed provision of grants and banquet invitations to delegates from developing

countries. Zbigniew Kundzewicz (Poland) has been thanked for his long-standing commitment as Editor of Hydrological Sciences Journal, Cate Gardner (United Kingdom) has been celebrated for her retirement from the IAHS Press office head after many years of excellent services, and Claire Lupton (United Kingdom) has been welcomed as the new executive secretary. A statement on a need for action to develop water resources management systems has been adopted by acclamation. Miroslav Tesar (Czech Republic) has facilitated several key logistical issues for the IAHS programme within the IUGG Assembly.



Left to Right: Anil Mishra (UNESCO), Hubert Savenije (President, IAHS), Pierre Hubert (Volker Medal Recipient), Paul Pilon (WMO).



Left to Right: Christophe Cudennec (Secretary General, IAHS), Anil Mishra (UNESCO), Hubert Savenije (President, IAHS), Mary Hill (Dooge Medal Recipient), Paul Pilon (WMO).



Left to Right: Hubert Savenije (President, IAHS), Cate Gardner, Desmond Walling (Chair of IAHS Ltd).



Left to Right: Christophe Cudennec (Secretary General, IAHS), Hubert Savenije (President, IAHS), Antonino Maltese (Tison Award Recipient), Zbigniew W. Kundzewicz (Retired Co-editor, HSJ).



Retiring editor of HSJ Zbyszek Kundzewicz and Co-Editor Demetris Koutsoyiannis.



Participants of the IAHS Ultimate Frisbee Tournament.

Elections and nominations were held for officers of the Association and its Commissions. The detailed results are to be found on the Association website: <http://iahs.info/>. As statutory, Hubert Savenije (The Netherlands) remains President. Elected members of the Bureau are: Günter Blöschl (Austria) President-Elect, Georgia Destouni (Sweden) Vice-President, Eric Servat (France) Vice-president, Elango Lakshmanan (India) Vice-President, Christophe Cudennec (France) Secretary General. Charles Onstad (USA) remains nominated Treasurer and Cate Gardner (United Kingdom) has been nominated incoming treasurer, with a transition period until the 2017 Assembly. Jun Xia (China) has been nominated honorary Vice President. Attilio Castellarin (Italy) has been nominated Co-Editor of Hydrological Sciences Journal, alongside Demetris Koutsoyiannis (Greece) and Mike Acreman (United Kingdom).

There were also two meetings of the IAHS Bureau: one of the old Bureau and one of the new. Among the many other items of business, the Bureau formally terminated the Working Group on precipitation. The new chair (Hilary McMillan, New Zealand) and leading team of the Panta Rhei initiative have been nominated. The location of the 2017 scientific assembly has been chosen (Port Elizabeth, South Africa).

Other events took place in Prague, including general assemblies of commissions, a meeting of National Associations of hydrology, and a meeting of editors of several hydrological journals.

In addition to Prague, many scientific events have been organized, sponsored or supported by IAHS and its Commissions and Working Groups in 2015. Among them we would like to quote the followings : Panta Rhei sessions at the EGU General Assembly (Vienna, Austria, 12-17 April) and AGU Fall Assembly (San Francisco, USA, 14-18 December); HydroEco 2015 (Vienna, Austria, 13-16 April); [6ème Colloque International sur les Ressources en Eau et le Développement Durable](#) (Algiers, Algeria, 21-23 February); Freshwater sessions at the Pre-COP21 Our common future under climate change conference (Paris, France, 7-10 July); ESA 3rd Space for hydrology workshop (Frascati, Italy, 15-17 September); International conference on water resources assessment and seasonal prediction (Koblenz, Germany, 13-16 October); African large river basins hydrology (Hammamet, Tunisia, 26-30 October); 9th NISOLS, International symposium on land subsidence (Nagoya, Japan, 15-19 November); Water-Food-Energy river and society in the tropics (Addis Ababa, Ethiopia, 18-20 November) with EGU; UrbanRain15 (Pontresina, Switzerland, 1-5 December).

In 2015 IAHS Press published in cooperation with Taylor and Francis twelve issues of the Hydrological Sciences Journal, including three special issues: 1) Evaluation of water resources with SWAT, guest edited by V. Krysanova and M. White; 2) Modelling temporally-variable catchments, guest edited by G. Thirel; and 3) African hydrology research, guest edited by D. Hughes and G. Mahé. The bureau decided in Prague to discontinue bilingualism of Hydrological Sciences Journal. Arrangements have been taken to reduce the backlog of accepted papers towards publication, and the multi-objective handling of the journal has been revisited in light of changes in the academic and publishing worlds.

IAHS Press also published the two last Red books of the series began in 1924 and supervised the transition towards the new PIAHS open-access e-book series, in cooperation with Copernicus, with the publication of the four first volumes (numbering and indexing in continuity with the Red Book series), three out of symposia of the Prague assembly and one out of the NISOLS conference in cooperation with UNESCO (www.proceedings-international-association-of-hydrological-sciences.net/home.html):

- Hydrological sciences and water security: Past, present and future, edited by C. Cudennec et al., IAHS Publ. 366, following the 2014 UNESCO-IAHS Kovacs colloquium
- Remote sensing and GIS for hydrology and water resources, edited by Y. Chen et al., IAHS Publ. 368
- Extreme hydrological events, edited by C. Cudennec et al., PIAHS 369, from an inter-association & WMO symposium in Prague

- Changes in flood risk and perception in catchments and cities, edited by M. Rogger et al., from a symposium in Prague
- Hydrologic non-stationarity and extrapolating models to predict the future, edited by J. Vaze et al., from a symposium in Prague
- Prevention and mitigation of natural and anthropogenic hazards due to land subsidence, edited by K. Daito et al., from the NISOLS conference with UNESCO

The IAHS TFDC (Task Force for Developing Countries) finished its action in distributing free of charge all IAHS publications to more than 60 selected Universities and Research Institutions of Africa, Asia, South-America and Eastern Europe since decades; as PIAHS volumes are now open access and digitized archives of the IAHS Red books have been made available within the recently relaunched website.

The close cooperation of IAHS with UNESCO, WMO, the UN-Task Force on Water and Climate and the UN-Water Group has been continued. We have taken part to the WMO –UNESCO working group on hydrological competencies, coordinated the IAHS-UNESCO-WMO sessions on freshwater at the pre-COP21 conference in July in Paris, contributed to the WDRR2016 report and the UNESCO IHP anniversary session at COP21 in Paris, and attended the IHP Bureau meeting and the WMO Global Runoff Data Center-GRDC steering committee. We have also been present at EGU General Assembly, EGU Leonardo conference, AGU Fall assembly, the Southern Africa Waternet meeting, the ESA conference on remote sensing for hydrology, the IAH assembly.

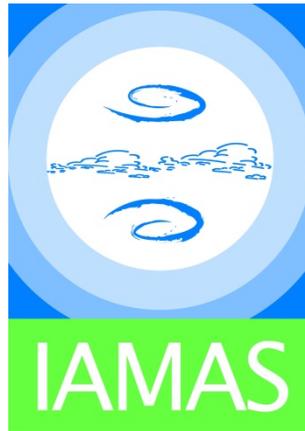
Some preparations have been made for the IAHS-UNESCO 2016 Kovacs colloquium to be held in June as the scientific segment of the UNESCO IHP Intergovernmental Council meeting and for the IAHS scientific assembly in Port Elizabeth, South Africa.

FUTURE ACTIVITIES

The continuation of the Panta Rhei initiative is well under way with a new coordinating team for the 2015-2017 biennium, planned events, and a publication plan in Hydrological Sciences Journal and in other journals.

A joint editorial to be published in several major hydrological journals is under finalisation following the meeting held in Prague, with a focus on innovation and impacts of scientific publications. Implementation at the IAHS level of the IUGG changes about individual membership and remote voting is under preparation, and the transition of the treasurer activities and bank accounts from the USA to the UK is ongoing.

Submitted by
Christophe Cudennec, IAHS Secretary General



International Association of Meteorology and Atmospheric Sciences (IAMAS)

www.IAMAS.org

INTRODUCTION

IAMAS is the specialized association of the International Union of Geodesy and Geophysics (IUGG) that deals with all aspects of the gaseous envelope around the Earth and other planets. The main research work is carried out, coordinated and communicated in IAMAS' 10 International Commissions (IC), which are in alphabetical order the:

- International Commission on Atmospheric Chemistry and Global Pollution (ICACGP)
- International Commission on Atmospheric Electricity (ICAE)
- International Commission on Climate (ICCL)
- International Commission on Clouds and Precipitation (ICCP) including the
Committee on Nucleation and Atmospheric Aerosols (CNAA)
- International Commission on Dynamical Meteorology (ICDM)
- International Commission on the Middle Atmosphere (ICMA)
- International Commission on Planetary Atmospheres and their Evolution (ICPAE)
- International Commission on Polar Meteorology (ICPM)
- International Ozone Commission (IOC)
- International Radiation Commission (IRC)

All ICs, and IAMAS as a whole, play a leading role in global coordination, communication and discussion of the latest research through organization of and participation in a wide range of scientific meetings that are open to all scientists.

ADMINISTRATION

Firstly, IAMAS expresses our deepest appreciation for all hard work by Hans Volkert, Athena Coustenis and Jenny Lin for the term 2011-2015. During the 26th General Assembly of IUGG in Prague, Czech Republic, the national members of the IAMAS General Assembly met twice (23 and 26 June 2015). The most important item on the agenda was the election of new officers and members at large. For the term 2015-2019, the IAMAS Executive Committee consists of the following officers:

President:	John Turner	UK
Vice-Presidents:	Joyce Penner	USA
	Laura Gallardo Klenner	CHILE
Immediate Past President:	Athéna Coustenis	FRANCE
Secretary General:	Teruyuki Nakajima	JAPAN
Deputy Secretary General:	Peter Pilewski	USA
Assistant Secretary General (not voting):	Yoshinobu Sasaki	JAPAN
Members at large:	Daren Lu	CHINA
	Colin Price	ISRAEL
	Lisa Alexander	AUSTRALIA
	Keith Alverson	Kenya/USA
	Iracema Cavalcanti	BRAZIL
Commission presidents (ex officio):		
ICACGP:	John P. Burrows	GERMANY
ICAE:	Daohong Wang	JAPAN
ICCL:	Neil Holbrook	AUSTRALIA
ICCP:	Andrea Flossmann	FRANCE
ICDM:	Richard Grotjahn	USA
ICMA:	Elisa Manzini	GERMANY
IOC:	Christos Zerefos	GREECE
ICPAE:	Sanjay Limaye	USA
ICPM:	Tom Lachlan-Cope	UK
IRC:	Werner Schmutz	SWITZERLAND

John Turner was elected to serve as president, and Joyce Penner and Laura Gallardo Klenner as vice-presidents. Lisa Alexander and Keith Alverson and Iracema Cavalcanti were elected as new members at large. The immediate past-president Athéna Coustenis will continue contributing their expertise and experience to assist with IAMAS matters.

ACTIVITIES

IAMAS provided 22 scientific programmes at the 26th General Assembly of IUGG in Prague, Czech Republic. The decided actions by EC meeting are: to designate a Vice President to chair the ECS awards committee, to recommend a WCRP liaison who has strong links to both WCRP and IAMAS/IUGG, to prepare an MOU for cooperation between IAMAS and Advances in Atmospheric Sciences, to read statutes and bring the issue back at Cape Town 2017 and to submit symposium proposals for Cape Town 2017 by December 2015 and so on.

The IUGG Gold Medal is bestowed upon Brian Hoskins, Imperial College London and the University of Reading, UK. The 2015 IAMAS Early Career Scientist Medal was awarded to Yuan WANG, a Post Doc research associate at Jet Propulsion Laboratory, California Institute of Technology. The former President of IAMAS Prof. Guoxiong Wu has been elected a Fellow of the American Geophysical Union.

