



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

# ANNUAL REPORT 2013





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

**IUGG Annual Report  
2013**

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# IUGG Annual Report 2013

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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.

IUGG is one of 31 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.

IUGG has initiated and/or vigorously supported collaborative efforts that have led to highly productive world-wide interdisciplinary research programs, 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 Decade for Natural Disaster Reduction (1991-1999), 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), the International Lithosphere Programme, the World Climate Research Programme, and Integrated Research on Risk Disasters. 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.

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 <http://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 web site. Each Adhering Body establishes a National Committee for IUGG, and names Correspondents to each Association (as appropriate). During 2013, the Union had 70 Member Adhering Bodies. Several members were in observer status because they were in arrears of dues payment. Five 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 2013 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 2013, 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)
- Working Group on History

## **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 web site. The most recent General Assembly was held in Melbourne, Australia, 27 June-8 July 2011. The next IUGG General Assembly will take place in Prague, Czech Republic, 22 June-2 July 2015.

## **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: <http://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 2011-2015

### IUGG Bureau

President:	Harsh Gupta	INDIA
Vice-President:	Michael Sideris	CANADA
Secretary General:	Alik Ismail-Zadeh	GERMANY/RUSSIA
Treasurer:	Aksel Hansen	DENMARK
Members:	Isabelle Ansorge	SOUTH AFRICA
	Pierre Hubert	FRANCE
	Kenji Satake	JAPAN

### IUGG Executive Committee

#### IUGG Bureau members

Immediate Past President:	Tom Beer	AUSTRALIA
IACS President:	Charles Fierz	SWITZERLAND
	Ian Allison (until July 2013)	AUSTRALIA
IAG President:	Chris Rizos	AUSTRALIA
IAGA President:	Kathy Whaler	UK
IAHS President:	Hubert Savenije	THE NETHERLANDS
	Gordon Young (until July 2013)	CANADA
IAMAS President:	Athéna Coustenis	FRANCE
IAPSO President:	Eugene Morozov	RUSSIA
IASPEI President:	Domenico Giardini	SWITZERLAND
IAVCEI President:	Ray Cas	AUSTRALIA

### IUGG Finance Committee

Chair:	David Collins	UK
Members:	Zoltan Hajnal	CANADA
	Jan Krynski	POLAND
	David Rhoades	NEW ZEALAND

### Association Presidents and Secretaries General

#### International Association of Cryospheric Sciences

President:	Charles Fierz	SWITZERLAND
	Ian Allison (until July 2013)	AUSTRALIA
Secretary General:	Andrew Mackintosh	NEW ZEALAND

#### International Association of Geodesy

President:	Chris Rizos	AUSTRALIA
Secretary General:	Hermann Drewes	GERMANY

#### International Association of Geomagnetism and Aeronomy

President:	Kathy Whaler	UK
Secretary General:	Mioara Mandea	FRANCE

#### International Association of Hydrological Sciences

President:	Hubert Savenije	THE NETHERLANDS
	Gordon Young (until July 2013)	
Secretary General:	Christophe Cudennec	FRANCE



International Association of Meteorology and Atmospheric Sciences

President: Athéna Coustenis FRANCE  
Secretary General: Hans Volkert GERMANY

International Association for the Physical Sciences of the Oceans

President: Eugene Morozov RUSSIA  
Secretary General: Johan Rodhe SWEDEN

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

President: Domenico Giardini SWITZERLAND  
Secretary General: Peter Suhadolc ITALY

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

President: Ray Cas AUSTRALIA  
Secretary General: Joan Martí SPAIN

**Union Commission Officers**

Union Commission on Climatic and Environmental Changes (CCEC)

President: Tom Beer AUSTRALIA  
Secretary: Keith Alverson USA

Union Commission on Mathematical Geophysics (CMG)

President: Yehuda Ben-Zion USA  
Secretary: Claudia Pasquero ITALY

Union Commission on Geophysical Risk and Sustainability (GRC)

President: Kuniyoshi Takeuchi JAPAN  
Secretary: Diana Greenslade AUSTRALIA

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

President: Satoru Tanaka JAPAN  
Secretary: Michael Bergman USA

Union Commission for Data and Information (UCDI)

President: Peter Fox USA  
Secretary: Adelina Geyer SPAIN

**Inter-Unions Commission: International Lithosphere Program (ILP)**

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

**IUGG BUREAU AND EXECUTIVE COMMITTEE MEETING**

The IUGG Bureau and Executive Committee meetings were held in Prague, Czech Republic, from 20 to 23 September 2013. The next IUGG Bureau meeting will take place in Baku, Azerbaijan, in June 2014.

## MESSAGE FROM THE PRESIDENT



2013 has been a very active and fulfilling year on many fronts. The importance of earth, atmosphere and ocean sciences was further recognized with the launch of the mega global project 'Future Earth' by ICSU. Several Associations of IUGG organized their scientific assemblies. The International Continental Drilling Program (ICDP), and the Asia Oceania Geosciences Society (AOGS) celebrated their tenth anniversaries. Personally, it has been gratifying to see 'Three Great Tsunamis: Lisbon (1755), Sumatra-Andaman (2004) and Japan (2011)', published by Springer under the 'Springer Brief In Earth Sciences' series, and a significant progress been made in the 'Koyna Deep Bore Hole' project.

Since the occurrence of the 1 November 1755 Lisbon earthquake and the resultant tsunami, a lot of scientific developments have taken place. The Lisbon earthquake is credited to have begun the science of Seismology. At that time, there was a great debate whether the earthquake was an act of God or a natural phenomenon. The questionnaire sent then to collect the information about the earthquake and the responses received have been a great source of information and are being reinterpreted even now. By the time of the 26 December 2004 Sumatra – Andaman earthquake, the science of tsunami warning had developed, but the necessary system to forecast tsunamis was not in place in the Indian Ocean. The huge loss of human lives was basically due to flouting the laws that prohibit commercial activity within 500 m from the high tide line. The situation was totally different for the 11 March 2011 Tohoku earthquake. The magnitude of this earthquake far exceeded the estimated size of the largest credible earthquake for the region and the tsunami defense measures fell short of the requirements. A lot has been learnt from these tsunamis and it is hoped that we are now better prepared than before to face the tsunami menace.

Koyna Dam, located in western India is globally the best known site of the artificial water reservoir triggered earthquakes, where the largest triggered earthquake of M 6.3 occurred in 1967. Earthquakes started soon after the impoundment of the reservoir in 1962 and have continued till now. These include 22 earthquakes of M ~ 5 and several thousand M 2 and larger events. The seismic activity is confined to a region of 20 km x 30 km, the depth is mostly shallower than 6 km and there are no other earthquake sources within 50 km of the Koyna Dam, making it an ideal site to comprehend the phenomenon of earthquake occurrence from near field observations. This view has been strongly supported by the ICDP and international scientific community. In the past year, 7 bore holes, of ~ 1500 m depths, penetrating the basalt cover and going a few hundred m into the granitic basement have been successfully drilled and logged. Two of these have been equipped with borehole seismometers. Airborne gravity gradient and magnetic surveys have been successfully conducted and a first cut regional model has been developed. The Government of India has supported drilling a ~6 km deep bore hole, instrumenting it and to carry out the desirable observations and measurements. ICDP and international scientific community are being involved in this exciting experiment.

I have had very interesting discussions with the President of IUGS in furthering the co-operation between IUGG and IUGS. To have a combined International Geological Congress (IGC) and IUGG GA is being discussed. This would provide a forum to address a few key global issues in Geosciences.

2014 is an important year for IUGG. The IUGG Bureau Meeting shall be held at Baku, Azerbaijan. Preparations are underway for the IUGG GA next year at Prague, Czech Republic.

I thank the IUGG Bureau, the Executive Committee, Secretariat and several individuals for their continued dedicated work and support to IUGG during 2013.

Harsh Gupta

## 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 (physical, chemical, and mathematical) and its environment in space. The year 2013 was another successful and remarkable year in the IUGG history: the Union was involved in various activities and showed its strength in international cooperation and science promotion.

IUGG is the roof of the geoscience colonnade that is supported by the eight pillars that are Union Associations. Five Scientific Assemblies organized by the Associations have been held in 2013 around the world: (i) DACA-13, a joint assembly of IACS and IAMAS, *Davos, Switzerland*, 8-12 July; (ii) the IAVCEI Scientific Assembly, *Kagoshima, Japan*, 20-24 July; (iii) the joint scientific assembly of IAHS-IAPSO-IASPEI “Knowledge for the Future”, *Gothenburg, Sweden*, 22-26 July; (iv) the IAGA Scientific Assembly,

*Merida, Mexico*, 26-31 August; and (v) the IAG Scientific Assembly, *Potsdam, Germany*, 1-6 September. More than 4,000 scientists participated in the assemblies from more than 100 countries.

New Union awards have been established by the Executive Committee: the *Gold Medal*, *IUGG Fellowship*, and the *Early Career Scientist Award* (see this issue of the E-Journal).

IUGG co-sponsored (US\$50,000 in total) thirteen scientific meetings worldwide (<http://www.iugg.org/meetings/sponsored.php>) and six science education events (<http://www.iugg.org/publications/reports/education.php>).

IUGG continued to strengthen the cooperation with International Scientific Unions and interdisciplinary bodies of the International Council for Science (ICSU). IUGG took part in the meeting of ICSU Scientific Unions in Paris, France, in April 2013, and participated in the ICSU *GeoUnions* Steering Committee meetings ([www.icsu-geounions.org](http://www.icsu-geounions.org); April, Paris, France, and November, Antalya, Turkey). IUGG participated in the meeting of the ICSU-ISSC-UNISDR Scientific Committee on Integrated Research on Disaster Risk (IRDR) and co-sponsored activities of the ICSU Scientific Committees on Space Research (COSPAR) and on Solar-Terrestrial Physics (SCOSTEP).

Together with the *International Mathematical Union* (IMU) and *International Union of Theoretical and Applied Mechanics* (IUTAM), IUGG organized a summer school in Merida, Mexico, in August, and together with the *American Geophysical Union* and IMU a Union session on Mathematics of Planet Earth in San Francisco, USA, in December.

IUGG cooperated with inter-governmental organizations in promoting scientific knowledge for the benefit of society. Particularly, IUGG participated in the Third Science and Technology Conference of the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO) in Vienna in June; IUGG together with the World Meteorological Organization (WMO) organized the Second Workshop on Ash Dispersal Forecast and Civil Aviation, Geneva, Switzerland, in November.

The IUGG Bureau, Executive Committee (EC), Finance Committee (FC), and Science Program Committee (SPC) met in Prague, Czech Republic, from 19 to 24 September to discuss the past activities and determine new directions in development of the Union. Special attention was paid to the preparations for the 2015 IUGG General Assembly.

The inauguration of the IUGG Secretariat took place on 7 June at the GFZ German Research Centre for Geosciences in Potsdam, Germany. IUGG is grateful to GFZ and the German Research Foundation (DFG) for generous support of the IUGG Secretariat.

I take this opportunity to thank the Adhering Bodies and National Committees, Union Associations and Commissions as well as all individuals who helped making the year 2013 exciting and productive in strengthening international Earth and space sciences for the benefit of society.

Alik Ismail-Zadeh

# IUGG ACTIVITIES

## IUGG SECRETARIAT

The office of the IUGG Secretariat moved in 2013 from Karlsruhe to Potsdam and is located now at the German Research Centre for Geosciences in Potsdam (GFZ-Potsdam, <http://www.gfz-potsdam.de/en/research/organizational-units/departments-of-the-gfz/departament-1/iugg-secretariat/>).