Highlights from the International Commissions within IAMAS

ICACGP (www.icacgp.org/)

During the IUGG 2015 Assembly, ICACGP was active in organising two sessions: JM3 Geochemical Processes and Cycles with President as Convenor and several commission members as co-conveners; M06 Observations of Anthropogenic Aerosol-Cloud Interactions. In addition the commission was active in several other sessions including U8 Geo-Monitoring in the 21st Century where Jim Drummond gave a solicited talk.

ICAE (www.icae.jp/)

ICAE has published two issues of newsletters. All the two ICAE newsletters are well received by ICAE colleagues and can be accessed through ICAE website www.icae.jp. ICAE has organized one session for IUGG2015. ICAE website and mailing list have been updated.

ICCL (www.iccl-iamas.net/)

The ICCL (co-)organized and (co-)sponsored five IAMAS symposia for the IUGG 2015 Assembly. Key contributions in 2015 includes: the ICCL helped organize two workshops on marine heatwaves and El Niño – Southern Oscillation in January and February 2015, respectively. Prof Mat Collins has been nominated to the IAMAS bureau as a liaison to WCRP.

ICCP (www.iccp-iamas.org/)

The commission co-organized four symposia at the IUGG 2015 Assembly. About 40 participants attended Secondary ice multiplication symposium in Manchester (UK) in November 2015. The goals of this symposium were to identify what is known about secondary ice multiplication; to make recommendations about how to further clarify and understand the physical nature of the secondary production process; to suggest what needs to be done to quantitatively constrain the associated ice particle production rates for use in numerical models and to produce a summary paper in BAMS summarizing the results of the meeting.

ICDM (<http://icdm.atm.ucdavis.edu>)

The commission co-sponsored and commission members helped plan a workshop on “Dynamics of Atmosphere-Ice-Ocean Interactions in the High-Latitudes” held at Rosendal, Norway. The commission sponsored or co-sponsored three joint symposia and five IAMAS symposia at the IUGG 2015 Assembly. Commission members completed their book project, the second volume in the IUGG Special Publication Series with Cambridge University Press.

ICMA (<http://icma.iaa.es/>)

ICMA held the symposium on Middle Atmosphere Science at the IUGG 2015 Assembly. The Middle Atmosphere Science symposium lasted 4 days (14 sessions) and had over 130 abstract submitted. ICMA has also co-sponsored 4 symposia with IAGA. The ICMA web page has been transferred to iaa.es and is maintained by Vice-President.

IOC (<https://ioc.atmos.illinois.edu/>)

The Commission has voted for Edinburgh (UK) as the location for the 2016 Quadrennial Ozone Symposium. The Symposium will be organized by the NERC Centre for Ecology & Hydrology, in collaboration with IO3C. Several meetings and teleconferences were set up in order to settle the scientific program and the general organization of the Symposium.

ICPAE (<http://icpae.iaps.inaf.it>)

ICPAE has organized oral and poster sessions on terrestrial atmospheres and outer planet atmospheres during the IUGG 2015 Assembly. The theme for the 2015 sessions was comparative planetary atmospheres. ICPAE participated in a proposal submitted to the IUGG to establish a commission on Planetary Science.

ICPM (www.icpm-iamas.aq/)

ICPM endorsed the 10th Antarctic Meteorological Observations, Modeling, and Forecasting Workshop (AMOMFW) in Cambridge, UK. A summary of the workshop has been accepted for publication in *Advances in Atmospheric Sciences*. During the IUGG 2015 Assembly, ICPM hosted several sessions included Clouds, Precipitation and Aerosols and their Influence on Climate at High Latitudes, including the Role of the Southern Ocean and Sea Ice; Weather and the Global Atmospheric Electric Circuit; and Numerical Models for Climate Studies and Forecasting at High Latitudes.

IRC (www.irc-iamas.org/)

IRC was active in organizing five sessions in the symposia “Radiation in the Climate System” during IUGG 2015 Assembly. The arrangement for the next International Radiation Symposium (IRS 2016) held on 16-22 April 2016 in Auckland, New Zealand was performed.

Reports of IAMAS liaisons to other organizations

WMO: Hans Volkert paid several visits to Geneva to attend parts of the large WMO meetings and with a focus to the World Weather Research Programme (WWRP) within the WMO-Commission for Atmospheric Sciences.

SCAR: John Turner chairs SCAR’s Advisory group on Antarctic Climate Change and the Environment (ACCE). It produces a paper for each year’s Antarctic Treaty meeting on recent advances in Antarctic climate science and the impacts on the biota.

FUTURE ACTIVITIES

All commissions are engaged in the planning of IAPSO-IAMAS-IAGA Assembly from 27th August to 1st September, 2017 in Cape Town, South Africa (www.iapso-iamas-iaga2017.com/). Bureau will summarize the proposals of symposia from the Commission at the IAMAS Bureau meeting held in April 2016 in Kyoto, Japan. The new official website of IAMAS will be released in February 2016.

Submitted by
Teruyuki Nakajima, IAMAS Secretary-General



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

<http://iapso.iugg.org>

INTRODUCTION

IAPSO has the prime goal of "promoting the study of scientific problems relating to the oceans and the interactions taking places at the sea floor, coastal, and atmospheric boundaries insofar as such research is conducted by the use of mathematics, physics, and chemistry." IAPSO works mainly through 1) biennial scientific assemblies; 2) working groups; 3) commissions; 4) services and 5) website information. Of special importance to IAPSO is to involve scientists and students from developing countries in the oceanographic activities.

IAPSO maintains formal liaison with other scientific commissions and committees. These include the ICSU's Scientific Committee on Oceanic Research (SCOR), and UNESCO's Intergovernmental Oceanographic Commission (IOC).

For more information see <http://iapso.iugg.org/>.

ADMINISTRATION

The IAPSO office has been situated at Gothenburg University, Sweden until June 2015, and the day-to-day business has been managed by the Secretary General (SG) Johan Rodhe, Sweden. In July 2015 the IAPSO office moved to the Institute of Marine Science of the National Research Council of Italy, Trieste and since then the day-to-day business has been managed by the newly elected SG, Stefania Sparnocchia.

The new Bureau of IAPSO comprises the President, Denise Smythe-Wright, the Past President, Eugene Morozov, the SG, Stefania Sparnocchia and the Treasurer, Ken Ridgway. The SG is responsible for the IAPSO website and in July, 2015 a new IAPSO page was created in the Facebook social network, with the aim of facilitating the spreading of information in the community (see www.facebook.com/iapso.iugg.org).

In 2015, there were four IAPSO business meetings and meeting of the EC during the IUGG General Assembly in Prague. Other IAPSO discussions were maintained by means of e-mail communication.

ACTIVITIES

The principal activity during the year was the participation in the IUGG General Assembly in Prague (IUGG 2015), Czech Republic, from 22 June to 2 July. The meeting was characterized by the central theme: "Earth and Environmental Sciences for Future Generation". The Assembly attracted over 4200 participants from 90 countries covering all five inhabited continents. Almost 5400 contributions out of more than 5700 submissions were presented (more than 2200 as posters) in a total of 202 symposia and workshops, divided into 639 sessions. IAPSO contributed to the 26th IUGG General Assembly 2015 by organizing 13 IAPSO only symposia and 11 interdisciplinary symposia. 345 scientists registered as IAPSO participants with 446 oral or poster presentations.

During IUGG 2015 in Prague, Emeritus Professor Toshio Yamagata from University of Tokyo and Director of Application Laboratory, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), was awarded for the Prince Albert I Medal for “his ground-breaking work and exceptional contribution to our understanding of El Niño/Southern Oscillation and the newly discovered Indian Ocean Dipole”. The Award ceremony took place on June 29, during which Prof. Yamagata gave the Albert I Memorial Lecture.

The Eugene LaFond Medal 2015 was awarded to Dr. Sana Ben Ismail from Tunisia for her oral presentation "Surface circulation features along the Tunisian coast (central Mediterranean Sea): the Atlantic Tunisian current" delivered within the IAPSO symposium "Physics and Biogeochemistry of Semi-Enclosed and Shelf Seas" during the IUGG 2015 General Assembly. The Award ceremony took place at the Closing ceremony on July 1.

IAPSO is now organizing the IAPSO-IAMAS-IAGA Joint Assembly in Cape Town, South Africa, from 27 August - 1 September, 2017. A first meeting for planning was held in Prague, involving IAPSO, IAMAS and IAGA officers and a further meeting was held by videoconference on October 2015. Information about the conference will be posted at www.iapso-iamas-iaga2017.com/.

IAPSO maintains formal relations with the ICSU's Scientific Committee on Oceanic Research (SCOR). Every year the IAPSO EC is involved in the evaluation of Working Group proposal to be funded by SCOR in the next years. Moreover, President Denise Smythe-Wright participated in the SCOR General Meeting in Goa India, 6-9 December 2015. One important issue during the meeting was the decision about which working groups to fund.

IAPSO sponsored activities:

- Commission on Mean Sea Level and Tides (CMSLT), President: Gary T. Mitchum. Vice-President: Simon Holgate. Website: www.psmsl.org/
- Permanent Service for Mean Sea Level, hosted by Proudman Oceanographic Laboratory, UK. Director: Dr. Lesley Rickards. IAPSO Liaison: Philip L. Woodworth. Website: www.psmsl.org/
- IAPSO Standard Seawater Service, hosted by OSIL, Havant, Hampshire, UK. Director: Paul, Ridout; Website www.osil.co.uk
- Joint Committee on the Properties of Seawater, JCS (with SCOR and IAPWS). Chair: Rich Pawlowicz. Vice-Chairs: Trevor McDougall, Rainer Feistel. Website: www.teos-10.org/
- IAPSO/IASPEI/IAVCEI Joint Tsunami Commission. Chair: Dr. Vasily V. Titov. IAPSO Representative: Efim Pelinovsky. Website: www.iaspei.org/commissions/JCT.html
- The working groups, commissions and services report to IAPSO. These reports are published on the IAPSO website <http://iapso.iugg.org/working-groups>

IAPSO Liaison Officers and IUGG Commission Correspondents:

The newly appointed/confirmed Liaison Officers and Correspondents to Commissions and Committees for 2015-2019 are as follows:

- UNESCO Intergovernmental Oceanographic Commission (IOC): Stefania Sparnocchia (Italy)
- ICSU Scientific Committee on Oceanic Research (SCOR): Denise Smythe-Wright (UK)
- ICSU Regional Office for Africa (ROA): Isabelle Ansorge (South Africa)
- Climatic and Environmental Changes (CCEC): Harry Bryden (UK)
- Mathematical Geophysics (CMG): Adam Monaham (Canada)
- Geophysical Risk and Sustainability (GRC): Christa von Hillebrandt-Andrade (USA)
- Data and Information (UCDI): Ira Didenkulova (Estonia)
- Working Group on History (WGH): John Gould (UK)

Members of IAPSO Executive Committee (EC) for 2015-2019:

President: Dr Denise Smythe-Wright (UK); Secretary General: Dr Stefania Sparnocchia (Italy); Past President: Dr Eugene Morozov (Russia); Treasurer: M.App.Sc. Ken Ridgway (Australia); Vice Presidents: Dr Isabelle Ansorge (South Africa); Dr Trevor McDougall (Australia); EC Members: Dr Agatha de Boer (Sweden), Prof Toshiyuki Hibiya (Japan), Dr Christa von Hildebrandt-Andrade (USA and Puerto Rico), Dr Chris Meinen (USA), Dr Satheesh Chandra Shenoi (India), Dr Hans van Haren (The Netherlands).

Submitted by
Denise Smythe-Wright, IAPSO President
Stefania Sparnocchia, IAPSO Secretary General



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

www.iaspei.org

INTRODUCTION

The International Association of Seismology and Physics of the Earth's Interior is the leading international association promoting studies of seismology, earthquake processes, and structure and ongoing geodynamical processes in Earth's interior. IASPEI achieves its goals primarily through scientific conferences organized by IASPEI and its Commissions, but also sponsors other international initiatives, fosters international cooperation, both in monitoring of seismic sources and research and education activities, especially in countries that are in the process of working towards full scientific development.

Most of the IASPEI efforts during 2015 were directed towards the IUGG2015 General Assembly in Prague, in particular IASPEI Symposia and the IASPEI-led Inter-Association Symposia. However, several important additional scientific meetings have been sponsored by IASPEI and several ongoing projects continued.

ADMINISTRATION

The IASPEI Bureau and Executive Committee have met several times in Prague in June/July. Several e-mails regarding important questions on financial support or business to be solved immediately have been exchanged with the members of Bureau and EC throughout the year.

In Prague, the name of the *Commission on Earthquake Source Modeling and Monitoring for Prediction* was changed to *Commission on Earthquake Generation Process – Physics, Modelling and Monitoring for Forecast* and a new Commission was established with the title *Commission on Earthquake Source Mechanics (ESM)*.

Statutes. After discussing the possibility of personal membership in IUGG Associations, the Statutes and By-laws of IASPEI were modified. The revised IASPEI Statutes and By-laws have been unanimously approved in Prague during the IUGG General Assembly. The new Statutes and By-laws are available for download from the website.

Newsletters. IASPEI Newsletters have been regularly sent as pdf-file attachments to e-mails. The Newsletters are also available for downloading from the website. Four issues were distributed in 2015.

ACTIVITIES

2015 IUGG General Assembly in Prague. IASPEI participated actively in the conference (505 officially registered as IASPEI) delegates, with 76 supported financially with grants. The scientific program included 13 IASPEI and 16 Inter-Association symposia with IASPEI participation. IASPEI

also organized an ad-hoc symposium about the Nepal 2015 Earthquake, contributed to the Union program with one Union Lecture and participated in nine of the 11 Union Symposia.

IASPEI support was granted to the 2015 ECGS Workshop on Earthquake and Induced Multi-hazard early warning and rapid response, which was held 18 – 20 November 2015 in Luxembourg (www.ecgs.lu/eewrr2015/).

IASPEI supported, also via donations received for this purpose, the IRIS workshop “Managing Data from Seismic Networks” in Hanoi, 9 – 15 September 2015 with 37 participants from 19 countries.

Some 2,000 hard copies of the first printed edition of the *IASPEI New Manual of Seismological Observatory Practice (NMSOP 2002)* are currently in use in more than 100 countries at seismological observatories, data and analysis centers, in teaching, research, and field applications, used as basic material in national and international seismology training courses, or by private enterprises and individual scientists. In 2014, a rigorously updated and amended electronic second edition, NMSOP-2, was completed and put online, thanks to the efforts of the late Peter Bormann. This version, as well as future ones, are professionally maintained, further developed and edited by the GFZ German Research Centre for Geosciences under a long-term commitment, the auspices of IASPEI and its Commission on Seismological Observation and Interpretation (CoSOI). All versions, including the slightly corrected 2009 electronic version of the first edition, are freely available and downloadable via <http://nmsop.gfz-potsdam.de>. This Website is mirrored both by IASPEI and ISC: (www.iaspei.org/projects/NMSOP.html, www.isc.ac.uk/standards).

The IDEA (International Digital Earthquake Archives) project of the Committee for Preservation of WWSSN and Historical Seismograms (also called *Seismoarchives: Seismogram Archives of Significant Earthquakes of the World*), continued its mission. IRIS is archiving the scanned seismograms. During the General Assembly in Prague it was decided that Graziano Ferrari (INGV) takes over the IDEA Project from W.H.K. Lee. The Project for scanning old Batavia seismograms was ongoing in 2015 and will be continued in 2016.

Awards. During the Opening Plenary of the IASPEI General Assembly in Prague, the second IASPEI medal was awarded to Dr. Willie H.K. Lee.

Obituaries for prominent scientists were regularly published in the IASPEI Newsletters.

FUTURE ACTIVITIES

In 2016, four *Regional commission assemblies* will be held:

- The European Seismological Commission (ESC) will hold its 35th General Assembly in Trieste (Italy).
- The Asian Seismological Commission (ASC) will hold its 11th General Assembly in Melbourne (Australia).
- The Latin American and Caribbean Seismological Commission (LACSC) will hold its 2nd General Assembly in San Jose (Costa Rica).
- The African Seismological Commission (AfSC) will hold its 1st General Assembly during a Nile cruise (Egypt).
- In 2017, the joint Scientific Assembly of IAG and IASPEI will be held in Kobe (Japan) (<http://iag-iaspei-2017.jp/>).

Submitted by
Johannes Schweitzer, IASPEI Secretary General & Treasurer



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

www.IAVCEI.org

INTRODUCTION

At the First General Assembly of IUGG (Rome, 1922), the *Section de Vulcanologie* became one of the constituent sections of the Union. This name was changed into *Association Internationale de Vulcanologie* at the Fourth General Assembly (Stockholm, 1930). It took its present name at the Moscow General Assembly (1971).

The IAVCEI is the primary international focus for research in volcanology and for efforts to mitigate volcanic disasters. Scientists also participate in IAVCEI research in closely related disciplines, such as igneous geochemistry and petrology, geochronology, volcanogenic mineral deposits, and the physics of the generation and ascent of magmas in the upper mantle and crust. Work is carried out in the following special Commissions:

- Chemistry of Volcanic Gases
- Cities and Volcanoes
- COSIV-Statistics in Volcanology
- Arcs Magmatism
- Collapse Calderas
- Explosive Volcanism
- Large Igneous Provinces
- Monogenetic Volcanism
- Remote Sensing
- Submarine Volcanism
- Tephra Hazard Modelling
- Volcanic Lakes
- Volcanic Hazards and Risk
- Volcanogenic Sediments
- Volcano Geoheritage and Protected Volcanic Landscapes
- International Volcanic Health Hazard Network
- Working Group on Volcano Acoustics
- World Organisation on Volcano Observatories

ADMINISTRATION

IAVCEI Executive Committee activities

- Revision of IAVCEI Finances, funding support, and potential funding sources and strategies.
- Update of the IAVCEI Commissions and Working Groups, conducted by the two Vice-Presidents and approved by the EC, in which active commissions have been identified and several inactive commissions have been deactivated.
- The website has been revised and updated
- Update of the Editorial Board of Bulletin of Volcanology

Discussion on the current state of IAVCEI and its relationships with IUGG

- Adoption of the Principle of Freedom of Participation in Learned Societies
- Submission of Proposal to Modernise IUGG and ICSU to IUGG and ICSU, focussing on adoption of self-governance of the associations
- Agreement to modernise and completely revise IAVCEI Statutes
- Agreement of the need to reintroduce compulsory individual membership fees along the lines of the AGU membership fee structure, to ensure the dramatic decline in financial reserves between end 2013 and 2014 is arrested

ACTIVITIES

Members

In 2015 the number of IAVCEI individual members was 2174, 82 of them being Life Members, 1676 non-donor members, and 498 donor members.

Webpage

The IAVCEI web page has been completely refurbished, and now the site has a completely new graphics.

Newsletters

Three issues of the newsletter "IAVCEI News" have been published through the website, during 2015

2015 Meetings, workshops and courses

The following meetings, workshops, and courses have been (co-) organised or sponsored by one (or more) of the IAVCEI commissions in 2015:

- 4th Course: Italian Association for Volcanology (AIV) 2015 International School in Volcanology: Volcanic growth and landscape response. Volcanic processes and basin sedimentation, Lipari, October 5-11, 2015
- 4th International Post-graduate Course of Volcanology, Olot, Girona, Spain, 12-25 October 2015
- XX1 Central Andes Volcanological Field Course, Universidad Nacional de Salta, 11-21 November 2015, Salta, Argentina

FUTURE ACTIVITIES

Foreseen activities for 2016:

- Publication of 4 IAVCEI newsletters
- Revision of Commission activity and definition of minimum requirement for a commission to be considered active
- Funding of workshops and meetings
- Complete the refurbishing of the web site

Meetings in 2016:

- 2nd International Workshop on Volcano Geology, 3-10 July 2016, Etna and Aeolian Islands, Italy. www.iavcei.org/IAVCEI_meetings/MADEIRA/Workshop_Volcano_Geology/Welcome.html
- 5th INTERNATIONAL POST-GRADUATE COURSE IN VOLCANOLOGY (in Spanish), 10-23 Oct 2016, Olot, Spain, www.gvb-csic.es/CURSO/Home.html
- 4th Course: Italian Association for Volcanology (AIV) 20145 International School in Volcanology: The use of geological data for hazard mapping. Ischia Island, Italy. www.aivulc.it
- Cities on Volcanoes 9: Understanding volcanoes and society: the key for risk mitigation, 20-25 November 2016, Puerto Varas, Chile, www.citiesonvolcanoes9.com.

Submitted by
Roberto Sulpizio, Secretary General of IAVCEI

ACTIVITIES OF THE UNION COMMISSIONS

The following reports illustrate the impressive range of activities within each Union Commission as well as their dedication to supporting science within developing countries. Each Union Commission has a web site where much more information can be found.

Commission on Climate and Environmental Change (CCEC)



www.ccec-iugg.org

INTRODUCTION

The Union Commission on Climatic and Environmental Change (CCEC) was established by the Executive Committee of IUGG in June 2012 in order to promote the advancement of scientific understanding of climatic and environmental change, to boost research in reducing uncertainties in climate and environmental models, to define criteria for collaborative trans-disciplinary research on climate and environmental change, to fulfil the objectives of IUGG and its associations, to provide an all-Union perspective on climatic and environmental change, and to make available the knowledge and insights developed through scientific research to the benefit of society and planet Earth, including consideration of the science of global change, related vulnerability and impacts, and potential responses.

CCEC provides a focus for IUGG scientific expertise in climate and environment related areas across the breadth of all IUGG disciplines and associations. CCEC enables the breadth of IUGG expertise to be brought to bear at the global level through collaborating with, and underpinning the work of ICSU and other international organizations. It also enables the geographic spread of IUGG expertise to be brought to bear at the local level through involvement with national bodies in the organization of meetings and other activities.

CCEC objectives are:

- To build scientific capacity for responsibly addressing the broad, multi-disciplinary issues involved in climatic and environmental change;
- To provide useful information, understanding, and support to the public and governmental organizations;
- To interact and cooperate with outside activities that would benefit from the capabilities and resources of the IUGG Associations; and
- To strengthen links across the Scientific Associations within IUGG, to build new external links to organizations outside IUGG, to strengthen existing links to external organizations and to promote IUGG's contribution to global change research.