The Secretariat is managed by the IUGG Secretary General Dr. A. Ismail-Zadeh and the Executive Secretary/Assistant Secretary General Dr. F. Kuglitsch, with a technical assistance from Mrs. K. Gundrum. IUGG thanks the GFZ-Potsdam for the arrangement and financial support of the Secretariat. On 7 June the IUGG Secretariat was officially inaugurated at the GFZ-Potsdam. More than 30 people attended the opening ceremony including Oliver Bens, GFZ Executive Board Member; Rainer Kind, Immediate Past President of the German National Committee for Geodesy and Geophysics (NKG); Roland Oberhänsli, President of the International Union of Geological Sciences (IUGS); and Magdalena Scheck-Wenderoth, Secretary General of the International Lithosphere Program (ILP). Harald Schuh, Director of the GFZ Department of Geodesy and Remote Sensing (the department hosting the IUGG Secretariat) and the IAG Vice President, gave an opening speech. Alik Ismail-Zadeh, IUGG Secretary General, thanked the GFZ representatives for hosting the Secretariat and gave a presentation about IUGG activities. Franz Kuglitsch, IUGG Executive Secretary, presented the tasks of the IUGG Secretariat. After the talks, the participants had some time for discussion in a relaxed atmosphere with snacks and refreshments.



(a)

(b)

*Opening of the IUGG Secretariat. (a) (left to right): R. Oberhänsli, R. Kind, H. Schuh, F. Kuglitsch, K. Gundrum, and A. Ismail-Zadeh; (b) during the reception (photo: E. Gantz, GFZ).*

## German Research Foundation's sponsorship

The German Research Foundation (DFG) supports the position of the Assistant to Secretary General and support some business trips of the Secretary General. IUGG is very thankful for this generous support from DFG.

## IUGG Yearbook for 2013

The 2013 Yearbook has been available at the IUGG website electronically in PDF format since January 2013 (<http://www.iugg.org/publications/yearbooks/yearbook2013.pdf>). The IUGG web site maintains the directory of Union and Association officials and the archive of IUGG memberships and General Assemblies.

## IUGG Annual Report for 2012

The IUGG Annual Report summarizes the activities of the Union, IUGG Associations and Union and Inter-Unions Commissions for 2012. The Annual Report has been posted on the web page: <http://www.iugg.org/publications/reports/report2012.pdf>. The Annual Report was printed together

with the 2013 IUGG Yearbook and mailed to the Adhering Organizations, National Committees, international partners, and major libraries in May 2013.

### **IUGG Webpage**

The IUGG web site <http://www.iugg.org>, in English and French, was maintained by the IUGG Webmaster Dr. D. Krupsky and permanently updated in 2013.

### **IUGG on Facebook**

To learn more about IUGG and to keep individuals updated on Union's activities, the IUGG Secretariat launched an IUGG Facebook page on 11 October. Everyone is welcome to join IUGG on <https://www.facebook.com/InternationalUnionGeodesyGeophysics>. The news about the XXVI IUGG General Assembly, 22 June – 2 July 2015, Prague, Czech Republic, are posted on <https://www.facebook.com/pages/26th-IUGG-General-Assembly/656937564347023?fref=ts>.

### **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, about awards and honors bestowed on IUGG scientists as well as obituaries, and a meeting calendar (<http://www.iugg.org/publications/ejournals/>).

### **IUGG BUSINESS MEETINGS**

The IUGG Bureau, Executive Committee (EC), Finance Committee (FC), and Science Program Committee (SPC) meetings were held in Prague, Czech Republic, from 19 to 24 September 2013. The Bureau (President, Vice President, Secretary General, Treasurer, and three members at large) met on 20-21 September, and the IUGG EC held its meeting on 21-23 September. The IUGG EC is comprised of the IUGG Bureau, the immediate Past President of IUGG, and the Presidents of eight Union Associations. The Association Secretaries-General, the Chair of the IUGG FC, and the Secretary-General of the International Lithosphere Program (ILP) were invited to attend the EC meeting.

The IUGG President, the Secretary-General, and the Presidents of the Union Associations reported on the activities since the last EC meeting (Melbourne, Australia, July 2011). The IUGG Vice President reported on the activities of Union Commissions. The EC ratified its decision to establish the Union Commission on Climatic and Environmental Changes (CCEC) and the Union Working Group on History (WGH). The IUGG Executive Secretary reported on the activity of the IUGG Secretariat and new initiatives related to an IUGG Facebook page, a central electronic library, web-conferencing software, and an online voting system. The IUGG Treasurer reported on the financial situation of the Union. Other topics on the agenda included (i) the preparations for the 2015 IUGG General Assembly in Prague (Chair of the Local Organizing Committee Vladimir Cermak reported on the activity of the Committee); (ii) the development of an honor and recognition program; (iii) appointments to the Statutes / By-Laws Committee, the Resolution Committee, the Nominating Committee for the 2015 Election, and the Site Comparison Committee for the 2019 General Assembly; (iv) the International Lithosphere Program (the ILP Secretary-General Magdalena Scheck-Wenderoth reported on the activities of the scientific program), (v) Union activities in the Joint Board of ICSU GeoUnions; (vi) reports of the IUGG liaisons to the ICSU Scientific Committees and to international and intergovernmental organizations; (vii) Union activities on capacity building and education; and (viii) the relationship to IUGG National Committees. The EC established three new Awards: the Gold Medal, IUGG Fellowship, and the Early Career Scientist Award (to be announced soon).



*During the EC meeting, 21 September 2013, Corinthia Hotel, Prague (photo: H. Volkert).*

On 20-21 September the IUGG Finance Committee (FC) met in Prague to discuss the IUGG financial report for 2011-2012, to review the IUGG accounts, to overview administrative matters, IUGG grants, allocations, and inter-association activities. The IUGG Treasurer was invited to attend the FC meeting.

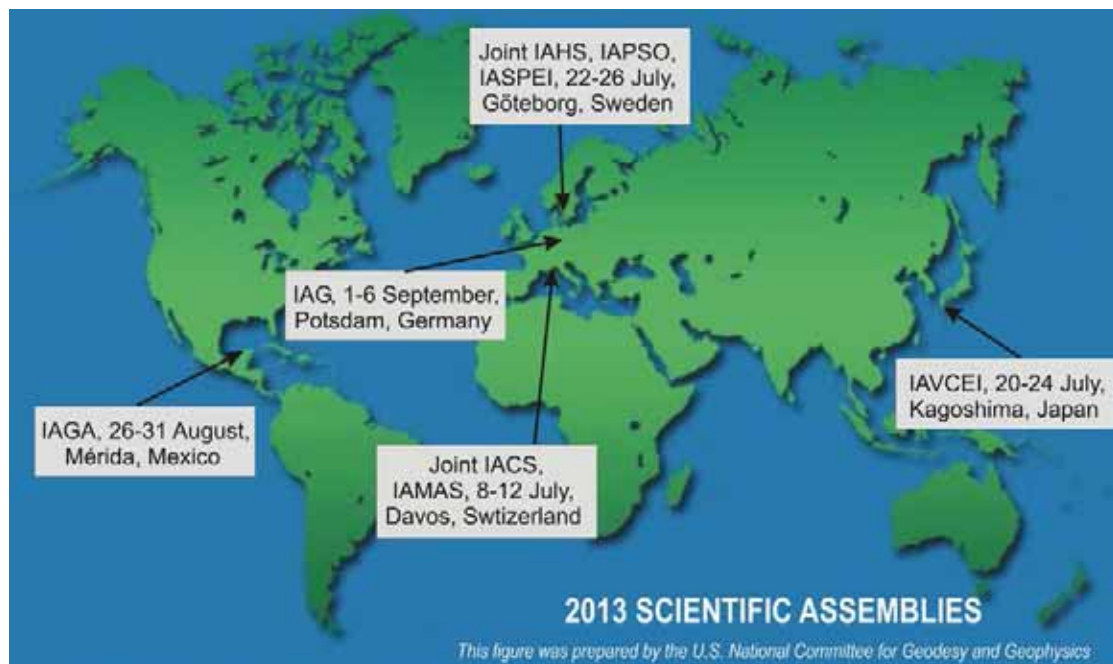


*IUGG officers during the visit of the Prague Congress Center (Photo: H. Volkert).*

On 22 September, the IUGG Executive Committee and Association Secretaries-General met the members of the Local Organizing Committee for the 2015 IUGG General Assembly and visited the venue of the future Assembly.

The Science Program Committee (SPC) for the XXVI General Assembly of IUGG met on 24 September. The SPC is comprised of the Chair (Eduard Petrovsky), the IUGG Secretary-General, eight Association Secretaries-General, and the IUGG President (ex-officio). Several Czech representatives of the SPC and the Chair of the Local Organizing Committee were invited to the SPC meeting. The tentative draft of the science program was discussed including topics of Union and inter-Association symposia. The science program should be finalized by early 2014.

## SCIENTIFIC ASSEMBLIES OF THE IUGG ASSOCIATIONS



### IACS-IAMAS Scientific Assembly

IACS and IAMAS held their joint scientific assembly DACA-13 (the Davos Atmosphere and Cryosphere Assembly 2013, “Air, Ice & Process Interactions”) from 8 to 12 July 2013 in Davos, Switzerland. The Opening Ceremony combined live music with short presentations and was moderated by Hans Volkert (IAMAS Secretary General) in an entertaining fashion. The majority of more than 950 participants from 52 countries on five continents were welcomed by Charles Fierz and Andrew Mackintosh (IACS President-Elect and Secretary-General), Athena Coustenis (IAMAS President) and Alik Ismail-Zadeh (IUGG Secretary-General). James Screen (UK) received the first IAMAS Early Career Scientist Medal (ECSM). Werner Schmutz and Michael Lehning introduced both scientific institutes of Davos (PMOD/WRC and SLF). Heini Wernli and Anja Schilling recalled the planning of DACA-13 and introduced organizational details.

Scientifically, the assembly covered numerous fields of atmospheric and cryospheric sciences, enriched by snow hydrology, oceanography, natural hazards, economy and risks, and the history of science. These made up an attractive program consisting of 21 mostly joint Symposia featuring several sessions each. More than 350 posters were on display for the whole week while dedicated poster sessions facilitated deeper discussions with the presenters in attendance. Four distinguished scientists delivered well-attended end-of-day keynote lectures, also open to the Davos public: Thomas Stocker started with the topic “*Climate change: Making the best use of scientific information*”; Valérie Masson-Delmotte lectured on “*Water stable isotopes and climate in Greenland, from present-day atmospheric monitoring to glacial-interglacial ice core records*”, Ronald B. Smith presented “*Global aspects of orographic precipitation*”; and Georg Kaser closed the scientific part of the assembly talking about “*The cryosphere after AR5: more knowledge but also more uncertainty*”. All abstracts can be downloaded from [www.daca-13.ch/program](http://www.daca-13.ch/program).

The assembly was highly ranked by the attendees. The quality of both talks and posters was generally considered as excellent, and the environment of Davos and its Congress Centre allowed for easy exchanges between colleagues and experts from different fields. It was a great pleasure to see many early career scientists attending the conference. Competition for the best student poster was fierce, and at the end of DACA-13, six “poster distinctions” were awarded to Fabiano Monti, Franziska Koch, Heather Archambault, Rianne H. Giesen, Saehee Lim, and Narendra Ojha. The cash prizes were

sponsored by the Swiss Meteorological Society (SGM) and the Swiss Snow, Ice and Permafrost Society (SIP).

In addition, the Association of Polar Early Career Scientists (APECS) organized a successful workshop, which, for the first time, considered the needs of early career cryospheric scientists in the Alpine area. Further social events included the Festa Cryospherica at the famous *Schatzalp Hotel*, and the Conference Dinner with over 500 guests in the plenary hall, entertained by a group of traditional musicians. Joyce Penner (IAMAS Vice President) and Andrew Mackintosh (IACS Secretary General) read out together a resolution of thanks to the hosts. All guests warmly applauded the joint organizing team and the considerable group of student helpers.

Since 2009, the Swiss National Organizing Committee (SNOC) chaired by Heini Wernli had meticulously planned this event, strongly supported by the two local Davos institutes, the Physikalisch-Meteorologisches Observatorium Davos / World Radiation Center (PMOD/WRC with Local Organizing Committee chair Werner Schmutz) and the WSL Institute for Snow and Avalanche Research (SLF with Scientific Program Committee chair Michael Lehning). Several generous sponsors helped in staging this event: the Swiss Academy of Sciences, MeteoSwiss, the Federal Office for the Environment, the Canton of Grisons as well as WMO (WCRP, WWRP) and IUGG by awarding travel grants in addition to those provided by IAMAS and IACS.