ADMINISTRATION

The following are current officers and members of the Commission:

Executive Committee:

Chair: Tom Beer (Australia)

Vice Chair: Jianping Li (China)

Secretary-Treasurer: Keith Alverson (USA)

Members of the committee representing Union Associations

Ian Allison (Australia, IACS)

Harry Bryden (UK, IAPSO)

Eigil Friis-Christensen (Denmark, IAGA)

Domenico Giardini (Switzerland, IASPEI)

Michael C. MacCracken (USA, IAMAS)

Setsuya Nakada (Japan, IAVCEI)

Dan Rosbjerg (Denmark, IAHS)

Stephen Self (USA/UK, IAVCEI)

Michael G. Sideris (Canada, IAG)

Makoto Taniguchi (Japan, IAHS)

Tonie Van Dam (Luxembourg, IAG)

Guoxiong Wu (China, IAMAS)

and a co-opted member: Serhat Sensoy (Turkey, WMO Commission for Climatology)

ACTIVITIES

The main activity for 2015 was CCEC participation at the XXVI General Assembly of IUGG held in Prague, Czech Republic. In addition to the participation of CCEC members in their personal capacities, the specific activities organised by CCEC at this Assembly were:

- To organise, convene and hold the Union Session U1 on Future Earth.
- The Business Meeting of the commission that reported progress on the various initiatives.
- To run a panel discussion on the Global Framework for Climate Services (GFCS)

During the year CCEC also:

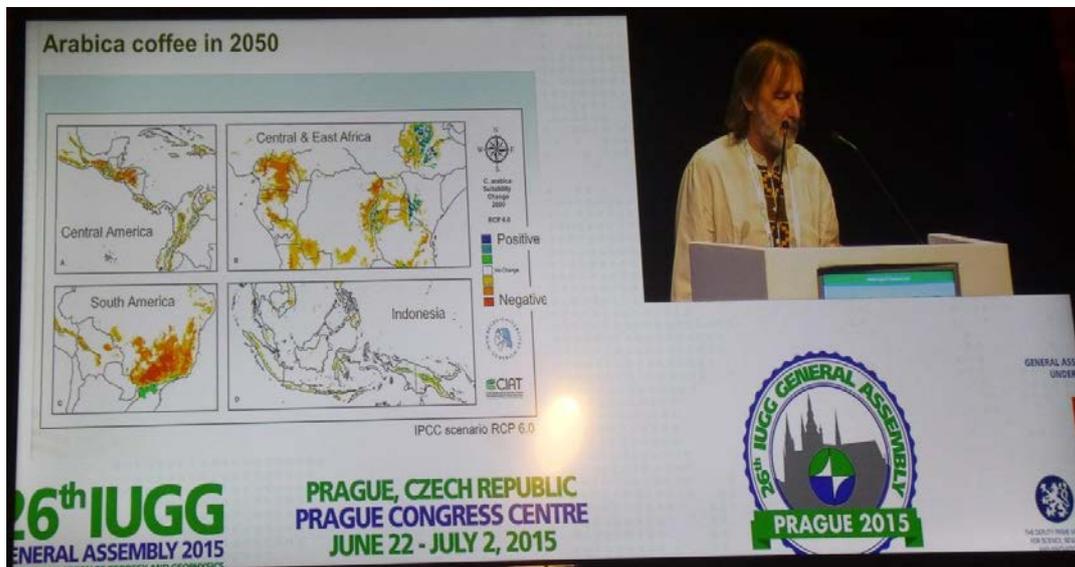
- Submitted a proposal to the Belmont Forum for funding
- Submitted a proposal to Cambridge University Press for production of an edited monograph titled: *Global Change and Future Earth: The Geodetic and Geophysical Perspective*

Session U1 of the IUGG General Assembly in Prague

The Scientific Program Committee of the IUGG General Assembly accepted a CCEC proposal to organise a Union symposium (Symposium U1) that was held on 23 June 2015 titled: *Future Earth and Sustainability* with the following invited speakers (in order of their presentation):

- Tetsuzo Yasunari (IAMAS Executive Member), Institute for Humanity and Nature (RIHN), Kyoto, Japan - Monsoon Asia and Future Earth
- Guoxiong Wu (ICSU Executive Board), LASG Institute of Atmospheric Physics, Beijing, China - Meteorology and Climate of Future Earth
- Bruce M. Campbell (Director, CCAFS), International Center for Tropical Agriculture (CIAT), c/o University of Copenhagen, Copenhagen, Denmark - Climate Change and Food Security
- Guy Brasseur, NCAR, Boulder, USA (Chair, WCRP JSC) - Climatic and Environmental Change
- Pavel Kabat (Director, IIASA), International Institute for Applied Systems Analysis (IIASA) Laxenburg, Austria - A Systems Approach to Future Earth

- Alberto Montanari (Director, Panta Rhei), University of Bologna, Bologna, Italy - Urbanisation and Water Resources
- David Johnston (Chair, IRDR), GNS Science/Massey University, Wellington, New Zealand - Future Earth and Disasters



Bruce M. Campbell (Director, CCAFS) during his presentation on Climate Change and Food Security

In addition to the invited oral contributions that were presented in the Plenary Hall of the Congress Centre, there were six contributed presentations that were organised as posters during the Assembly poster session.

- | | |
|--|---|
| Future Earth in the MENA region | <i>Manfred Lange (Cyprus)</i> |
| Water-energy-food nexus for sustainability in Asia-Pacific | <i>Makoto Taniguchi (Japan)</i> |
| Commuter exposure to black carbon particles on a public bus route | <i>Admir Créso Targino (Brazil)</i> |
| Weather, climate and food security | <i>Tom Beer (Australia)</i> |
| Exposure to black carbon, ozone and particulate matter in different urban microenvironments and travel modes using mobile measurements | <i>Marcelo de Paula Correa (Brazil)</i> |
| Robert Mallet Foundation: from a participatory approach to a sustainable development model | <i>Graziano Ferrari (Italy)</i> |



Poster Session for the UI Symposium at the Prague General Assembly (Source: IUGG & C-IN).

CCEC Business Meeting

The CCEC Business Meeting was held on 30 June 2015 during the Prague General Assembly. Minutes are given in Appendix 1. The Executive of CCEC agreed to serve for a further 4 year period. Harry Bryden replaced Lawrence Mysak as the IAPSO representative. Domenico Giardini is to serve as IASPEI representative but he was unable to attend the Business Meeting.

It was decided to have the 2nd CCEC Science Meeting in Luxembourg in 2016. Subsequent to the business meeting the dates were set as 22-25 October 2016.

Panel Discussion on Global Framework for Climate Services (GFCS)

Co-sponsored by IUGG and WMO.

On behalf of CCEC, Arthur Askew organised a panel discussion on GFCS that was held on Wednesday 24 June 1800-1930.

The Panel Discussion was designed to elucidate the IUGG role (if any) in the World Meteorological Organization's (WMO) new initiative entitled the Global Framework for Climate Services (GFCS). The aim of the Framework is to guide the development and application of science-based climate information and services in support of decision-making so as to enable society to better manage the risks and opportunities arising from climate variability and change, especially for those who are most vulnerable to such risks.

The Panel was successful drawing an audience of approximately 80 participants. The panel was chaired by Dr Tom Beer, Chair of CCEC, and the other panelists (on stage) were:

Arthur Askew (Introduction), Roger Pulwarty [NOAA, USA] who spoke on the Challenge to IUGG, Vlad Kattsov (WCRP) who of the need for a dialogue between scientists and users, Harald Kunstmann (IAHS) who pointed out the numerous ways in which IAHS can assist WMO, including their Panta Rhei research program, and finally Filipe Lucio (WMO) who summarised the WMO position after he had heard the presentations and the audience discussion.

The open discussion included statements from Roxana Bojaru (Romania), Mike MacCracken (USA), Pierre Hubert (IUGG Bureau), and Gordon McBean (ICSU President).

Belmont Forum

CCEC prepared a funding pre-proposal for submission to the Belmont Forum with the title:

CLIP-SEAS: Climate Predictability and the South East Asian Region

as a project developed by CCEC scientists. The project draws on the past interactions between CCEC and the strong support for climate modelling, hydrological forecasting, and near-term forecasting that exists in the Southeast Asian region. CLIP-SEAS brings together three groups from the SouthEast Asian region to examine the details of regional extremes at both the large scale and the small scale by using general circulation models (GCM) to examine tropical cyclones (large scale) and localised flooding (small scale) and the ability of such models to explain past events; the ability of such models to produce near-term forecasts of future events; and the ability to apply knowledge from disparate scientific areas -- such as disaster warnings, and hydrological forecasting, to prepare culturally neutral forecast products that can be used for near-term forecasting.

The pre-proposal was not selected for transition to a full proposal.

Global Change and Future Earth: The Geodetic and Geophysical Perspective

In December 2015 Cambridge University Press accepted a proposal for an edited monograph with the above title to be published in October 2017 as part of the IUGG Series of publications. Letters of invitation have been sent to proposed Chapter authors and a major 2016 initiative for CCEC will be the production of the book.

The Editors are Tom Beer, Jianping Li, Keith Alverson.

The Editors are supported by an Editorial Advisory Board consisting of:

Hans Volkert, Athena Coustenis, Alberto Montanari, Makoto Taniguchi, John Burrows.

Submitted by
Tom Beer, CCEC Chair

Commission on Mathematical Geophysics (CMG)

www.iugg.org/about/commissions/cmg.php

SUMMARY

During 2015 the commission was working on organizing the 31th biennial CMG meeting in Paris. A business meeting was held during the 26th IUGG General Assembly in Prague.

ADMINISTRATION

Membership. The CMG membership remained the same in 2015. **Chair:** Yehuda Ben Zion (USA); **Vice-Chairs:** Einat Aharonov (Israel) and Claudia Pasquero (Italy); **Secretary:** Ilya Zaliapin (USA); **Past Chair:** Dan Rothman (USA)

Business meeting. A CMG business meeting was held during the 26th IUGG General Assembly in Prague at Prague Congress Center, Room 1.1 on June 29, 2015, 12:00 – 13:00. Attendance: Yehuda Ben-Zion (Chair), Roberto Carniel (IAVCEI), Alik Ismail-Zadeh (IUGG Secretary General), Malcolm Sambridge (IASPEI), Gordon Swaters (IAPSO), Ilya Zaliapin (Secretary). The agenda included Report of the Commission Chair, Yehuda Ben-Zion, on organizing the CMG 2016 meeting in Paris, France; discussion of the CMG draft scientific program; report of IUGG Secretary General, Alik Ismail-Zadeh, on the Commission funding; and discussion of the possible venue for the 32nd CMG meeting in 2018.

ACTIVITIES

CMG biennial meeting 2016 in Paris, France

During 2015, CMG was working on organizing its 31st CMG biennial meeting. The meeting will take place during June 6-10, 2016 in Paris, France at the Université Pierre et Marie Curie. The meeting topics span across many geophysical areas, including terrestrial, atmospheric and oceanic flows, seismology, modeling of seismic sources and eruptions. In addition to its traditional focus on theoretical and modeling works, CMG2016 will also emphasize experimental works – in particular conceptual experiments that address physical mechanisms and scaling laws.

The abstract submission is now closed. The conference attracted a record number of participants, with 260 submitted papers from 240 researchers from around the world. The conference will be organized in 16 special sessions that will combine oral and poster presentations.

The local organizing committee members: Philippe Claudin (CNRS, ESPCI), Alexandre Fournier (IPG Paris), Valérie Vidal (CNRS, Laboratoire de Physique - ENS de Lyon), and Renaud Toussaint (CNRS, IPG Strasbourg).

NSF support will be sought to support the meeting participation by US-based early-career scientists. The conference web site is: <http://cmg2016.sciencesconf.org/>

FUTURE ACTIVITIES

The Commission is preparing to the 31st CMG meeting in Paris (see above). The Commission is working on selecting the venue and LOC for the 32nd CMG meeting in 2018.

Submitted by
Ilya Zaliapin, CMG Secretary
Yehuda Ben Zion, CMG Chair

Commission on Geophysical Risk and Sustainability (GRC)



www.iugg-georisk.org

INTRODUCTION

The IUGG Commission on Geophysical Risk and Sustainability (IUGG GeoRisk Commission) established by the IUGG Bureau in August 2000 is dedicated (i) to promoting scientific studies applied to the reduction of risk from natural hazards in an increasingly urbanized world and sustainability and (ii) to reducing death and destruction from natural and technological hazards by providing hazards data and information to emergency managers, policy-makers, scientists and the general public in the most timely and effective manner as possible. This includes the integration of knowledge concerning environmental, social and economic processes. The fundamental scope of this Commission is to facilitate communications – between scientists via meetings, workshops and publications, as well as between scientists and decision makers, between scientists and the public, and between scientists and schools.

ADMINISTRATION

Business Meeting

Business Meeting of the GRC was held on 25 June 2015 at the Prague, Czech Republic Convention Center, during the IUGG General Assembly in Prague, Czech Republic. A total of 19 members and observers were present. Minutes of the meeting are available on the GRC website.

Election of new officers

Joan Marti was nominated as Chair.

It was agreed to combine the Secretary and Treasurer positions, and Paula Dunbar was nominated into this position.

Alan Thomson was nominated as second Vice-Chair.

All accepted the nominations and were voted in.

Membership

The current membership is listed below.

Joan Marti	Chair	IAVCEI
John Labrecque	Vice-Chair	Lead, Geohazards Monitoring Focus Area, GGOS
Alan Thomson	Vice-Chair	IAGA
Paula Dunbar	Secretary-Treasurer	IAPSO
Christa von Hillebrandt-Andrade	EC Member	IAPSO
Guy Brasseur	EC member	IAMAS
Michael Krautblatter	EC member	IACS
Mohsen Ghafory-Ashtiany	EC Member	IASPEI
Kuniyoshi Takeuchi	Past Chair	

Kosuke Heki	Member	IAG
Stephen McNutt	Member	IAVCEI
Martin Funk	Member	IACS
David Boteler	Member	IAGA
Vladimir Kossobokov	Member	IASPEI
Tom Beer	Honorary Member	IAMAS
Ramesh P. Singh	Honorary Member	IASPEI
Alik Ismail-Zadeh	Honorary Member	IASPEI
Harsh Gupta	Advisory Board Member	IASPEI
Viacheslav Gusiakov	Advisory Board Member	IAPSO
Uri Shamir	Advisory Board Member	IAHS
Gordon McBean	Advisory Board Member	Policy Studies Institute for Catastrophic Loss Reduction

Hannah Jenkins Webmaster

Treasurer's Report

A separate report from the Treasurer has been sent to Dr. Aksel Hansen, IUGG Treasurer. At the 2015 IUGG General Assembly Alik Ismail-Zadeh advised that there would likely be a reduction in future allocation to the Georisk Commission due to a drop in overall funding levels for IUGG. To date, there have been no IUGG allocations to the Georisk Commission for the year 2015.

ACTIVITIES

GRC website

At the 2015 IUGG General Assembly in Prague, Diana Greenslade presented a paper provided by the current webmaster. It was decided that the new Executive Committee would consider the proposals in the paper and make a decision about a way forward. No action has been taken on this item.

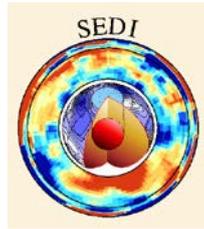
FUTURE ACTIVITIES

Upcoming meetings

International Conference "Data Intensive System Analysis for Geohazard Studies" which will be held in Sochi (Russia), 18–21 July 2016, <http://sochi2016.gcras.ru/>

Submitted by
Paula Dunbar, GRC Secretary

Commission on the Study of the Earth's Deep Interior (SEDI)



www.sedigroup.org

INTRODUCTION

SEDI is an international scientific organization dedicated to the Study of the Earth's Deep Interior. The scope of SEDI includes the core and lower mantle, but interest may extend to the surface. The scientific questions and problems of interest to SEDI include: 1) the investigation of the origin, evolution, structure, geochemical and mineralogical composition of the inner core, outer core, mantle and crust, 2) the investigation of core magnetohydrodynamics at all time scales, both from a theoretical point of view and from an observational point of view, and of more general fluid rotational dynamics that can affect the core, 3) the investigation of mantle dynamics, both from a theoretical point of view and observational point of view, 4) the investigation of mechanical, electromagnetic, thermal and chemical interactions between the inner-core, core, mantle, crust and possibly outer layers on a planetary scale, particularly in view of a global understanding of the Earth as a globally interacting system, with special emphasis on investigation of interfaces, 5) The thermodynamics of the Earth and the investigation of its long-term thermal evolution.

Since 1987, SEDI has been a Union Commission of the International Union of Geodesy and Geophysics ([IUGG](#)). As such, it cuts across the traditional discipline-oriented bounds of the Associations of the IUGG [such as the International Association of Geodesy ([IAG](#)), the International Association of Geomagnetism and Aeronomy ([IAGA](#)), the International Association of Seismology and Physics of the Earth's Interior ([IASPEI](#)), and the International Association of Volcanology and Chemistry of the Earth's Interior ([IAVCEI](#))], which normally study the Earth from a particular point of view. The intent of SEDI is to amalgamate all sources of data and all points of view to generate the most coherent and consistent picture of the workings of the Earth's deep interior.

ADMINISTRATION

SEDI is currently chaired by Jonathan Aurnou (UCLA, USA), vice-chaired by Christine Thomas (U. Münster, Germany), with Michael Bergman (Simon's Rock College, USA) acting as Secretary-General. It has a membership of about 600, as recorded on the email list used to broadcast information related to SEDI activities, upcoming meetings, funding opportunities, and academic openings.

ACTIVITIES

IUGG 2015 General Assembly

The main activity in 2015 was the IUGG General assembly. At the IUGG 2015 General Assembly, several symposia were held that were closely related to SEDI interests. In particular, the Union Symposium U05 entitled "New Discoveries in Deep Interiors of Earth and Planets" was co-convened by Satoru Tanaka (SEDI), Dominique Jault (IAGA), Richard Gross (IAG), Thorn Lay (IASPEI), and John Gamble (IAVCEI). This was a very well-attended session, with good interdisciplinary discussions relevant to deep Earth processes and structure.

In addition to a poster session, twelve invited speakers made oral presentations: Arwen Deuss “Seismic Inner Core Structure”; Steve Grand “Global Seismic Mantle Structure”; Gauthier Hulot “Satellite Observation of the Geomagnetic Field”; Hikaru Iwamori “Hemispherical Mantle Geochemical Heterogeneity”; Andy Jackson “Dynamo Simulations Without Viscosity”; Alexey Kuvshinov “Global and Regional Geo-Electromagnetic Mantle Structure”; Allen McNamara “Mantle Convection and ULVZs”; Yangxin Pan “Geomagnetic Field and Life”; Isabella Panet “Satellite Gravity”; Barbara Romanowicz “Global Mantle Seismic Structure”; Christopher Russell “Vesta and Ceres”; and Dave Stevenson “A Habitable Planet”.

The Business Meeting was held on July 28th, 2015. The new chair and vice-chair and continuation of the secretary were approved. The new executive committee members were also approved. Finally, it was suggested that we consider creating an Associate Secretary position, in order to lower the workload taken on by the Secretary General.

FUTURE ACTIVITIES

SEDI 2016 Meeting

The 15th SEDI Meeting will be held the 24th through the 29th of July in Nantes, France. This marks the return of the SEDI Meeting to France 18 years after the 6th SEDI Meeting was held in Tours in 1998. The meeting location will be at La Cité conference center in downtown Nantes. The meeting website is accessible from the main SEDI site, <http://sedigroup.org/>.

The Local Organizing Committee is comprised of Hagay Amit, Éric Beucler (webmaster), Antoine Bézos, Yann Capdeville, Gaël Choblet, Caroline Dumoulin, Christèle Guivel, Erwan Benoit Langlais (Chair), Thébault, Gabriel Tobie, and Olivier Verhoeven. The Science Steering Committee is Hagay Amit, Denis Andrault, Jon Aurnou, Mike Bergman, Nicolas Coltice, Dominique Jault, Benoit Langlais, Michael Le Bars (Chair), Manuel Moreira and Christine Thomas.

Invitations have been sent to keynoted and invited speakers and the program is now set and accessible on the “Scientific Program” page of the SEDI2016 site.

Submitted by
Jonathan Aurnou, Chair, SEDI
Christine Thomas, Vice-Chair, SEDI
Michael Bergman, Secretary-General, SEDI

Working Group on History (WGH)

INTRODUCTION

At IUGG-2011 in Melbourne, an ad-hoc interest group for the history of IUGG was formed having in view the centenary of the Union in 2019. In November 2012, the IUGG Working Group on History (WGH) was formally established by the Executive Committee. The broad goals of the WGH are to raise the historical consciousness of IUGG Association members and to help preserve IUGG's scientific and institutional history. Historical awareness helps to broaden scientists' horizon and to enrich their lives by enabling them to relate the struggles and triumphs of predecessors to their own day-to-day challenges.

The WGH promotes historical content in Union and Association scientific sessions and sponsors stand-alone history sessions at Union General Assemblies, with emphasis placed on the centenary of IUGG's foundation coming-up in 2019. The WGH encourages publication of historical articles by Association members in relevant journals, in books, and on websites. In a secondary role, the WGH serves as a consultant to the IUGG and Association leadership on the preservation of institutional and scientific records.

ADMINISTRATION

A business meeting was held on 27 June 2015 during the IUGG General Assembly in Prague. The following individuals agreed to serve during the current quadrennium:

Chair: Hans Volkert (Germany) **Vice-Chair:** Claude Boucher (France)

Association representatives:

IACS:	Marc Carey (USA)	IAG:	József Ádám (Hungary)
IAGA:	Edward Cliver (USA)	IAHS:	Maurits Ertsen (Netherlands)
IAMAS:	Hans Volkert (Germany)	IAPSO:	John Gould (UK)
IASPEI:	Roger Musson (UK)	IAVCEI:	Grant Heiken (USA)

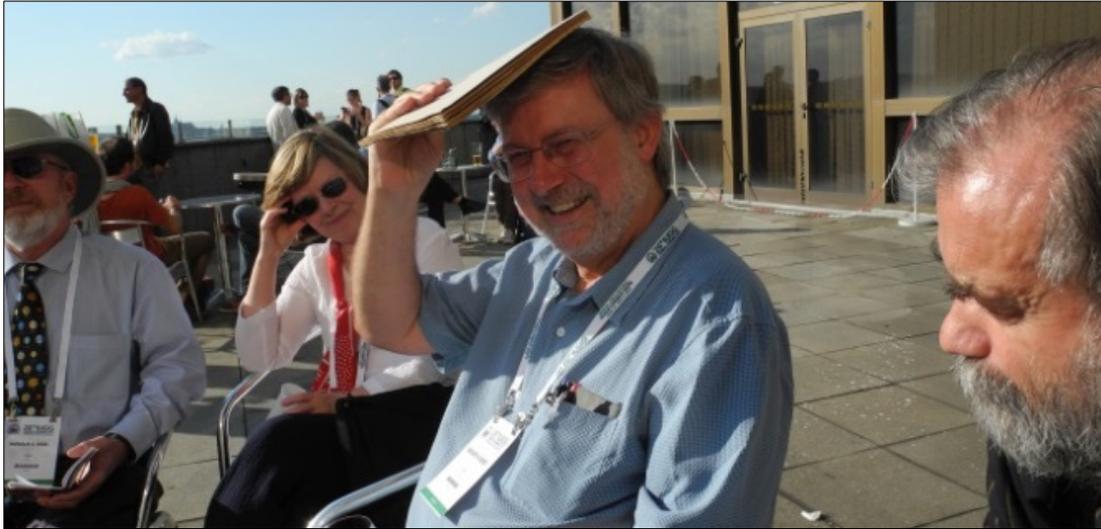
History of Science advisors:

Ronald Doel (USA) Gregory Good (USA)

The latent and growing interest in the historic development of the geophysical compartments was noted. At IUGG-2015 the inter-association symposium IA06 "Data of the edge: preservation and utilization of historical data in the geosciences" and the Union symposium U09 "Revolutions in Earth sciences: from different spheres to a common globe" were regarded as important steps for the integration of science-historical topics in IUGG-assemblies. In view of a compact publication for the IUGG centenary in 2019 the atmospheric science volume by Harper (2007) was mentioned as an example, which covered the 20th century by ten decadal steps. Altogether, the firm integration of historians of science with good knowledge of geophysical sub-disciplines was considered essential.