*Intense discussions during a coffee break (photo: M. Senft, PMOD/WRC).*

Several commissions and committees of both Associations held business meetings during DACA-13. The IAMAS Executive Committee discussed a resolution about aspects of ‘geo-engineering’ and adopted the bid for a triple-association assembly (IAGA-IAMAS-IAPSO) in Cape Town, South Africa, in 2017. On the weekend after DACA-13, the IACS Bureau interacted with its correspondents, SG and WG chairs, as well as with its partners and stakeholders in a quite interesting open session; it then dealt with other Association matters during a closed session. At the end of two days of intensive discussions, Charles Fierz took office as IACS President, while Ian Allison continues to serve as Past President. The report was received from Charles Fierz (IACS President) and Hans Volkert (IAMAS Secretary General).



## IAVCEI Scientific Assembly

The IAVCEI 2013 Scientific Assembly was held from 20 to 24 July 2013 in Kagoshima, Japan. The assembly recorded the largest number of participants among IAVCEI conferences. It was attended by 1,069 scientists from 43 countries. The main theme of the conference was “Forecasting Volcanic Activity: Reading and translating the messages of nature for society”. 1,209 (oral: 651 and poster: 558) papers were presented in 37 scientific sessions grouped into four symposia: Symposium 1 (Magmatic processes), Symposium 2 (Monitoring, observation and modeling of volcanic processes), Symposium 3 (Eruption processes and volcano evolution), and Symposium 4 (Volcanic hazards, risk and environmental impact). Keynote lectures on “Adensite: their origin and the role in the Earth evolution” and “Forecasting volcanic activity of Sakurajima” were delivered by Yoshiyuki Tatsumi and Masato Iguchi (both Japan), respectively. The program and abstracts of the assembly can be downloaded at: <http://www.iavcei2013.com/sessionlist/session.html>.

The Opening Ceremony was held at the Houzan Hall on 20 July and was followed by the Awarding Ceremony where the IAVCEI medals and new honorary members were presented. Shigeo Aramaki (Japan) received the Kraft Medal, Barry Voight (USA) the Thorarinsson Medal, Antonio Costa (Italy) and Fidel Costa (Singapore) the Wager Medal, Heather Wright (USA) the George Walker Award. New IAVCEI Honorary members are Servando de la Cruz-Reyna (Mexico), Sergei Fedotov (Russia), Grant Heiken (USA), and Izumi Yokoyama (Japan).

The scientific assembly was accompanied by two pre-conference and four post-conference field trips to visit various active volcanoes in Japan and China. During the mid-conference field trips to visit volcanoes in Kagoshima, participants were lucky to see the spectacular vulcanian explosions of Sakurajima. Eight workshops and many business meetings of IAVCEI Commissions and other groups were conducted in association with the conference.



*Vulcanian eruption at Sakurajima Volcano: mid-assembly field trip on July 22 (photo: J. Marti).*

The participants also enjoyed the Ice-Breaker, GALA-party, and the conference dinner, met old friends / found new friends, and experienced the local culture and foods. The next major IAVCEI meetings are COV8 (2014, Yogyakarta, Indonesia), XXVI IUGG General Assembly (2015, Prague, Czech Republic), and IAVCEI Scientific Assembly (2017, Portland, USA). More information can be found at the IAVCEI website: <http://www.iavcei2013.com>. The report was received from Joan Marti, IAVCEI Secretary General, and Shinji Takarada (IAVCEI 2013 Steering Committee Member)



Three of IUGG's constituent Associations, IAHS, IAPSO and IASPEI, met for a Joint Scientific Assembly in Gothenburg, Sweden, from 22 to 26 July 2013. The theme of the Assembly, "Knowledge for the Future", was chosen in order to highlight the importance of improved knowledge in hydrology, oceanography and seismology in addressing the challenges posed by climate change and the risks of natural extreme events. The Assembly attracted 1,087 participants from 66 countries. The Assembly's opening day was marked by a joint plenary session with a lecture from each Association:

- James Mori (Japan), the plenary lecturer for IASPEI described the ambitious JFAST expedition, which aimed to study the causes of the major earthquake that caused the 2011 tsunami. The expedition set new records, drilling over 800 m into the seafloor at a water depth of 8000 m.
- Kathryn Kelly (USA), the plenary lecturer for IAPSO, focused on meridional heat transport in the Atlantic Ocean, a key component of the global climate system. She combined different data sources to review the heat budget and anomalies in the heat transport, indicating a southern source for the anomalies.
- Kuniyoshi Takeuchi (Japan), the plenary lecturer for IAHS, emphasized the key role for geosciences in a proactive approach to disaster risk reduction. He warned that disasters occur when we ignore nature and the lessons of the past, leading to the take-home message "there is no such thing as a natural disaster".

The plenary lectures were followed by a formal Opening Ceremony. The participants of the assembly were welcomed by David Turner (Chair, Local Organizing Committee), Elisabet Ahlberg (Dean, University of Gothenburg), Leif Anderson (First Vice-President, Royal Swedish Academy of Sciences), Alik Ismail-Zadeh (IUGG Secretary General), and Emmali Jansson (Deputy Mayor, City of Gothenburg). The Opening Ceremony was followed by a reception hosted by the City of Gothenburg.

Each Association offered a broad program of lectures and posters, with up to 11 parallel sessions at any one time. The lecture program was organized into 48 Association symposia, together with nine joint symposia focusing on areas such as land-ocean interactions, advanced applied statistics, and tsunamis. This program was complemented by two afternoon poster sessions. Some highlights from the Association's programs:

- IASPEI's Milne lecture on the History of British seismology was delivered by Roger Musson (UK). The lecture was followed by a documentary movie about the life of John Milne, the English scientist, who played a leading role in development of seismology as a scientific discipline. Dr. Robin Adams was awarded the first IASPEI Medal, for sustaining IASPEI goals and activities and for scientific merits.
- The highlight of the IAPSO program was the presentation of the 2013 Albert I Gold Medal, commemorating the Prince of Monaco, Vice President of IUGG (1919-1922). The medal was presented to Albert Gordon (USA), who then delivered the Albert I Memorial Lecture describing his research on the Indonesian Throughflow, the link between the Pacific and Indian Oceans.
- *Deltas* were a significant focus of the IAHS program, including a plenary lecture delivered by Efi Foufoula-Georgiou (USA), where she described an international initiative to develop and deliver the knowledge base for understanding and protecting these vulnerable coastal systems. Several prizes and medals were awarded during the week.

Hubert Savenije (who was the IAHS President-elect for 2011-2013) assumed office of the IAHS President for the term of 2013-2017. Participants of the IAHS Plenary thanked President Gordon Young for his leadership during the presidential term of 2009-2013. More information on the assembly can be found at: <http://iahs-iapso-iaspei2013.com/>. The report was received from David Turner, Chair of the Local Organizing Committee

## IAGA Scientific Assembly

The IAGA 2013 Scientific Assembly was held from 26 to 30 August 2013 in Mérida, Mexico, under the motto “*Living on a magnetic planet*”. The meeting was attended by 459 participants from 43 countries; 871 papers (609 oral and 262 posters) were presented in 51 sessions organized by the five IAGA Divisions and the two Interdivision Commissions. An Opening Ceremony was held on 24 August followed by the first IAGA Award Ceremony. Jean-Louis Le Mouél (France) was awarded the new *Shen Kuo Medal* for interdisciplinary achievements. Evgeny Kharin (Russia) and Michel Menvielle (France) received the *IAGA Long Service Medal*, and four early career scientists Henrique Aveiro (USA), Laura Holt (USA), Cristina Garcia-Lasanta (Spain), and Ilya Kuzichev (Russia) received the *IAGA Young Scientist Awards*. During the assembly, two remarkable keynote lectures were delivered by Cathy Constable “A survey of geomagnetic field variations over the past 10 thousand years: evolutionary trends from the dipole to the South Atlantic Magnetic Anomaly”, and by Eigil Friis-Christensen “The three-satellite geomagnetic field mission, Swarm”. Two evening lectures about archeo-astronomy of the ancient Maya calendar and the surprising astronomical knowledge of Mayan were presented by Mexican scientists, José Franco-López and Jesús Galindo-Trejo.



*Award & Opening Ceremony (left) and poster session (right) (photos: H. Böhnel).*

A week before the assembly, the first IAGA Summer School took place, also in Mérida, with the participation of 21 students and eight renowned teachers. During the assembly, a workshop of high school teachers was organized bringing together 40 teachers from the Yucatan peninsula. They received an introduction to different topics in geomagnetism and later constructed simple instruments, which may be easily made and used at their schools. Delegates enjoyed local food and culture at the Opening Ceremony, and at the conference dinner, held at a hacienda in the city outskirts, one of many in the area that was converted to sisal production in the 19<sup>th</sup> century, a major export from the region. Pre- and post-meeting excursions were organized to some of the spectacular Mayan archaeological sites nearby, like Uxmal, Chichen Itza, and Dzibichaltun, as well as to natural sink holes sacred sites (Cenotes), and to the ecological reserve Celestun. The meeting enjoyed the very comfortable, safe and therefore relaxed environment of Mérida and the charm and kindness of the local people, with excellent conference facilities making easier good scientific and social interactions. The IAGA EC members and the National Delegates warmly thanked the LOC and particularly its chair, Harald Böhnel, for the organization. The report was received from Mioara Manda, IAGA Secretary General.

## IAG Scientific Assembly 2013 “150 Years of International Cooperation in Geodesy”

The International Association of Geodesy (IAG) held its Scientific Assembly, on 2-6 September 2013 in Potsdam, Germany, on the occasion of the 150<sup>th</sup> anniversary of international cooperation in geodesy. The Central European Arc Measurement (Mittleuropäische Gradmessung), which is considered the forerunner of IAG, was initiated by the Prussian General Johann Jacob Baeyer in 1862 and successfully started with the first General Assembly in Berlin in 1864. After extending to all Europe in 1867 and to the International Geodetic Association in 1887, the Section of Geodesy was officially integrated into the IUGG in 1922 and officially became today’s International Association of Geodesy in 1946.



*Participants of the IAG Scientific Assembly, Potsdam, Germany, 2-6 September 2013 (photo: E. Gantz).*

532 participants from 47 countries registered at the Scientific Assembly 2013, which was organized by the GFZ German Research Centre for Geosciences, Potsdam. There were 240 oral and 220 poster presentations under the six themes: (i) Definition, implementation and scientific applications of reference frames; (ii) Gravity field determination and applications; (iii) Observing, understanding and assessing Earth hazards; (iv) Science and applications of Earth rotation and dynamics; (v) Observation Systems and Services; and (vi) Imaging and Positioning Techniques and applications.

In the opening session there were words of greetings and congratulations of State Secretaries of the German Federal Ministry of the Interiors, the Federal Ministry of Education and Research, and the Ministry of Science, Research and Culture of the State of Brandenburg. The scientific sister associations and societies were represented by welcome speeches of the IUGG Vice-President Michael Sideris and the Joint Board of Geospatial Information Societies (JBGIS) representative Christian Heipke. The IAG Young Authors Awards for best papers published in IAG's Journal of Geodesy during the last two years were presented to Thomas Artz, Germany (for 2011) and Manuela Seitz, Germany (for 2012).

A special session on the IAG history included three lectures covering the periods from 1862 to 1916, 1917 to 1959, and 1960 to 1990 were given by Past President Wolfgang Torge, Past Secretary General Claude Boucher, and Past President Ivan Mueller, respectively. The following years up to present were presented thematically in the sessions of the specific themes. The session on history was followed by guided tours of the historical facilities at Telegrafenberg, the domicile of the former Prussian Royal Geodetic Institute, a barbecue celebration and ad hoc presentations, historical movies, photos, and amusing tales relevant to the 150<sup>th</sup> anniversary.