ACTIVITIES

In 2015, WGH concentrated on organizing the above mentioned interdisciplinary symposia at the General Assembly in Prague, which resulted in enhanced cross-association understanding. The altogether 26 presentations (15 of them solicited) comprised a broad combination from all eight associations by junior and senior colleagues from within IUGG and beyond.



Four of the speakers after the IUGG-2015 JA06 and U9 symposia in the evening sun at Prague Convention Centre on 29 July: Ronald Doel (with hat), Kristine Harper (with scarf), Gregory Good (under document), and Roger Musson (Photo: Hans Volkert).

PLANS

The immediate aim of WGH is to systematically integrate history of science orientated symposia in the (inter-)association assemblies scheduled for 2017. The IAPSO-IAMAS-IAGA assembly in Cape Town is to serve as an example linking ocean-atmosphere-magnetosphere aspects. Valuable motivation and factual input can be drawn from the recent book about the interdisciplinary development of atmospheric science (Fleming, 2016), as it also touches neighboring geophysical disciplines and as the protagonists Bjerknes, Rossby and Wexler were personally instrumental for international cooperation in geophysical research, also in the context of IUGG.

In 2016 a decision has to be sought within WGH and in conjunction with the IUGG Bureau about a dedicated publication ready for the IUGG centenary in summer 2019. A coordinated volume within the Special Publication Series with *Cambridge University Press* is seen as one option. Tapping the vast personal experience of Jo Ann Joselyn (IUGG secretary-general 1999-2007), old IUGG papers residing at the American Institute of Physics (Center for History of Physics) and equivalent material from the associations are considered as a necessary requirement for such an enterprise.

Additionally, material is to be collected for a multifaceted exhibition to be displayed at IUGG-2019 in Montréal. Posters with explanatory text and instructive photographs (cf. sample below which was displayed at IUGG-2015) are seen as a standard means. Selected artefacts as key instruments can contribute important additional flavor. Special emphasis is to be put on the acting persons and their cultural backgrounds in order to underscore IUGG's cooperative aspects on a voluntary basis.

References:

- Fleming, J.R., 2016: *Inventing atmospheric science: Bjerknes, Rossby, Wexler, and the foundations of modern meteorology*. The MIT Press, Cambridge, Mass., x + 296 pp.
- Harper, K.C., 2007: *Weather and Climate: Decade by decade* (Twentieth century science series). Facts on File, New York, xxi + 250 pp.
- IUGG, 1927: The International Union of Geodesy and Geophysics. *Nature* **120**, no.3022, 494-495; online: www.nature.com/nature/journal/v120/n3022/pdf/120494a0.pdf

FROM THE HISTORY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

The 3rd IUGG General Assembly, Prague 1927

Vladimir Čermák and Petr Holota

Geophysical Institute, Czech Acad.Sci., Prague

Research Institute of Geodesy, Topography & Cartography, Zdiby, Prague-East



Example for historical awareness within the Local Organizing Committee of IUGG-2015: Title block and large group photograph from a poster about the IUGG General Assembly in 1927 [displayed in the foyer of the Prague Convention Centre; cf. also IUGG (1927)].

Submitted by
Hans Volkert, Chair, WGH

THE INTER-UNIONS COMMISSION: International Lithosphere Program (ILP)



www.scl-ilp.org/

INTRODUCTION

The International Lithosphere Program (ILP) seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere through international, multidisciplinary geoscience research projects – Task Forces (TF) and Coordinating Committees (CC) addressing major ILP themes:

- I. Geoscience of global change
- II. Contemporary dynamics and deep processes
- III. Continental lithosphere
- IV. Oceanic lithosphere

ADMINISTRATION

ILP operates on the base of terms of reference and has an international Bureau with members from several countries. They meet regularly to monitor the progress and to select new projects in close consultation with the representatives of National Committees. The Bureau is chaired by the President with support from the Secretary General. The ILP Secretariat is located in the German Research Centre for Geosciences in Potsdam (GFZ-Potsdam) and is headed by the Executive Secretary A. Rudloff (Germany). The current ILP Bureau membership is presented below:

President:	S. Cloetingh	The Netherlands
Secretary General	M. Scheck-Wenderoth	Germany
Representative of IUGG	D. Jackson	USA
Representative of IUGG	K. C. Sain	India
Representative of IUGS	R. Oberhänsli	Germany
Joint Representative of IUGG and IUGS	A. Green	Switzerland
Chair Committee National Representatives:	V.L. Pease,	Sweden,
	A. Tibaldi	Italy

The Bureau is also supported by the associate members: J.-P. Burg (Switzerland), H. Thybo (Denmark), A. Morozov (Russia), F. Roure (France), M. Zoback (USA), and P. Mc Keever (UNESCO); by the lifetime members M. von Knorring (Sweden) and H. Gupta (India) as well as by Honorary President A. Green (Switzerland) and ILP Fellow J.F.W. Negendank (Germany).

Business meetings of ILP, Vienna, Austria, 2015

The annual business meeting was held on the occasion of the EGU General Assembly, as every year since 2011. It was attended by most of the PIs in ILP as well as by guests from IUGG and IUGS. At the meetings a short report has been given by the president and SG on new developments and on the

financial situation in ILP. In addition all active Task Forces and Coordinating Committees reported on the activities and future plans. The minutes were distributed among the Bureau Members and are available on request. The next business meeting at EGU 2016 in Vienna, Austria is scheduled for Monday, 18 April 2016, 18:00 - 20:00 h, Room 0.51 (Splinter meeting SPM6).

Reports to Executive Committee (EC) meetings of IUGG and IUGS

The SG has participated at the IUGS EC Meeting Vancouver, Canada, January 2015 and presented a brief report on past activities. The president has participated at the IUGG EC meeting in Prague, June 2015 and presented a brief report on past activities.

ILP bureau and science meeting 2015 on the occasion of ILP's 35th birthday

A major science highlight was the 35th Anniversary meeting of ILP in Potsdam (program below), where all TF and CC chairs have reported on the main achievements of the past 5 years. In addition keynotes have been presented by the presidents of IUGS, IUGG and EGU on where lithosphere research should move forward. Also each of the main themes of ILP has been elucidated by a key note presentation. Link to program and abstracts: www.scl-ilp.org/events/35-ilp/

A bureau meeting was held after the science meeting where the roadmap for 2016-2020 has been defined. The minutes are available on request.

ACTIVITIES

Science and Research

As every year most of the ILP TF and CC have been visible at the large international meetings EGU and AGU. In addition ILP had a strong presence at the IUGG international assembly in Prague. Moreover, most TF and CC contributed to specific conferences within their thematic fields and held dedicated smaller but international workshops. The publication activity was significant for most teams and several TF and CC produced Special Issues in peer-reviewed journals summarizing topical results. Some specific meeting highlights and new developments are listed as appendix:

Selected publications:

- Akinen et al., in press. Crustal xenoliths of Bennett Island, DeLongs. *Arktos*, 2015.
- Breitzkreuz, C., Rocchi, S. 2016: Physical Geology of Shallow Magmatic Systems Dikes, Sills and Laccoliths. Special Issue in the Series: Advances in Volcanology.
- Cloetingh, S. and Haq, Bilal, 2015: Inherited landscapes and sea level change. *Science*, 347, 6220.
- Dressel, I., Scheck-Wenderoth, M., Cacace, M., Lewerenz, B., Götze, H.-J., Reichert, C. (2015): Reconstruction of the southwestern African continental margin by backward modeling. - *Marine and Petroleum Geology*, 67, p. 544-555.
- Geoffroy, L., Burov, E., and P. Werner, Volcanic passive margins: another way to break up continents, *Scientific Reports - NATURE*, in press, 2015.
- Gibson G., Manatschal G. and Roure F., eds., 2015. Sedimentary basins and crustal processes at extended and hyper-extended continental margins. Special volume, Geological Society, London. (This book will contain about 15 chapters presented in 2012 during the Task Force 6 sessions at the World Geological Congress in Brisbane, Australia).
- Koptev, A., Burov E., Calais, E., Leroy, S., Cloeting, S., and T. Gerya, Contrasted continental rifting via plume-craton interaction: applications to Central East African rift, *Geoscience Frontiers*, invited, submitted, 2015.
- Koptev, A., Calais, E., Burov, E., and S. Leroy, Dual continental rift systems generated by plume-lithosphere interaction, *NATURE Geoscience*, DOI: 10.1016/j.gr.2015.02.002, 2015.

- Mezri, L., Le Pourhiet, L., Wolf, S., and E. Burov, New parametric implementation of metamorphic reactions limited by water content, impact on exhumation along detachment faults, *Lithos*, in press, 2015.
- Przybycin, A. M., Scheck-Wenderoth, M., Schneider, M. (2015): The 3D conductive thermal field of the North Alpine Foreland Basin: influence of the deep structure and the adjacent European Alps. - *Geothermal Energy*, 3.
- Sonibare, W., Sippel, J., Scheck-Wenderoth, M., Mikeš, D. (2015): Crust-scale 3D model of the Western Bredasdorp Basin (Southern South Africa): data-based insights from combined isostatic and 3D gravity modelling. - *Basin Research*, 27, 2, p. 125-151.
- Tilita, M., Scheck-Wenderoth, M., Matenco, L., Cloetingh, S. (2015): Modelling the coupling between salt kinematics and subsidence evolution: Inferences for the Miocene evolution of the Transylvanian Basin. - *Tectonophysics*, 658, p. 169-185.
- Wang, K., Burov E., Gumiaux, C., Chen, Y., Lu, G., and L. Zhao, Can Metamorphic Core Complexes develop without pre-thickening of continental crust? A case study of North China Craton, submitted to *Lithos*, 2015.
- Zhang et al., 2015. Provenance characteristics and regional implications of Neoproterozoic Timanian-margin successions of Northern Norway. *Precambrian Research*, 268,153-167.

FUTURE ACTIVITIES

- Implement new science plan developed during the 35th ILP Anniversary Workshop and the subsequent Bureau Meeting for 2016-2020
- Start new Task Forces/Coordinating Committees
- Several sessions with TF and CC contributions at EGU-GA Vienna, 2015
- Several workshops of individual task forces
- ILP Business meeting at EGU-GA in Vienna, April 2016
- Strengthen links with other IUGG and IUGS programs
- Update new ILP website
- Advertising for new support by national science foundations and industry

Submitted by
Sierd Cloetingh, ILP President
Magdalena Scheck-Wenderoth, ILP Secretary General
Alexander Rudloff, ILP Executive Secretary

IUGG FINANCIAL REPORT

INTRODUCTION

This report describes in short the status of the IUGG finances for the year 2015, the 4th year of the IUGG quadrennium 2012-15. The report will be discussed at the 2016 Bureau/EC meeting in Paris.

The full quadrennial accounting will be presented in Montreal 2019.

The 2015 budget was approved at the Council meeting in Melbourne, July, 2011. The price of 1 unit increased in 2015 to \$1,905 as compared to \$1,875 in 2014.

By the end of 2015/beginning of 2016 IUGG has 69 members representing 276 units. 10 members are associate members. The Philippines have left the union as of January 1st, 2016. On page 7 one can find more details about memberships.

The membership dues paid by members are the economical basis for the activities of IUGG. The situation is right now is relatively steady in the sense that the union has a constant number of members and thereby also a constant income.

At the Melbourne GA in 2011 the Council approved a budget with considerably higher spending than normal. This has, however, not been fully completed yet.

There is a world wide debate of value for money regarding memberships of scientific organizations like IUGG. Therefore, IUGG must continue to have focus on the membership issue in the foreseen future.

The accounting is a cash flow system. Therefore, the 4-year accounting for the full budget period gives a more precise description of the financial status of the union than the individual accountings year by year.

The accounts of the treasurer's office are audited by a chartered auditor.