Interesting and novel results were presented in all the sessions on the six scientific themes. Highlights were the studies on the improvement of celestial and terrestrial (global and regional) reference frames; results of the satellite gravity field missions GRACE and GOCE; observations of sea level rise and seismic crustal deformations; theoretical studies on precise modelling of Earth rotation; the Global Geodetic Observing System (GGOS); and the precise positioning by combining the present and upcoming GNSS techniques.

In the closing session there were short résumés of the conveners of the themes, and the presentations of the best young authors' talks and posters awards endowed with a financial grant. The best talk awards were handed over to Mathis Bloßfeld (Germany), Liang Wenjing (Germany), and Sara Bruni

(Italy). The best poster awards were presented to Krzysztof Sosnica (Poland), Benedikt Soja (Germany), and Ulla Kallio (Finland). Book gifts (Torge: Geodesy) were given to eight other outstanding oral and poster presentations. The report was received from Hermann Drewes, IAG Secretary General.

## **UNION HONOR AND RECOGNITION PROGRAM**

In 2013, based on the proposal of the IUGG Honor and Recognition Committee, the IUGG Executive Committee established the following Union awards: the *Gold Medal*, the *Fellowship*, and the *Early Career Scientist Award* to honor distinguished senior scientists as well as outstanding early-career scientists for their scientific contribution to the field of Earth and space sciences and international research cooperation in geodesy and geophysics.

The Gold Medal is the highest Union honor to be awarded to Earth and space scientists for outstanding contributions to geodesy and geophysics and for unselfish international research cooperation. The Awardee is bestowed the Gold Medal, a Medal certificate and a certificate of IUGG Fellow (Honorary Member).

The IUGG Fellowship (or Honorary Membership) is a tribute to individuals who have made exceptional contributions to international cooperation in geodesy or geophysics and attained eminence in the field of Earth and space sciences. Honorary Members are bestowed a Silver Medal and a certificate of IUGG Fellow (Honorary Member).

The Early Career Scientist Award honors early career scientists for their outstanding research in Earth and space sciences and for their international research cooperation. IUGG Early Career Scientist awardees are bestowed a certificate. IUGG supports travel of the awardees to attend the General Assembly. The awardees will be invited to give a talk at the General Assembly.

All Union awards will be presented at the IUGG General Assembly following the awards announcement. Details of the Union Honor and Recognition program can be found at: [http://www.iugg.org/honors/u\\_awards.php](http://www.iugg.org/honors/u_awards.php).

## **NEW IUGG AFFILIATE MEMBER**

On 17 October 2013, an application for admission to IUGG as an Affiliate Member was received from the Commission for the Geological Map of the World (CGMW). The IUGG Executive Committee welcomed this application, and it was placed before the IUGG Adhering Bodies in regular status for a vote by correspondence. The vote is now complete, and the application was accepted. According to the IUGG Statutes and By-Laws, the Affiliate membership of CGMW is provisional until the next meeting of the IUGG Council in Prague, Czech Republic, in June 2015, when a final vote will be taken.

The Commission for the Geological Map of the World (CGMW) is responsible for promoting and coordinating the preparation and publication of solid Earth Sciences maps of continents, oceans, major regions of the earth, and promoting those of national territories, and for developing cartography in the solid Earth Sciences. The CGMW organizes international coordination for the study of problems concerning Earth Science cartography and undertakes bibliographic and cartographic studies necessary to carry out its mission. This implies an active role in the evolution of thematic cartography, demanding imaginative new approaches to the representation of data sets. The CGMW is a truly international-scientific organization: under the guidance of an international Bureau, geoscientists of all nations participate in projects that encompass the many facets of Earth Science. To the rapidity of acquiring data today corresponds a need for accelerated map compilation and publication.

## IUGG SPECIAL PUBLICATION SERIES

IUGG signed a Memorandum of Agreement with the Cambridge University Press to publish a series of works entitled “Special Publications of the International Union of Geodesy and Geophysics” (hereinafter the Series). The Series will be composed of high-quality books, which will review the present state-of-the-art developments, discoveries and/or perspectives in Earth and space sciences around the world. The Editorial Board consists of the Editor-in-Chief (IUGG Secretary General) and 8 Board Members (Association Secretaries General). In addition, an Advisory Board of the Series has been appointed to supplement the regional and subject expertise of the Editorial Board and to provide advice to it on the topics of possible volumes and potential editors of the volumes. More information: <http://www.iugg.org/publications/special/> and <http://www.cambridge.org/us/academic/subjects/earth-and-environmental-science/series/special-publications-international-union-geodesy-and-geophysics>

The first volume of the series “*Extreme Natural Hazards, Disaster Risks and Societal Implications*” is to be published in May 2014

<http://www.cambridge.org/us/academic/subjects/earth-and-environmental-science/earth-science-general-interest/extreme-natural-hazards-disaster-risks-and-societal-implications>.

The second volume of the series “*Dynamics and Predictability of Large-Scale, High-Impact Weather and Climate Events*” is planned for 2015.

## IUGG GRANT PROGRAMME FOR INTERNATIONAL MULTIDISCIPLINARY COOPERATION

The IUGG Grants Programme aims to support projects of importance to the international geophysical and geodetic community, which will explore new scientific ideas and develop future international initiatives (<http://www.iugg.org/programmes/grants2015.php>).

### Report on Monitoring Crustal Deformation and the Ionosphere by GPS in the Caribbean

In the frame of the IUGG Grants Program, the project *Monitoring crustal deformation and the ionosphere by GPS in the Caribbean* was granted for the term 2012-2014. This project is further sponsored by IASPEI, IAG, and IAGA. The main objective of this initiative is to invite the Caribbean countries to participate actively in geodetic and geophysical projects going on in the Central and South American region, in order to enable the use the acquired data for practice and science in their countries, and to promote geosciences. This includes capacity building activities providing the basis for profound education and sustainable development as well as the establishment of international and interdisciplinary contacts to participate in research projects at regional and global scales. According to this, a capacity building event called *School on Reference Systems, Crustal Deformation and Ionosphere Monitoring* was carried out in Panama City from 21 to 23 October 2013. The main topics of the school were:

- Types of coordinates, their definitions, relations and transformations;
- Geodetic reference systems and frames (celestial and terrestrial reference systems and frames, regional reference frames, SIRGAS, vertical reference frames);
- Installation and maintenance of observation instruments (in particular of GNSS), real-time data dissemination (via Internet), and data archiving and management;
- Coordinates determination from GNSS (observation equations, uncertainties in GNSS positioning, controlling errors in GNSS positioning, adjustment of GNSS networks); and
- Crustal deformation observation and modelling (geodynamic processes, plate tectonics, seismic deformation, aseismic crustal deformation, monitoring deformations by GPS).
- Ionosphere modelling and analysis (structure of the atmosphere, models of the ionosphere, observation techniques, analysis of the ionosphere).

The school was attended by 145 participants from 28 countries: Germany, Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Jamaica, Mexico, Monserrat (UK), Nicaragua, Panama, Peru, Puerto Rico, Spain, St. Lucía, Suriname,

Trinidad and Tobago, Turks and Caicos Islands, Uruguay, USA, and Venezuela. The main results of the school regarding this project are

- The purpose of Dominican Republic, Puerto Rico, Suriname, Trinidad and Tobago, Jamaica, St. Lucia and Turks and Caicos Islands to join the IAG activities developed in the region through SIRGAS (the Geocentric Reference Frame for the Americas, the 1.3b Sub-commission of the IAG). Representatives of these countries started the necessary contacts to be integrated in different working and research groups.
- Trinidad and Tobago and Dominican Republic are interested on hosting a similar school in order to disseminate these topics to those people that were not able to come to Panama.
- Costa Rica, Dominican Republic, Guyana, Nicaragua and Puerto Rico are now integrating their geodetic reference stations into the continental reference frame.
- The objective of Dominican Republic to install a GNSS processing center of high-level.

This school provided a significant outreach in all related fields of geosciences and practice; especially in those IUGG disciplines covered by IASPEI, IAG, and IAGA. The new knowledge transferred contributes to the sustainable development of geosciences in the region and it is expected that the participants become more engaged in geodetic and geophysical activities. The Caribbean area is underrepresented in IUGG and its Associations, as well as in active participation in Earth science projects. This project enhanced the visibility of IUGG and encouraged the colleagues to raise funds from their governments and private companies to extend the existing observational infrastructure and to support data processing at a high-level. As an immediate task, SIRGAS will support, as far as possible, all requirements of the Caribbean countries related to their integration in international geodetic and geophysical initiatives. These follow-on actions will provide a better coverage of the region in terms of observatories, data delivery, analysis and interpretation. This will have an effect not only on the scientific knowledge but also on the sustainable development in practical applications (navigation, surveying, engineering, etc.).



*Participants of the School (photo: C. Brunini)*

The resources granted by IUGG were invested to support the travel of some Caribbean colleagues to Panama. However, applicants of travel support were requested to find additional resources to cover a complementary part of the costs (flight ticket, daily expenses or accommodation). In this way, it was guaranteed that attendees were really interested in the school and the so-called *scientific tourism* was avoided. In addition to the IUGG resources, it was possible to get economical support from the IAG and from the *Pan-American Institute of Geography and History* (PAIGH), also for travel grants. The school was hosted by the *Instituto Geográfico Nacional Tommy Guardia* of Panama under the coordination of the *SIRGAS Executive Committee*. All this support is highly appreciated. The report was received from Claudio Brunini and Laura Sánchez (co-leaders of the IUGG project).

## Report on the Partnership Conference “Geophysical observatories, multifunctional GIS and data mining”

From 30 September to 2 October the ancient Russian town of Kaluga hosted the international partnership conference “Geophysical observatories, multifunctional GIS and data mining”. The conference was a part of the IUGG-sponsored project “Extension of Intermagnet Russian Segment: Prospects and Challenges”. The conference in Kaluga, Russia was organized under the auspices of UNESCO as a part of the Year for the Mathematics of Planet Earth and supported by IUGG and IAGA. The organizers of the conference include the Russian National Committee for IUGG, the Russian Academy of Sciences, the International Institute for Applied Systems Analysis (IIASA, Laxenburg, Austria), the Institut de Physique du Globe (IPGP, Paris, France), Roshydromet, the Committee on Data for Science and Technology (CODATA), and the Russian Foundation for Basic Research.



*At the Partnership conference in Kaluga, Russia (photos: R. I. Krasnoperov)*

The conference program included the following scientific sessions and panel discussions: (i) Geophysical observation systems and data mining, (ii) High quality observations of the Earth’s magnetic field, (iii) Multifunctional intellectual methods for geophysical, ecological, socio-economic and biomedical research, (iv) Advanced system analysis, data mining and artificial intelligence in processing time series from geomagnetic, geophysical, ecological, socioeconomic and biomedical observations, and (v) Geology, geophysics and geo-informatics of the Arctic region: multifunctional observatories and intelligent GIS.

The conference was attended by more than 120 scientists and data experts in geophysics, geo-informatics, environmental sciences, applied and advanced system analysis, and artificial intelligence from Austria, Canada, Czech Republic, Finland, France, Germany, Hungary, Russia, Switzerland, Ukraine, and the USA. One of the important objectives of the Kaluga conference was sharing knowledge, data and experience among partner organizations from different countries, which collaborate in the areas of research mentioned above. Expansion of the magnetic observatory network on the territories of Russia and Ukraine will help establish a corresponding segment of INTERMAGNET with a sufficiently uniform coverage. It will provide the world scientific community with data, required for more precise modeling of the geomagnetic field and recognition of the magnetic activity. During the panel discussions special emphasis was given to geomagnetic studies, ground and space geomagnetic observation systems, including expected results of the SWARM satellite project. Other key topics of the panel discussions included intelligent geo-information systems and technologies (IGIS) and modern mathematical methods. The panelists focused on applications of these techniques to geophysical, geological, socioeconomic and biomedical data and models. Principal tasks of geo-informatics include development of geo-information environment and methods of artificial intelligence for data mining. Their integration enables creation of multifunctional integrated



geo-information systems for various purposes. Participants discussed the problems of integration of geo-scientific, environmental, biomedical and socio-economic data within a complex multifunctional intelligent GIS, provided with a wide range of algorithms for object-orientated analysis. Such IGIS is a sophisticated instrument for decision-making support in poverty mitigation, food and water problems, ecology improvement and world overpopulation. These problems are the three key research themes of the International Institute for Applied Systems Analysis (IIASA), and the conference also focused the attention of participants on the opportunities of joint projects within IIASA's research programs. The report was received from Alexei Gvishiani (co-leader of the project).

## SCIENTIFIC MEETINGS CO-SPONSORED BY IUGG

IUGG co-sponsors symposia and workshops appropriate to our disciplines of study and supports the participation of young scientists and scientists from developing countries.

For 2013, IUGG supported the following meetings (the name of the IUGG Associations that endorsed the meetings are indicated in brackets):

- School "Impact of solar variability on climate", Thessaloniki, Greece, 11-15 March.
- 4th International Workshop on Hydro-Ecology (HydroEco 2013), Rennes, France, 13-16 May.
- Reconciling observations and models of elastic and viscoelastic deformation due to ice mass change, Ilulissat, Greenland, 30 May - 2 June.
- 19th CNAAC Conference, Fort Collins, USA, 24-28 June.
- Workshop "Measurement Problems in Ice Clouds", Zurich, Switzerland, 5-6 July.
- International Tsunami Symposium, Fethiye-Gocek, Turkey, and Rhode Island, Greece, 22-26 July.
- Facets of Uncertainty: 5th EGU Leonard Conference; Hydrofractals '13; Statistical Hydrology - STAHY '13, Kos, Greece, 17-19 October.
- 2nd IUGG-WMO workshop "Ash dispersal forecast and civil aviation", Geneva, Switzerland, 18-20 November.

In addition to the awards, IUGG will award travel grants (via Union Associations) to scientists attending 2013 Scientific Assemblies.

In 2013 IUGG selected the following meetings to be supported in 2014:

- Joint model-data workshop for the Late Pleistocene evolution of the Greenland and Antarctic ice sheets, Grenoble, France, 22-24 May (IACS).
- School on Reference Systems - Escuela en Sistemas de Referencia and Symposium on Geocentric Reference System for the Americas (SIRGAS), Santa Cruz, Bolivia, 22 September-1 October (IAG).
- 22nd International Workshop on Electromagnetic Induction in the Earth, Weimar, Germany, 24-30 August (IAGA).
- Geospace revisited: Understanding dynamic processes with new spacecraft and ground-based observations, Rhodes, Greece, 15-20 September (IAGA).
- 16th IAGA Workshop on Geomagnetic Observatory Instruments, Data Acquisition and Processing, Hyderabad, India, 7-16 October (IAGA).
- Evolving Water Resources Systems - Understanding, Predicting and Managing Water - Society Interactions, Bologna, Italy, 4-6 June (IAHS).
- 12th Kovacs Colloquium, Paris, France, 21 June (IAHS).
- 13th Quadrennial iCACGP Symposium and 13th IGAC Science Conference on Atmospheric Chemistry, Natal, Brazil, 22-26 September (IAMAS).
- 3rd "Titan through time" ICPAE-workshop, Laurel, MD, USA, 8-10 April (IAMAS).
- Regional Assembly - Latin American and Caribbean Seismological Commission (LACSC-2014), Bogota, Colombia, 23-27 July (IASPEI).
- Mega earthquakes and tsunamis in subduction-zones: forecasting approaches and implications for hazard assessment, Rhodes, Greece, early October (IASPEI).
- 5th International High Energy Particle Precipitation in the Atmosphere (HEPPA) Workshop, Baden-Baden, Germany, 5-9 May (IAGA, IAMAS).
- Special Symposium - Four paradigms in predicting extremes: Legacy of Vladimir I. Keilis-Borok, Merida, Yucatan, Mexico, 2-4 June (IASPEI, CMG).

- GEORISK 2014: Improving Geophysical Risk Assessment, Forecasting, and Management, Madrid, Spain, 18-21 November (IAVCEI, GRC).
- 40th COSPAR Scientific Assembly, Moscow, Russia, 2-10 August (IAMAS, IAGA, IAG).

## SCIENTIFIC MEETING REPORTS

### Workshop “eGYAfrica - better Internet connectivity for research and education institutions in Africa”

The eGYAfrica Awareness and Planning Workshop was held in Nairobi, Kenya, 26-28 October 2012. The workshop was co-sponsored by the International Council for Science (ICSU) and IUGG/UCDI. The Workshop brought together scientists and teachers, who share a common desire to improve Internet access in research and education institutions in Africa. 27 participants from 13 countries attended the workshop to review progress in eGYAfrica and NREN (Research and Education Network), to introduce newcomers to eGYAfrica, to prepare a work plan for the next period (approximately 2 years), and to expand the network of national eGYAfrica groups. The number of national eGYAfrica groups has expanded from 5 to 12 as a result of the Workshop. Given the rapid increase in Internet capability in Africa following the installation of undersea fibre-optic cables linking Africa to the rest of the world, the need for eGYAfrica was examined. The unanimous view was that eGYAfrica is still very much needed and provides a valuable mechanism for staff in research and education institutions to voice their concerns about Internet needs. The comprehensive range of presentations by delegates forms an excellent statement about the status of Internet developments in various parts of Africa. Sharing such information is emerging as a useful role for eGYAfrica. For the first time the scope of the Workshop was expanded by including secondary schools. This demonstrated that some secondary schools have better Internet access than universities.

Guidelines for the establishment of national eGYAfrica focus groups have been developed and posted on the website. Focus group contacts have been established in Cote d'Ivoire, D.R. Congo, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Uganda, and Zimbabwe. Suitable contacts have been identified for Algeria, Burkina Faso, R. Congo, and South Africa. Increasing importance should be placed on establishing these national groups, as they are the key for engaging with decision makers and delivering eGYAfrica outcomes. The results of the *PingER project* (<http://www-iepm.slac.stanford.edu/pinger/>) provide objective information about the Internet performance in Africa and allow a valuable reality check on exaggerated claims. eGYAfrica is proving to be a fertile environment for securing more PingER sites in Africa. For example, Malawi is expected to become a much-needed PingER host. Dr. Les Cottrell, who runs the project, participated in the Nairobi Workshop. *NREN developments in Africa*. The National Research and Education Network (NREN) is a specialized Internet service provider dedicated to supporting the needs of research and education communities within a country. Dr. Francis Tusubira, CEO of Ubuntunet, participated in the Nairobi Workshop. Membership of the UbuntuNet Alliance, a regional REN (RREN) supported by the Association of African Universities (AAU), has increased from 5 NREN in 2005 to 14 NREN members today. West and Central Africa were lagging behind on research and education networking. In 2006, when the AAU established a REN Unit, there was one single REN in this region. Today, through the stakeholders' commitment and AAU's effort, five NREN have been established in the region, and a West and Central African Research and Education Network (WACREN) has been established. With the Arab Scientific and Research Education Network (ASREN) covering Northern Africa, all African countries are now covered by at least one regional REN. Many countries are about to establish their NREN, a good number of them with the support of the AAU. The African REN Forum (AfREN) is now an annual rendezvous for REN stakeholders in Africa and beyond to network and exchange experiences.

Peter Fox, Chair of the IUGG Union Commission for Data and Information, participated in the Nairobi Workshop and proposed to explore possibilities within the African Geospace Society to establish an informatics group to deal with data and information issues and to link to eGYAfrica. Strong links have developed with IUGG's GIRAF program in Africa. Anna Nguno, a member of GIRAF, is the new secretary of eGYAfrica. eGYAfrica communicates regularly with IGIRGEA. The eGYAfrica Committee believes that eGYAfrica is too small and would be more effective if it

functioned within the framework of a larger, well-established group. The two outstanding candidates are the Association of African Universities, and the ICSU Regional Office for Africa.

Major outcome of the workshop

- Expansion of participating countries from 5 to 12.
- New opportunities for the PingER project to measure the Internet performance in Africa.
- Emerging role for eGYAfrica in providing information and NREN developments.
- Scientists should be better positioned to influence decision makers regarding better Internet capabilities at the working place.
- Reinvigoration of eGYAfrica with new officers and a clear work plan.

More information about eGYAfrica and the Workshop (e.g., program, participants, presentations) can be found on the eGYAfrica website (<http://egy.org/egyafrika.php>). The report was received from Charles Barton, Workshop organizer.

### **Report on the Training School on Impact of Solar Variability on Climate**

TOSCA (“Towards a more complete assessment of the impact of solar variability on the Earth’s climate”, <http://www.tosca-cost.eu>) is a multidisciplinary European network of scientists from more than eighteen countries whose objective is to provide a better understanding of the role of the Sun in climate change. This action aims at assessing the various contributions of solar variability to the Earth’s climate by bringing together solar physicists, space scientists, atmospheric scientists, climate modelers, paleoclimatologists, and others. TOSCA organized its first training school in Thessaloniki, Greece, from 10 to 15 March 2013. The objective of this school was to give young scientists a global understanding of the topical but also controversial role of solar variability in climate change. 28 students and early-career scientists from 17 countries attended this school. It was a very diverse group of bright students and young scientists with expertise in various research topics such as lightning and atmospheric electricity, operational space weather, ocean dynamics, geomagnetism, neutron monitors, radiative transfer modelling, regional climate simulations, solar image analysis, and some others. The participation in this school was entirely free of charge, but students were encouraged to contribute at least partly to their travel expenses. Financial support from COST (European Cooperation in Science and Technology), IUGG (IAMAS/ICMA), SCOSTEP, and COSPAR enabled participation of more students.



*Participants of the School (Photo: T. D. de Wit).*

The five-day program featured lectures, a computer class, a poster session, two movies with a debate, and a daily assessment. Lectures addressed various aspects of the Sun-climate connection, with a blend of fundamental physical issues, key questions, and practical aspects such as existing sources of data. Among the lessons learnt were the importance of being pedagogically innovative in order to get students actively involved rather than having them just listen to the lectures. Another major challenge was how to give a good understanding of a large variety of physical processes to such a diverse audience. This highlighted the importance of conveying information on the basic physical meaning of the processes rather than on specific issues and nomenclature. The debate showed how unprepared we

are for bringing scientific concepts to the public, especially when facing opposition. Clearly, more effort should be spent on helping students and lecturers to communicate controversial issues. Received from Thierry Dudok de Wit, on behalf of TOSCA

### **ICCL 2013 Expert Assessment Workshop on “Decadal Climate Variability and Cross-Scale Interactions”**

The International Commission on Climate (ICCL), one of 10 commissions of the International Association of Meteorology and Atmospheric Sciences (IAMAS), organized the Expert Assessment Workshop on “Decadal Climate Variability and Cross-Scale Interactions” in Beijing, China on 16-17 April, 2013. The workshop’s keynote speakers from five countries, including Australia, China, Germany, UK, and USA, delivered themed lectures. About 50 faculty and postgraduate students from the Chinese Academy of Sciences (CAS) and the National Climate Center (NCC) attended the workshop. ICCL Executive Secretary and co-chair of the workshop, Jianping Li from the Institute of Atmospheric Physics (IAP), CAS, presided over the opening ceremony. ICCL President and co-chair Neil Holbrook from the University of Tasmania gave some opening remarks. He outlined the missions of ICCL and introduced the aims of the workshop: (i) to assess and document key issues and knowledge gaps associated with decadal-scale climate variability and cross-scale interactions in a warming world, and (ii) to ask key questions for future research, which was closely related to the upcoming Fifth Assessment Report of Intergovernmental Panel on Climate Change (IPCC AR5) to be released in 2013.