A student assists me with the keeping order in my files, writing letters etc. Since 2007 I have not had an Assistant Treasurer.

Contents:

1. Summary of the IUGG accounts in US dollars for 2015	page 91
2. General comments and highlights	page 92
3. An overview of IUGG grants and allocations	page 93
4. Membership information and statistics	page 94

SUMMARY OF THE IUGG ACCOUNTS in US DOLLARS FOR 2015



SUMMARY OF IUGG ACCOUNTS 2015

US dollars	Accounts	Budget
RECEIPTS		
1. Membership Subscription	583.165,55	522.500,00
2. ICSU Grants	0,00	0,00
3. Assembly Surcharge	118.680,00	20.000,00
4. Sales of Publications	411,60	200,00
5. Miscellaneous		
a. Interest	0,00	12.500,00
b. Gain on exchange		
c. Other	0,00	
d. Associations, surcharge	0,00	
6. Total Receipts	702.257,15	555.200,00
7. Cash in hand	1.000,00	0,00
8. Bank balance on 1/1 2015	673.276,30	588.100,00
9. Check Sum	1.376.533,45	1.143.300,00
EXPENDITURES		
11. Administration		
11.1 Personnel	7.018,24	20.000,00
11.2 Equipment	0,00	5.000,00
11.3 Supplies	0,00	5.000,00
11.4 Communications	4.376,84	8.000,00
11.5 Travel, Administration only	62.201,70	70.000,00
11.6 Miscellaneous	2.004,75	5.000,00
11.6a surcharge	53.018,94	0,00
11.7 Travel, representation	9.603,52	30.000,00
12. New initiatives		
12.1 Education and outreach	23.142,94	30.000,00
12.2 Science	19.631,31	30.000,00
13. General Assemblies		
13.1 Organization	12.643,51	10.000,00
13.2 Travel	26.432,45	60.000,00
14. Symposia	0,00	0,00
15. Annual allocations		
15.1 Annual allocations	259.814,14	257.100,00
16. Dues and Grants		
16.1 ICSU	23.588,28	25.000,00
17. ICSU grants		
17.1 MAGNIO	0,00	0,00
18. Union activities		
18.1 GRC, SEDI, CMG, UCDI	0,00	18.000,00
18.2 Inter-Union Science (ILP)	14.847,55	15.000,00
18.3 Liaison Officers	3.040,79	30.000,00
18.4 International Scientific Programs	0,00	25.000,00
18.5 New commissions CCEC	5.000,00	5.000,00
19. Contres in need		
19.1 Travel Grants, General Assemblies	106.442,75	90.000,00
20. Fees		
20.1 Professional services	15.661,32	5.000,00
20.2 Bank fees	1.919,09	3.000,00
21. Contingencies	0,00	5.000,00
22. Loss on exchange	1.442,99	
23. Total Expenditures	651.831,11	751.100,00
24. Balance on 31/12 2015, cash included	724.702,34	392.200,00
25. Check sum	1.376.533,45	1.143.300,00
Check sum balance	0,00	

	US\$DKK	
	Exchange rates: Line 8	6,105 =DEC 31, 2014
April 16, 2015	Line 22	6,820 =DEC 31, 2015
Aksel Wælløe Hansen	Other:	6,704 average
	US\$EUR	
	Line 8	0,820 =DEC 31, 2014
	Line 22	0,914 =DEC 31, 2015
	Other:	0,899 average

GENERAL COMMENTS

The balance of the IUGG 2015 accounting is of the same size or bigger than 1 year's turnover. The summary of the IUGG accounts is shown in USD. It is the sum of three different Danske Bank accounts in USD, EUR and DKK respectively. In addition IUGG also has a Mastercard account which is used mostly in connection with traveling and I have a little cash in hands too. A new account has been opened to handle the economy of the new IUGG commission on climate, CCEC. But this account is not included in the present report.

In 2015 the income from dues was relative high due to late payments of 2014 dues from several big countries. This has led to a high balance pr December 31st. Adding to this are also some delays of payments of surcharge from GA 2015 to a few of the associations.

Since 2008 the EUR account allows European members to pay dues directly in EUR and IUGG to do relevant transfers in EUR (several Associations have accounts in EUR).

SOME HIGHLIGHTS

Receipts

Line 1, Membership subscription

Right now (May 30, 2016) IUGG has received payments equivalent to a total of 257 units for 2015. This number also includes payments received in 2016 for 2015. The amount also includes payments of 2014 dues in early 2015.

Line 3, Assembly Surcharge

In Prague 3956 participants paid a surcharge of \$30 each, eq. to a total of \$118,680. Out of that sum \$97,590 goes to the associations.

Line 5.a, Interest

No interest was paid in 2015, as the year before.

Line 5.b, Gain on exchange

This line together with the corresponding line 22 is used to balance the accounts. In 2015 there was a loss on exchange. We lose on exchange when we keep money in EURO and Danish Kroner when the dollar goes up.

Expenditures

By and large there is a good correspondence between accounting and budget although there are some specific deviations.

Line 11, Administration

In 2015 there were no expenditures on equipment and supplies. During the whole quadrennium there has been a significant reduction of personnel expenditures.

As explained above the surcharge was not returned to all associations in 2015 due to delays in establishing new accounts for the new elected secretary generals.

Line 13, General Assemblies

Line 13.1 includes a reimbursement of €5,928 from C-IN as their contribution to the promotion of GA 2015.

Line 13.2 should be seen together with line 19.1.

Line 15.1, Annual allocations to associations

The annual IUGG allocation to the associations (50% of the dues paid the year before) is installed when the financial reports for the previous year are received. The distribution percentages and the allocations used in 2012-2015 are shown here:

	%	2015 amount according to the applied algorithm
IACS	9,55	\$20,876
IAG	12,02	\$26,275
IAGA	16,46	\$35,981
IAHS	11,86	\$25,925
IAMAS	16,20	\$35,412
IAPSO	10,75	\$23,499
IASPEI	13,61	\$29,751
IAVCEI	9,55	<u>\$20,876</u>
		\$218,595

Pr definition IACS will get the same contribution as that of IAVCEI.

The amount shown in line 15.1 is larger than the \$218K. This is due to a movement of payment of 2014 allocations to 2015 for one association.

Line 17, ICSU grants

No ICSU grant was received in 2015.

Line 18, Union activities

For different reasons the contributions to the union committees (GRC, SEDI, CMG, UCIDI) were not transferred in 2015.

A new account was opened in 2014 to handle the money spending of the climate commission CCEC.

The budget from Melbourne 2011 allowed a considerable travel activity of our liaison officers. Only one travel reimbursement was actually paid out in 2015. Thanks to every body for finding other sources of funding of the travel expenses.

OVERVIEW OF IUGG GRANTS AND ALLOCATIONS

IUGG is supporting science in different ways:

- i) Annual allocation to associations, line 15 (see further comments on page 4)
- ii) New initiatives, line 12
- iii) Smaller scientific meetings, line 14
- iv) Special grants with ICSU, line 17
- v) Union activities, line 18
- vi) Travel grants in connection with General Assemblies, line 13.2 and line 19.1

Here follow some main figures for the amounts allocated in 2015:

i) Line 15.1 (2015 figures)

8 associations **\$ 218,595**

ii) Line 12 (new initiatives)

Preprint of Nature article	\$ 3,143
This line is also used to pay ICTP training course activities	\$ 20,000
IUGG grant to conference	<u>\$ 19,631</u>
Total	\$ 42,774

iii) Line 14 (Symposia grants)		
In a GA year there are no meetings grants awarded	\$ 0	
Total		\$ 0
iv) Line 17 (ICSU grants)		
No ICSU grant in 2015	€ 0	
Total		\$ 0
v) Lines 18.1, 18.2 (Union Activities)		
18.1 GRC, CMG	\$ 0	
18.2 ILP	\$ 15,000	
18.3 Liaison officers	\$ 3,040	
18.5 CCEC	\$ 5,000	
Total		\$ 23,040
vi) Lines 13.2 and 19.1 (Grants in connection with General Assemblies)		
IUGG supports participants with travel grants of various types.		
In addition the associations also have a substantial travel grant scheme.		
In 2015 IUGG's share of the total travel grant scheme was		\$ 129,200

SOME MEMBERSHIP INFORMATION AND STATISTICS

At the time of writing (May 30, 2016) IUGG has 69 members representing 276 units, one down compared to one year earlier: The Philippines are no longer member of IUGG.

10 members are in associate status and 13 paying members representing 32 units are in observer status:

In category 1, 8 members, 8 units

Bulgaria (5. year as observer)
Iran (5. year as observer)
Macedonia (4. year as observer)
Azerbaijan (1. year as observer)
Nicaragua (2. year as observer)
Colombia (1. year as observer)
Indonesia (1. year as observer)
Mozambique (1. year as observer)

In category 2, 3 members, 6 units

Chile (1. year as observer)
Nigeria (2. year as observer)
Thailand (2. year as observer)

In category 3, 1 member, 3 units

Brazil (2. year as observer)

In category 7, 1 member, 15 units

France (1. year as observer)

In addition some members started 2016 as observers, but the dues in arrears have been paid by now.

In summary, the membership overview is

Category	No. of members	No. of units/member	Total units
11	1	35	35
8	3	20	60
7	1	15	15
6	5	10	50
5	3	7	21
4	6	5	30
3	5	3	15
2	15	2	30
1	20	1	20
A	10	0	0
In total	69		276

ADDITIONAL UNION MATTERS

Awards and Honors

IUGG AWARDS

(presented at the IUGG2015)

IUGG Gold Medal is bestowed on Sir *Brian J. Hoskins* (Imperial College of London, UK) for “*his scientific contributions that have been pioneering and profound in almost all aspects of the atmospheric and climatological sciences, with strong linkages to IUGG and its Associations*”, in the words of the jury’s citation.

IUGG Fellows (Honorary Members)

Elected:

John Burrows (Germany/UK)
Chen Xiaofei (China)
Andrea Flossmann (France/Germany)
Sophie Godin-Beekmann (France)
Gerald Jones (Canada), and
Li, Jianping (China/USA)

Conferred:

IUGG: A. A. Ashour (Egypt), G. Balmino (France), O. B. Andersen (Denmark), J. Chen (China), Y. T. Chen (China), V. K. Gaur (India), S. Gregersen (Denmark), E. Groten (Germany), M. J. Hamlin (UK), D. D. Jackson (USA), J. A. Joselyn (USA), B. L. N. Kennett (Australia), M. Kono (Japan), G. McBean (Canada), H. Moritz (Austria), P. Pinet (France), U. Shamir (Israel), J. Somogyi (Hungary), A. F. Spilhaus (USA), K. Suyehiro (Japan), A. A. Tealeb (Egypt), J. F. Vilas (Argentina), S. Uyeda (Japan), P. J. Wyllie (USA);

IACS: I. Allison (Australia), G. Kaser (Austria), M. Lange (Germany/Cyprus);

IAG: G. Beutler (Switzerland), C. Boucher (France), M. Louis (France), I. Mueller (USA), F. Sansó (Italy), W. Torge (Germany);

IAGA: C. Barton (Australia), E. Friis-Christensen (Denmark), B. Hultqvist (Sweden), D. J. Kerridge (UK), H. W. Kroehl (USA), J. G. Roederer (USA);

IAHS: A. Askew (Switzerland/Australia), H. Colenbrander (The Netherlands), J. C. Rodda (UK), K. Takeuchi (Japan), G. Young (Canada);

IAMAS: H. C. Davies (Switzerland), R. A. Duce (USA), B. J. Hoskins (UK), M. Kuhn (Austria), R. List (Canada), M. C. MacCracken (USA), G. Wu (China);

IAPSO: F. E. Camfield (USA), S. Imawaki (Japan), P. Malanotte-Rizzoli (USA/Italy), R. D. Muench (USA), L. Mysak (Canada), J.-J. O'Brien (USA), L. V. Shannon (South Africa);

IASPEI: R. Adams (UK), E. R. Engdahl (USA), C. Froidevaux (France), A. V. Nikolaev (Russia), Z. Wu (China);
 IAVCEI: S. Aramaki (Japan), P. Gasparini (Italy), S. A. Fedotov (Russia), G. Heiken (USA), R. W. Johnson, S. R. McNutt (USA), S. Nakada (Japan), O. Navon (Israel), H.-U. Schmincke (Germany), S. J. Sparks (UK).