*The workshop participants (photo: J. Feng)*

The workshop was organized in four sessions: (i) Is the Inter-decadal Pacific Oscillation a real and dynamic feature of the climate system?; (ii) Cross-scale interactions between El Niño-Southern Oscillation (ENSO), decadal variability and anthropogenic climate change; (iii) Unambiguous detection and attribution of anthropogenic climate change above natural decadal to multi-decadal climate variability – how best to do this?; (iv) Decadal modes on regional climates. The keynote talks were given by leading scientists in the field of decadal climate variability, including Matthew Collins (Coordinating Lead Author of IPCC AR5 WG1), Mojib Latif, Thomas Knutson, Emanuele Di Lorenzo, Feifei Jin, Ronghui Huang, Guoxiong Wu, Chognyin Li, Neil Holbrook, and Jianping Li. Scott Power (CLA of IPCC AR5 WG1) gave his talk remotely by phone from Australia. The talks were very well received and initiated intensive discussion after each session. Another highlight of the workshop was that the discussion followed the way IPCC is working, including the assessment and documentation of literature. Speakers and participants agreed on generating potential outcomes in international journals.

The workshop was hosted by the ICCL and organized by the State Key Laboratory of Numerical Modelling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG/IAP, CAS). Ruiqiang Ding from the IAP was the chair of the Local Organizing Committee. The workshop was co-sponsored by the National Natural-Science Foundation of China (NSFC), China Association of Science and

Technology (CAST), LASG/IAP, CAS, National Basic Research Projects, CNC-IUGG, IUGG, and IAMAS. The participants all agreed that the workshop was inspiring and fruitful. It provided a unique platform for exchanges, not only for ICCL members but also for decadal climate variability research communities outside the commission. The report was received from Jianping Li and Neil Holbrook.

### **Report on the HYDRO ECO 2013 Conference**

The last decade has been characterized by a growing number of studies at the interface between hydrology and ecology. The interest in coupling hydrological and ecological studies has been triggered by purely scientific questions related to the quantification of the role of interactions between hydrological and biological processes on surface and groundwater resources and quality, but also by the importance of these physical and biological interactions at small, local and regional scales. These scales are of paramount importance for applied environmental issues related to air and water quality or biodiversity dynamics. The first HYDRO ECO conference was held in Karlovy Vary, Czech Republic, in 2006, the second and third conferences in Vienna, Austria, in 2009 and 2011.

The fourth HYDRO ECO Conference was held in the University of Rennes 1, Rennes, France, 13-16 May 2013. The principal objectives of the fourth conference was (i) to present new findings and approaches on interactions between hydrology and ecology; (ii) to promote interdisciplinary interactions on water related issues between hydrology, hydrogeology, biogeochemistry, microbial ecology, and ecology; (iii) to explore emerging patterns, breakthroughs and challenges; and (iv) to provide management applications and guidelines to tackle environmental issues. The conference brought together more than 200 experts from 44 different countries from the 5 continents with different disciplines such as hydrologists (groundwater, surface water), ecologists, biologists, subsurface microbiologists, environmental biogeochemists, ecotechnologists, geomorphologists, hydraulic engineers, forest managers, nature reserve managers, regional and landscape planners. During four conference days, 11 sessions were organized with 7 plenary talks, 84 oral and 73 poster presentations. The IUGG financial support allowed more scientists to attend the conference by reducing their travel expenses, especially for those coming from Argentina, Botswana, Colombia, Egypt, Iraq, Mongolia, Tanzania, and Tunisia. The conference participants presented and discussed many research topics including:

- three-dimensional nature of water fluxes in gaining and losing river reaches to consider the relative importance of hyporheic exchange flows, bank seepage and links to regional groundwater for nutrient supply and processing;
- groundwater - surface water interactions and their potential influence on biogeochemical transformations with the use of controlled laboratory and field experiments;
- combination of hydrological measurements and modeling tools with measurements of biogeochemical transformations to understand (i) the spatial variation in biogeochemical hotspots, and (ii) the controls on respiration and macro-invertebrate assemblages along hyporheic exchange flows at the reach and patch scales;
- understanding on how biogeochemical processes scale in landscapes and drainage basins using mathematical frameworks, modeling approaches, and empirical tools;
- discrepancy between space and time scales of observation and space and time characteristics of main hydro-ecological processes; and
- development of climate change scenarios using integrated system analyses, ecosystem services, risk, uncertainty, and ecosystem function.

The hydro-ecology scientific community has reached the maturity to become one of the key providers of sound science-based solutions to maintain and promote the restoration of aquatic and terrestrial ecosystem functions under global change uncertainties. The next conferences will be held in Vienna, Austria, in 2015 and in Birmingham, UK, in 2017. The report was received from Gilles Pinay, Conference organizer.

### **Report on the 19th International Conference on Nucleation and Atmospheric Aerosols**

The 19th International Conference on Nucleation and Atmospheric Aerosols (ICNAA) was held in Fort Collins, Colorado, USA, 24-28 June 2013. This meeting is one of the premier regular (quadrennial) international meetings concerning the formation, physical and chemical properties,

transformations and cloud impacts of atmospheric aerosol particles. There were more than 230 attendees from six continents and 27 countries represented. The meeting offered a unique opportunity for young scientists to share research results and have discussions with an international cross-section of experts in their fields. The meeting focused on Nucleation Theory & Experiment, Tropospheric and Stratospheric Aerosols, Cloud Drop and Ice Nucleation, and Aerosol-Climate Interactions. A special session was held on CLOUD (Cosmics Leaving Outdoor Droplets), a project at the CERN facility, which studies the influence of galactic cosmic rays on the Earth's climate through the media of aerosols and clouds. Ten scientists delivered featured conference plenary talks of high current interest.



*At the ICNAA conference in Fort Collins, USA (photos: P.J. De Mott)*

IUGG co-sponsored travel of students and earlier career scientist to the Conference. The International Advisory Committee of the Conference reviewed 28 applications received for the IUGG travel grants, and awarded five graduate students from Austria, Germany, India, UK/Nigeria, and Sweden. All awardees were first-time conference attendees. Each awardee presented a paper at the conference, three of them orally and two in the well-attended poster sessions that composed eight hours over the first three days of the conference. The conference provided international exposure for awardees in a venue that was intensively focused within their major areas of research. At the same time, the meeting was intimate enough to provide for ample interaction with professional peers from around the world, interactions that will hopefully encourage the awardees to continue their professional development as scientists. The organizing committee of the conference was impressed by the maturity of the awardees, and the energy they brought to sessions through their thoughtful questions. The papers presented at the meeting were published in the conference proceedings: DeMott, P. J., and O'Dowd, C. D., eds. (2013). *Nucleation and Atmospheric Aerosols, 19th International Conference*, AIP Conference Proceedings No. 1527, AIP Publishing, Melville, NY, ISBN: 978-0-7354-1152-4. The report was received from Paul J. DeMott, co-Chair of the 19<sup>th</sup> ICNAA

### **Report on the Workshop on Measurement Problems in Ice Clouds**

A workshop supported by IUGG was convened on 5-6 July 2013 at the ETH Zurich, Switzerland, to address issues related to ice particles in clouds and precipitation and how these particles impact weather and climate. The specific objectives were: (i) to identify critical, unresolved scientific questions related to the formation and evolution of ice in clouds, (ii) to summarize the uncertainties and limitations of in situ and remote sensors related to measurements of ice cloud properties, and (iii) to assess and evaluate potential approaches to reduce the uncertainties and to minimize the limitations related to measurements of ice cloud properties, including a review of emerging technologies. During the two days of the meeting there were 11 presentations (<http://www.iccp-iamas.org/>) that covered the current state of knowledge with respect to how ice forms in clouds and evolves into precipitation, the methods available for measuring ice particle properties and the types of models that are presently being employed to evaluate ice processes. Scientists and 12 students from nine countries were represented at the meeting. The proceedings of the workshop were summarized at the Davos Atmosphere and Cryosphere Assembly and will be published sometime in late 2014 as a monograph of the American Meteorological Society. The report was received from Darrel Baumgardner, a workshop organizer.

## Report on Joint Conference “Facets of Uncertainty”



Three different series of events, the EGU Leonardo Conference, taking place annually in Europe, the IAHS Statistical Hydrology (STAHY) Workshop, taking place annually in different places of the world, and the Hydrofractals Conference, taking place every ten years, coincided in space and time at Kos Island, Greece, 17–19 October 2013, during the “FACETS OF UNCERTAINTY” meeting. More than 110 scientists from 30 countries attended the joint conference.

Uncertainty has often been regarded as an opponent of science, whose task is to eliminate it or to reduce it as much as possible. However, it has also been argued that uncertainty is intrinsic in nature, impossible to eliminate, and also a quality with positive aspects. Understanding and quantifying uncertainty could make the understanding of Nature more feasible and its modeling more realistic. Therefore, the focus of the Kos convention was not only to contribute to uncertainty elimination, but to show how modeling can be combined with uncertainty estimation to improve the quality of models and predictions.

One of the important highlights of the scientific program was the Round Table entitled “*The legacy of Harold Edwin Hurst in hydrological stochastics*”. The British hydrologist H. E. Hurst spent 60 years in studying the Nile for the Egyptian government, during which he laid the foundation of a monumental set of hydrological records and investigations. His studies of the size of reservoir needed to maintain a given supply from natural Nile flow series showed that this was significantly greater than that based on random series. This finding, known as the Hurst phenomenon, was confirmed in other natural series, and in connection with advances in theoretical and practical mathematics and statistics (illustrated by the work of Kolmogorov and Mandelbrot) has been fruitful in many scientific disciplines including economics, electronics and recently climatology. The Round Table, chaired by John Sutcliffe, aimed to celebrate Hurst’s legacy; the participants focused on (a) his life and career, (b) his scientific contribution and (c) the links of his work to the advances to which it gave rise.

Of significant importance was also the *Poster Session*, held at the archaeological site of Asclepion (see the figure above), a sacred and important monument recognized as a world cultural heritage. About 50 posters were presented and many of the authors gave short oral overviews of their poster, which were recorded and made available online at the IAHS/STAHY web site (<http://www.stahy.org/Events/ReportKOS2013/tabid/115/Default.aspx>). Our team at the National Technical University of Athens tried to combine an interesting scientific program along with pleasant social activities. A high attendance in all sessions continued during the breaks and social events with socializing and networking of the delegates. It was unanimously agreed that it was a successful conference. The report was received from Demetris Koutsoyiannis (Conference Chairman).



Participants of the Poster Session (photos: D. Koutsoyiannis)

## Report on the 2<sup>nd</sup> IUGG-WMO Workshop on Ash Dispersal Forecast and Civil Aviation



The 2<sup>nd</sup> IUGG-WMO workshop on Ash Dispersal Forecast and Civil Aviation was held under the sponsorship of the World Meteorological Organization (WMO), the International Union of Geodesy and Geophysics (IUGG), the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI), the University of Geneva, the British Geological Survey, and the U.K. Met Office. Ninety-five participants from eighteen countries representing various academic institutions, operational agencies (including all nine Volcanic Ash Advisory Centers - VAACs) and stakeholders gathered at the Geneva Headquarters of the WMO (Geneva, Switzerland) from 18 to 20 November 2013, resulting in a total of 47 invited talks and 32 posters. The report below summarizes the objectives of the workshop and its main conclusions.

As a consequence of the severe disruption to air traffic generated by the April-May 2010 Eyjafjallajökull eruption in Iceland the tephra-dispersal community had to revise monitoring and forecasting methodologies in order to provide a more robust and reliable response to the social needs. A new multidisciplinary scientific community joined for the 1<sup>st</sup> IUGG-WMO workshop on Ash dispersal Forecast and Civil Aviation (Geneva, 18-20 October 2010) to promote stronger interactions between the volcanological and the operational forecasting communities, and the resulting outcomes served as a road-map for research. During the last three years (2010-2013) a great deal of scientific progress has been made in the characterization of volcanic eruptions and in ash dispersal modelling and forecasting as a result of increased multidisciplinary collaboration. A large number of projects and consortia have been funded worldwide that cover multiple aspects of ash dispersal, ranging from the expansion of remote sensing networks and capabilities for the characterization of the distal field to the real-time characterization of the source. However, recent volcanic crisis (i.e. Grímsvötn 2011, Iceland; Cordón-Caulle 2011, Chile) demonstrated how some specific needs remained (e.g. accurate description of the source term) and proposed new challenges (e.g. re-suspension of deposited volcanic ash) that motivated the organization of the 2<sup>nd</sup> IUGG-WMO workshop on Ash Dispersal Forecast and Civil Aviation. The main objectives of the 2<sup>nd</sup> workshop were to discuss: 1) progress since 2010 and on-going projects; 2) operational response to recent eruptions: practice and challenges; 3) characterization of Eruption Source Parameters (ESPs) and; 4) ash and gas dispersal modelling. Specific objectives included: i) to review and institutionalize the interaction between meteorological, atmospheric, volcanological, modeling and remote sensing communities, ii) to develop strategies for a closer working relationship and further collaboration between the aviation industry and the scientific community, iii) to document progress from the 1<sup>st</sup> IUGG-WMO workshop, iv) to identify best practice modelling strategies to support operational implementation and, v) to identify and develop concepts to address current challenges. These objectives were covered during three days of dedicated talks, posters, break-out sessions, and extensive plenary discussions (focusing on operational challenges, characterization of the source term and ash and gas dispersal modelling) in combination with a document compiled before the workshop gathering the opinions of the participants on the most pressing challenges in our communities and the efforts made across disciplines to overcome them.





*The Workshop participants (photo: A. Folch)*

***Current knowledge and capabilities.*** The research carried out by the communities represented at the 2013 workshop has been considerable and has provided some new methods and techniques to improve eruption onset detection, better constrain initial plume height, mass eruption rate and grain size distribution as well as provide improved observations of the downwind plume and clouds for comparison with the Volcanic Ash Transport and Dispersal Models. Improvements since 2010 have been made in:

- *Characterization of ESPs and cloud*, including source plume modelling, proximal observations of ESPs, distal observations of ash clouds by satellites and in-situ using aircrafts, inverse modelling of source terms, re-suspension of ash and volcano observatory monitoring.
- *Ash dispersal modelling*, including model physics and model validation.
- *Operational forecasting*, including communication and collaboration (e.g. programs of ‘Best Practice’ workshops aimed at sharing of experience and enhancement of services/activities), training, use of and access to observational data, modelling enhancements, understanding uncertainty and new services and operational pull-through.
- *Hazard communication and aviation sector*, including harmonization of procedures, VAAC output and graphics and vulnerability of engine and airframe components.

***Challenges and recommendations.*** The breakout groups and plenary discussions held during the workshop defined some of the continuing and new research challenges that need to be approached. These include:

- *Characterization of the observations and source term*, including pre-eruptive ESP for scenario planning, measuring source terms at the vent (mass eruption rate, event occurrence at remote volcanoes, aggregation, ash and SO<sub>2</sub> separation and re-suspension) and distal cloud measurements.
- *Ash dispersal modelling*, including the improvement of quantification of ESP, model uncertainty, data assimilation, ensemble forecast, aggregation, and plume-atmosphere interaction.
- *Operational forecasting*, including use of and access to observational data, modelling enhancements, understanding of uncertainty, training, communication and collaboration and new services for operational pull-through.
- *Hazard communication and aviation sector*, including harmonization of procedures and responses (different civil aviation authorities do not apply the same restrictions to their sovereign airspace for a variety of reasons), VAAC outputs and graphics (need to move beyond the ash-no ash graphics that VAACs have routinely produced with a new-generation forecast graphic that depicts ash clouds three dimensionally) and vulnerability of engines and airframe components including the development of damage curves for dilute ash of various composition, grain size, concentration.

## **NATIONAL COMMITTEES FOR GEODESY AND GEOPHYSICS: REPORTS**

### **Annual Meeting of the French National Committee for Geodesy and Geophysics**

The Annual Meeting of the French National Committee for Geodesy and Geophysics (CNFGG) was held on 19 March 2013 at the Institute de Physique du Globe de Paris (IPGP), in Paris, France. The first part of the Annual Meeting was a scientific colloquium entitled “Les fantaisies du champ magnétique”, and its second part was dedicated to the Committee’s business. The IUGG Secretary General A. Ismail-Zadeh attended the meeting and welcomed the participants at the beginning of the colloquium. Three talks were presented by J.-P. Valet, J. Dymant (both IPGP), and S. Fauve (Ecole Normale Supérieure) on different topics of Earth magnetism: (i) the Laschamps geomagnetic excursion and the demise of Neanderthal; (ii) high resolution deep-sea marine magnetic investigations, and (iii) studies on dynamos. The 2012 CNFGG Doctoral Thesis Prize was presented to Emmanuel Vincent (now a post-doc at MIT, Massachusetts, USA) for his thesis entitled «Interactions between tropical cyclones and ocean». Emmanuel gave a talk on this topic. At the business meeting J. Dymant, CNFGG President, addressed the participants and reported on the activities of the Committee for the last year. Several aspects of the Committee’s activities were discussed, including the reports from the Committee’s Sections, the financial report, and the election of the new members of the Committee. The report was received from J. Dymant, CNFGG President.

### **Annual Meeting of the Austrian National Committee for IUGG**

The business meeting of the Austrian National Committee for IUGG (ÖNK-IUGG) was held on 30 September 2013 at the Central Institute for Meteorology and Geodynamics (ZAMG). Austrian representatives of six IUGG Associations reported about their work and presented their recent and planned activities. The cooperation between the different IUGG Associations in Austria was discussed. Harald Schuh terminated his term as President of the Austrian National Committee for IUGG, and Wolfgang Lenhardt was elected President. Dr. Lenhardt (born in 1957, Vienna, Austria) studied geophysics at the University of Vienna, where he received his PhD in 1983. From 1985 until 1991 he worked in South Africa in the gold mining industry, where he was in charge of the seismic network for detecting and analyzing rock bursts. In 1991 he returned to Austria and joined the ZAMG. Since 2009 he is in charge of the Department of Geophysics of the ZAMG. He is lecturer at the Montanuniversität Leoben (MUL) in Austria, holds several positions in international seismological organizations and has published numerous papers on induced and natural seismicity. The report was received from Norbert Höggerl, Secretary of the ÖNK-IUGG.

## **REPORTS OF IUGG LIAISON OFFICERS**

### **Report on the Sixty-fifth Session of the WMO Executive Council**

The Sixty-fifth Session of the Executive Council of the World Meteorological Organization (WMO) was held in Geneva, Switzerland, from 15 to 23 May 2013. The session ran smoothly and in good humor. WMO does not have the financial resources that it would wish but it is receiving an increasing flow of extra-budgetary funding for specific projects and most member states are paying their dues more promptly than in the past despite the financial difficulties that most countries face. The Organization has always had a reputation for being efficient and it is now making an effort to further enhance this reputation by cutting to the minimum the length of the sessions of its constituent bodies. For example, this meeting ran for only eight working days. A major effort was made at this session in this regard by identifying many documents as being “non-controversial” and participants were then encouraged to adopt them without much or even any discussion. At least two substantial documents were presented and then adopted without a single comment from anyone.

IUGG was explicitly mentioned in the context of the WMO/IUGG Volcanic Ash Scientific Group. In a side event, the Vice-President of WMO’s Commission for Aeronautical Meteorology referred to this Group and stressed the importance of improved measurement of ash at its source. So, the next day, I intervened in Plenary to welcome the close co-operation between meteorologists and volcanologists in efforts to improve observation networks and instrumentation. A number of countries-members of the

Arctic Council are proposing that WMO be given formal status as an observer. Renewed interest by Russia has given hope that Arctic HYCOS (Arctic Hydrological Cycle Observing System) will soon be launched. The news from the Global Climate Observing System is that the atmospheric system is going well, responsibility for the oceanic system has been transferred from the Intergovernmental Oceanographic Commission of UNESCO in Paris, France, to WMO in Geneva, and the U.N. Food and Agriculture Organization has stopped supporting the terrestrial system even though the elements within it are progressing well.

The Global Framework for Climate Services (GFCS) did not dominate the session as much as in recent sessions, but close attention was paid to the forthcoming first session of the Intergovernmental Board on Climate Services (IBCS) which will be held in Geneva from 1 to 5 July 2013. Preparatory work on the GFCS has raised the problem of the international exchange of data because the past resolutions on this thorny issue refer to meteorological and hydrological data but not to climate data. There has been some discussion of revising these past resolutions to cover climate data but this is strongly resisted by the majority and so it is now more likely that a third resolution will be proposed to WMO Congress to cover climate data. The report was received from Arthur Askew, an IUGG Liaison Officer to WMO.

### **Report on SCOSTEP Activities: from CAWSES to VarSITI**



SCOSTEP (Scientific Committee for Solar-Terrestrial Physics) is an interdisciplinary body of the International Council for Science (ICSU) with the following principal tasks: (1) to promote, organize and coordinate international interdisciplinary programs in solar-terrestrial physics, (2) to conduct and sponsor international meetings in the scientific area of solar-terrestrial physics, (3) to define the data relating to these programs that should be exchanged through the World Data Centres, and (4) to conduct capacity building activities such as advanced schools on solar terrestrial physics. The SCOSTEP Bureau consists of a President, Vice President, Scientific Secretary, and one representative from each of the ICSU Participating Bodies. The current officers are: N.Gopalswamy (President), F.-J. Lübken (Vice-president), M. G. Shepherd (Scientific Secretary), A. Seppälä (SCAR), V. D. Kuznetsov (IAGA & IUGG), M. Lester (IUPAP), L.-A. McKinnell (URSI), T. Nakamura (COSPAR), D. Siskind (IAMAS), M. Zhang (IAU). The SCOSTEP website is <http://www.yorku.ca/scostep/>. In 2009-2013, SCOSTEP promoted and coordinated the research on the CAWSES Program (Climate and Weather of the Sun-Earth System) (CAWSES-I and CAWSES-II). The International CAWSES-II Symposium organized by SCOSTEP (November 18-22, 2013, Nagoya, Japan) discussed the results obtained within the framework of CAWSES-II and outlined a new research program - VarSITI (Variability of the Sun and Its Terrestrial Impact) to start in early 2014 and last for five years (2014-2018).

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In 2009-2013, SCOSTEP promoted and coordinated the research on the CAWSES Program (Climate and Weather of the Sun-Earth System) (CAWSES-I and CAWSES-II). The International CAWSES-II Symposium organized by SCOSTEP (18-22 November 2013, Nagoya, Japan) discussed the results obtained within the framework of CAWSES-II and outlined a new research program VarSITI (Variability of the Sun and Its Terrestrial Impact) to start in early 2014 and last for five years (2014-2018).



The **VarSITI** program will strive for international collaboration in data analysis, modeling, and theory to understand how the solar variability affects the Earth. The VarSITI Co Chairs are K. Georgieva and K. Shiokawa. The VarSITI program will have four scientific elements that address solar terrestrial problems keeping the current low solar activity as the common thread.

**SEE** (Solar Evolution and Extrema), Co-Chairs P. C. Martens, D. Nandi, and V. N. Obridko;  
**ISEST/MiniMax24** (International Study of Earth-affecting Solar Transients), Co-Chairs J. Zhang, M. Temmer, and N. Gopalswamy;  
**SPeCIMEN** (Specification and Prediction of the Coupled Inner-Magnetospheric Environment). Co-Chairs: J. Bortnik and C. J. Rodger;  
**ROSMIC** (Role Of the Sun and the Middle atmosphere/thermosphere/ionosphere In Climate), Co-Chairs F.-J. Lübken, A. Seppälä, and W. E. Ward).

The main subjects of the VarSITI Program are closely related to those addressed by IUGG and its Associations, which is the basis for a broad cooperation in the related fields of research. More information can be found at the VarSITI website: <http://newserver.stil.bas.bg/varsiti/>. The report was received from V. D. Kuznetsov, IUGG Liaison to SCOSTEP.