IUGG Early Career Scientist Awardees

Ruiqiang Ding (China), Atmospheric Sciences
 Andreas Fichtner (Switzerland), Seismology
 Gregory Foltz (USA), Oceanography
 Matthias Huss (Switzerland), Glaciology
 Markus Hrachowitz (The Netherlands), Hydrology
 Ben Kravitz (USA), Atmospheric Sciences
 Ben Marzeion (Austria), Climatology
 Ilona Riipinen (Sweden), Atmospheric Sciences
 Johanna Salminen (Finland), Paleomagnetism
 Futoshi Takahashi (Japan), Geomagnetism

The IUGG President presented the Union awards to the Gold Medalist, six elected Fellows, and ten Early Career Scientists Awardees on 23 June 2015 at the Opening Ceremony, and to the conferred Fellows on 1 July 2015 at the Closing Ceremony of the 26th IUGG General Assembly.



After the Award Ceremony. First row (from the left to the right) – the Gold Medalist Sir Brian J. Hoskins; IUGG Fellows: John Burrows, Xiaofei Chen, Andrea Flossmann, Sophie Godin-Beekmann, Gerald Jones, and Jianping Li; President Harsh Gupta, Secretary General Alik Ismail-Zadeh, Vice President Michael Sideris. Second row (from the left to the right) – Early Career Scientist Awardees Andreas Fichtner, Gregory Foltz, Markus Hrachowitz, Matthias Huss, Ben Kravitz, Ruiqiang Ding, Ben Marzeion, Ilona Riipinen, Johanna Salminen, and Futoshi Takahashi.

ASSOCIATIONS AWARDS

(presented at the IUGG2015)

IACS Awardee

- Mathieu Morlighem (USA) was awarded the 2015 Early Career Scientist Price

IAG Awardees

- Reinhard Rummel (Germany) was awarded the Levallois Medal
- Yoshiyuki Tanaka (Japan) was awarded the Bomford Prize
- Krzysztof Sosnica (Switzerland) was awarded the 2013 Young Authors Award
- Álvaro Santamaria-Gómez (France) was awarded the 2014 Young Authors Award

IAGA Awardees

- Dan Baker (USA) was awarded the Shen Kuo Award for interdisciplinary achievements
- Hans-Joachim Linthe (Germany) and John Riddick (UK) were awarded the IAGA Long Service Awards
- Erin Dawkins (UK), Maria Mendakiewicz (Poland), Israel Silber (Israel), and Rémi Thiéblemont (Germany) were awarded the Young Scientist Awards

IAHS Awardees

- Mary Hill (USA) was awarded the 2015 International Hydrology Prize (IHP Dooge medal)
- Pierre Hubert (France) was awarded the 2015 International Hydrology Prize (IHP Volker medal)
- Antonino Maltese (Italy) and Fulvio Capodici (Italy) were awarded the 2015 Tison Award

IAMAS Awardees

- Yuan Wang (USA) was awarded the 2015 Early Career Scientist Medal

IAPSO Awardees

- Toshio Yamagata (Japan) was awarded the 2015 Prince Albert I Medal

IASPEI Awardees

William H. K. Lee (USA) was awarded the Medal 2015

OTHER AWARDS

Christine Amory (France), past co-chair of the IAGA Interdivisional Commission on History, received the International Marcel Nicolet Medal for Space Weather and Space Climate 2015 for her outstanding efforts to structure the space weather community at an international level.

Günter Blöschl (Vienna University of Technology, Austria, and IAHS President-elect 2015-2017) received the *Robert E. Horton Medal*, **Gordon McBean** (University of Western Ontario, Canada, and IUGG Fellow, Bureau Member 1987-1995) the *Ambassador Award*, and **Anne Thompson** (NASA Goddard Space Flight Center, USA, and IAMAS Vice President 2007-2011) the *Roger Revelle Medal* of the American Geophysical Union (AGU). **Peter Fox** (Rensselaer Polytechnic Institute, Troy, USA, Chair of the IUGG Union Commission on Data and Information) and **Guoxiong Wu** (Chinese Academy of Sciences, Beijing, China; and past President of IAMAS) was elected AGU Fellow.

IUGG Fellow **John P. Burrows**, Chair of the IAMAS Commission on Atmospheric Chemistry and Global Pollution (ICACGP), was bestowed the Alfred Wegener Medal and Honorary Membership of

the European Geosciences Union (EGU). **Jeffrey M. Forbes**, IAGA Executive Committee Member (2011-2015), was awarded the EGU Julius Bartels Medal. **Thierry Fichet**, Member of the Belgian National Committee for IUGG, was awarded the EGU Louis Agassiz Medal. **Srinivas Bettadpur**, Vice President of the IAG Commission 2: Gravity Field, was awarded the EGU Vening Meinesz Medal.

Pierre Hubert (France), IUGG Bureau Member, received a Life Time Achievement Award from the National Geophysical Research Institute in Hyderabad (NGRI) and the Association of Hydrologists of India (AHI) for his outstanding contributions to the field of global hydrology.

Mioara Manda, IAGA Secretary General, was elected Member of the Academia Europaea, a European Academy of Humanities, Letters and Sciences.

Valérie Masson-Delmotte, Chair of the IACS Division on Cryosphere, Atmosphere and Climate, was elected Co-Chair of the Working Group I of the Intergovernmental Panel on Climate Change (IPCC).

Giuliano F. Panza (Italy), President of the Italian National Committee for IUGG, was designated as Knight of the Order of Merit of the Italian Republic. The honor cites Panza's outstanding, internationally recognized scientific achievements related to geophysics and seismology.

Flavia Tauro (Italy) received a Young Researcher Award of the Consiglio Nazionale delle Ricerche (CNR) to attend the 26th IUGG General Assembly

Christos Zerefos (Greece), President of the Greek National Committee for IUGG, received the 2015 Yoram J. Kaufman Unselfish Cooperation in Research Award of the American Geophysical Union for his "broad influence in atmospheric science through exceptional creativity, inspiration of younger scientists, mentoring, international collaborations, and unselfish cooperation in research."

Obituaries

Claude Froidevaux (1930-2015)

IUGG Fellow Claude Froidevaux died on 11 August 2015 in Paris, France. Claude Froidevaux was a pioneer in studies of the interplay between physics and tectonics as well as a very dedicated leader in many international associations. Born in Switzerland in 1930, Claude Froidevaux had rather eclectic interests and skills: after a bachelor's degree in modern history from the University of Lausanne, Switzerland, he switched to physics and obtained a D. Phil. in low temperature physics from the University of Oxford, UK. In 1964, after a post-doctoral research in the University of California at Berkeley, USA, he joined the University of Orsay, France, where he initiated a very successful research group developing experimentation based on nuclear magnetic resonance. Claude Froidevaux was a very prominent personality of international geosciences. He was among the scientists who promoted the European Union of Geosciences (EUG), a predecessor of the European Geosciences Union (EGU), as Editor of the *Terra Cognita* journal. In 1995, he was elected President of the International Association of Seismology and Physics of the Earth's Interior (IASPEI) and became a Member of the IUGG Executive Committee. Many of us keep marvelous memories from the summer schools he organized in Cargese and Porto-Heli and from the IUGG Conference on Mathematical Geophysics in southern France. Claude had a genuine interest both in people and in science even in domains rather far away from his own field. This prompted him to help many, especially earlier career scientists. Claude will be remembered as an optimistic, enthusiastic, and generous personality. (*Luce Fleitout and Henri-Claude Nataf, ENS, Paris*)

LIST OF ACRONYMS

AAAS	American Association for the Advancement of Science
AGU	American Geophysical Union
AOGS	Asia Oceania Geosciences Society
APECS	Association of Polar Early Career Scientists
CAST	China Association for Science and Technology
CCEC	Commission on Climatic and Environmental Changes
CCTF	Consultative Committee for Time and Frequency
CEA	China Earthquake Administration
CMG	Commission on Mathematical Geophysics
CNC-IUGG	Chinese National Committee for Geodesy and Geophysics
CODATA	Committee on Data for Science and Technology
COSPAR	Committee on Space Research
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
DFG	German Research Foundation
EGU	European Geosciences Union
EMSEV	IAGA/IASPEI/IAVCEI Inter-Association Working Group on Electromagnetic Studies of Earthquakes and Volcanoes
GEO	Group on Earth Observation
GGOS	Global Geodetic Observing System
GOOS	Global Ocean Observing System
GRC	Commission on Geophysical Risk and Sustainability
IACS	International Association of Cryospheric Sciences
IAEA	International Atomic Energy Agency
IAG	International Association of Geodesy
IAGA	International Association of Geomagnetism and Agronomy
IAHS	International Association of Hydrological Sciences
IAMAS	International Association of Meteorology and Atmospheric Sciences
IAPSO	International Association for the Physical Sciences of the Ocean
IASPEI	International Association of Seismology and Physics of the Earth's Interior
IAU	International Astronomical Union
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
ICACGP	International Commission on Atmospheric Chemistry and Global Pollution
ICAE	International Commission on Atmospheric Electricity
ICAO	International Civil Aviation Organization
ICCL	International Commission on Climate
ICCP	International Commission on Clouds and Precipitation
ICDM	International Commission on Dynamical Meteorology
ICMA	International Commission on the Middle Atmosphere
ICPAE	International Commission on Planetary Atmospheres and their Evolution
ICPM	International Commission on Polar Meteorology
ICSU	International Council for Science
ICTP	Abdus Salam International Centre for Theoretical Physics
IGCP	International Geoscience Programme
IGOS-P	Integrated Global Observing Strategy Partnership
IGU	International Geographical Union
IHP	International Hydrological Programme
ILP	International Lithosphere Program
INQUA	International Union for Quaternary Research
INTERMAGNET	International Real-time Magnetic Observatory Network
IOC	UNESCO Intergovernmental Oceanographic Commission
IOC	International Ozone Commission
IRC	International Radiation Commission
IRDR	Integrated Research on Disaster Risk
ISC	International Seismological Centre
ISPRS	International Society for Photogrammetry and Remote Sensing
ISSC	International Social Sciences Council
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUSS	International Union of Soil Sciences
IUTAM	International Union of Theoretical and Applied Mechanics
JBGIS	Joint Board of Geospatial Information Societies
NKGG	German National Committee for Geodesy and Geophysics
OECD	Organisation for Economic Co-operation and Development
ÖNK	Austrian National Committee for IUGG

PAIGH	PanAmerican Institute of Geography and History
PHIVOLCS	The Philippines Institute of Volcanology and Seismology
ROA	ICSU Regional Office for Africa
ROAP	ICSU Regional Office for Asia & the Pacific
ROLAC	ICSU Regional Office for Latin America and the Caribbean
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Ocean Research
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SEDI	Study of the Deep Interior of the Earth
UCDI	Union Commission on Data and Information
UCPS	Union Commission on Planetary Sciences
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISDR	United Nations International Strategy on Disaster Reduction
UNOOSA	United Nations Office for Outer Space Affairs
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
URSI	International Union of Radio Science
WCRP	World Climate Research Programme
WDS	ICSU World Data System
WMO	World Meteorological Organization
WPMG	Western Pacific Geophysics Meeting
WSF	World Science Forum
VAACs	Volcanic Ash Advisory Centers
VASAG	Joint WMO-IUGG Volcanic Ash Scientific Advisory Group