## **GEOSCIENCE EDUCATION**

In 2013 IUGG awarded six 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 Mathematical Models of Climate Variability, Environmental Change and Infectious Diseases, 29 April - 10 May.
- Workshop on Water Resources in Developing Countries: Planning and Management in a Climate Change Scenario, 6 - 17 May.
- Workshop on GNSS Data Application to Low Latitude Ionospheric Research, 6 - 17 May.
- Synthetic Aperture Radar: A Global Solution for Monitoring Geological Disasters, 2 - 6 September.
- Fundamentals of Ocean Climate Modelling at Global and Regional Scales, 30 June - 1 September (two weeks), Hyderabad, India.
- Earthquake and Tsunami Risk Reduction: Bridging Education, Research and Communication for a Better Preparedness, 7 - 18 October, Morocco.

Founded in 1964 by the late Nobel Laureate Abdus Salam and co-sponsored by UNESCO, IAEA, and the Italian government, ICTP ([www.ictp.it](http://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.

### **Report on the ICTP workshops in 2012 co-sponsored by IUGG**

*The Workshop on Science Applications of GNSS in Developing Countries* (11 April - 1 May 2012) was attended by 106 lecturers and participants from 36 countries of Europe, Africa, Asia and the Americas. The topics covered by the lectures were grouped in the following areas: Fundamentals of GNSS, GNSS and Scientific Exploration, GNSS Scientific Applications, Space Weather and Ionospheric Exploration with GNSS. An important part of the Workshop was dedicated to computer laboratory work. The topics covered ranged from Kalman filtering applied to satellite navigation exercises to GNSS derived ionospheric data processing and total electron content calibration. A number of the 31 presentations were given by those presenting their own work or that undertaken in

their institutions regarding the general topic of the Workshop. During open discussion sessions the workshop received very positive feedback and it was requested to continue carrying out this type of activity.

***The Workshop on Atmospheric Deposition: Processes and Environmental Impacts*** (21-25 May 2012) was attended by 55 participants and 11 speakers. The general theme of the workshop was wet deposition of atmospheric compounds and environmental impacts. Particularly the workshop addressed the following topics: modeling of the complex processes leading to dry and wet deposition of atmospheric compounds (ozone, nitrogen, sulfur); basic physical and chemical mechanisms determining deposition flux; observational networks including Africa, Europe, and USA; observed regional trends in atmospheric deposition for different continents; cloud processes and impacts on wet deposition and the ways to constrain better models; dust aerosol deposition and its impacts; and some others. Laboratory sessions presented and discussed (i) the use of regional climate models to perform simulations of atmospheric chemistry and atmospheric depositions, and (ii) the use of some materials (e.g. rain collectors and passive samplers). The workshop was successful in promoting exchange and discussions between participants and lecturers.

***The targeted training activity (TTA) “El Nino Southern Oscillation Monsoon in the Current and Future Climate”*** (30 July – 10 August 2012) was attended by 47 participants from the following countries: India, Pakistan, Bangladesh, Philippines, Maldives, Saudi Arabia, Vietnam, China, Egypt, Cameroon, Senegal, Ethiopia, Nigeria, Kenya, Sudan, Ghana, Brazil, Argentina. The TTA was structured in the following way. Each morning, there were lectures on the theory of ENSO, the regional monsoons and their modeling. Each afternoon, laboratory sessions were organized, where observational and CMIP5 data as well as analysis tools were provided to the participants and the task was to evaluate the model performance in reproducing ENSO and the ENSO-monsoon relationships. On the first day, participants built groups and selected (or were assigned) projects to work on during the whole period of the activity (afternoons). In these projects the participants collaborated between them and sought the advice of the experts present during the activity. Members of the groups presented the results of the projects on the last day of the activity. All participants were very enthusiastic and greatly profited from the possibility to perform their own small research project and to present it to everybody, including the experts in the field. Also, some common misconception about the use of climate model data could be identified and clarified during the activity. Overall, the meeting was a big success and many participants explained that they were inspired and would return to their host institutions and continue to work on the projects that they started during the activities and use the new methods/tools introduced by the expert lecturers and in the computer labs.

***The Workshop on Geophysical Data Analysis and Assimilation*** (29 October – 3 November 2012) attracted 31 participants from 24 countries including 26 participants from economically less developed countries, and 14 lecturers from France, Germany, Italy, Netherlands, Russia, Switzerland, and USA. The goal of this workshop was to assess the current state of geophysics and data science efforts and to indicate successful progress made to date and the challenges that presently exist. The workshop highlighted the progress and perspectives in data analysis and assimilation studies in various fields of geophysics (particularly, in seismology and geodynamics). One of the main aims of the workshop was to facilitate the link between theoretical and experimental researchers, adequately explaining new achievements in geophysics to a wide audience of scientists and engineers, giving a unified treatment of those methods that are currently used in interpreting actual data. Results of analysis and interpretation of seismological observations, such as tomographic maps, seismic anisotropy measurements, characteristics of seismic events, provide constrains and input data for development of geodynamical Earth models. Three-dimensional maps of present-day seismic velocities combined with physical models to translate these seismic velocity anomalies into density and temperature anomalies and with models of mantle viscosity structure can allow for efficient assimilations of mantle flow and temperatures to the geological past. The basic element of the data analysis and assimilation is methodology (theoretical and computational). Analysis and assimilation of seismological observations and geodynamical data were the main topics of the workshop. The workshop provided training in advanced methodologies of R&D in fundamental studies of the Earth's structure, evolution and dynamics. Numerous applied problems, such as prospecting for mineral resources, study of recent earthquakes, were treated as well. The theoretical grounds include (i) the theory of seismic wave propagation in realistic Earth models, (ii) the theory of mantle dynamics and plate motion, and (iii)

computational techniques and methods for inversion of seismic wave fields, and seismological and geodynamical data assimilation. Lectures focused on the research methodologies and on recent results of data interpretation and assimilation. A great benefit from the workshop was the close personal contact between lecturers and the participants, and the good connections established between the young scientists from all over the world. Nine participants presented results of their recent studies related to the workshop program in an oral and poster sessions. Several hours were dedicated every day to computer exercises, with the active engagement of students. Students were provided with specialized software, user manuals and tutorials facilitating their enthusiastic work.

*The School on Quantification of Seismic Hazards in the Indo-Asian Collision Zone* (15 – 21 November 2012) was held in Kathmandu, Nepal and attended by 39 participants spanning the following countries: Australia, Bangladesh, China, India, Italy, Nepal, Pakistan, UK, and USA. The school provided the attendees with some of the tools needed to estimate seismic hazard and to turn these into estimates of seismic risk. The school focused on issues, which could lead to erroneous estimates of seismic hazard, and on applications of seismic hazard assessment in the Himalayan region. The morning sessions of the school were devoted to geological, geophysical and geodetic observations of hazard followed by methodologies for assimilating these hazards and turning them in quantitative estimates of risk. Afternoon sessions were designed to provide attendees with the tools needed to process GPS data.

The Abdus Salam International Centre for Theoretical Physics (ICTP) acknowledges the IUGG co-sponsorship of the workshops and targeted training activities in 2012.

## **IUGG IN THE INTERNATIONAL COUNCIL FOR SCIENCE**

### **ICSU Meeting of International Scientific Unions**

The meeting of the International Scientific Unions of the International Council for Science (ICSU) was held at the Institut d'astrophysique in Paris, France, on 29-30 April and chaired by Prof. Yuan Tseh Lee, President of ICSU and a Nobel-Prize winner in Chemistry 1986. The ICSU Executive Director Dr. Steven Wilson presented the scope and the aims of the meeting and gave brief overview of the ICSU strategy and activities after the 2011 ICSU General Assembly in Rome, Italy. Al so he presented the activities on the ICSU 10-year major programme "Future Earth". Deputy Executive Director Dr. Carthage Smith discussed the importance of science education, and Ms. Denis Young talked about the communication between ICSU and Scientific Unions. After the talks, all participants were split into three thematic groups to discuss (i) the Future Earth Program, (ii) Science education, and (iii) the communication between ICSU and Scientific Unions. At the end of the first day, all participants gathered for a plenary meeting to hear reports from break-outs and to discuss the results. The second day was dedicated to (iv) the ongoing ICSU Program "Integrated Research on Disaster Risk (IRDR)" co-sponsored by UNISRD and ISSC (the report was given by Jane Rovins, IRDR Executive Director); (v) the new ICSU program "Urban Health and Well-being"; (vi) new interdisciplinary horizons; and (vii) open-access to data and information. Similarly, four talks were followed by intensive discussions by four break-out groups, which later gathered together for the plenary meeting to discuss findings with others. A concluding discussion was dedicated to new opportunities, particularly, related to the enhancement of the ICSU's visibility, to a recognition program, to strengthening the links between ICSU and its Unions with U.N. bodies, policy makers and the media. The IUGG President Harsh Gupta and Secretary General Alik Ismail-Zadeh attended the ICSU meeting.

### **2013 ICSU grants**

IUGG was involved in two international interdisciplinary projects sponsored by ICSU:

- Project "Mathematics of Climate Change, Related Natural Hazards and Risks" led by the International Mathematical Union (IMU) and supported IUGG, the International Union of Theoretical and Applied Mechanics (IUTAM), the U.S. National Academy of Sciences, Academia Mexicana de Ciencias, IRDR, WCRP, Centro de Investigación en Matemáticas in Mexico, and the ICSU Regional Office for Latin America and the Caribbean (ROLAC). Mathematics and

mechanics play an important role in geoscience education, and hence a mathematical training is an essential component for capacity building of the new generation of scientists dealing with climate change and natural hazards. Holding the educational workshop in Latin America in the framework of the 2013 UNESCO-sponsored “Mathematics of Planet Earth Program” made a great impact on science education in the region and raised the profile of ICSU and its Members. IUGG was involved in the project through its Union Commission on Mathematical Geophysics (CMG), which contributed to the project by its expertise in mathematical geophysics especially related to fluid components of the Earth system.

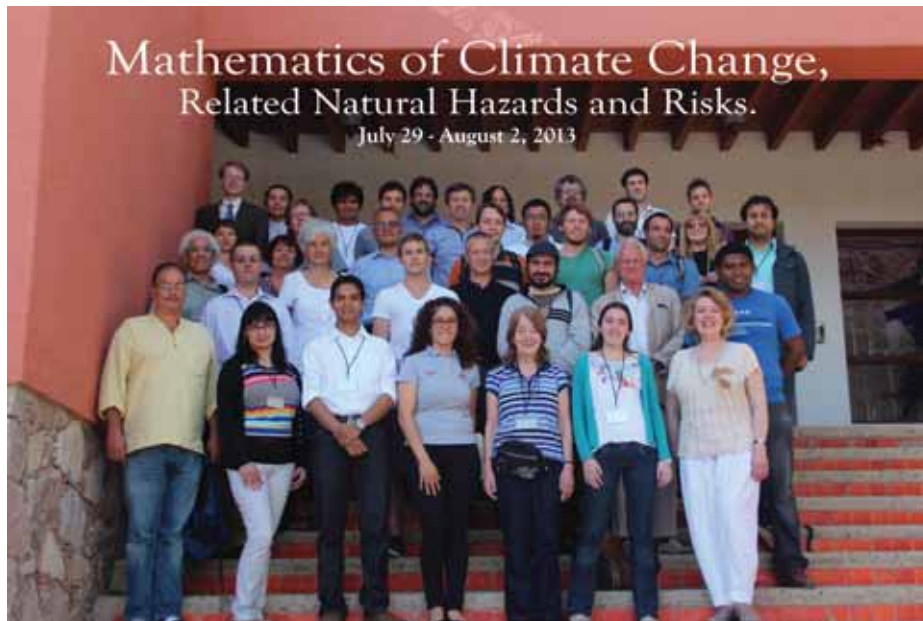
- Project “G@GPS-Africa: Long-term Recharge of Large Groundwater Basins” led by the International Union for Quaternary Research (INQUA) and supported by IUGG and IUGS. IUGG was involved in the project through the IAHS International Commission on Groundwater, a commission dealing with research on groundwater basins and associated hydrogeological processes.

### **Report on the Workshop “Mathematics of Climate Change, Related Hazards and Risks”**

The educational and capacity-building workshop, a joint initiative of the International Mathematical Union (IMU), International Union of Theoretical and Applied Mechanics (IUTAM) and IUGG took place in Centro de Investigación Matemáticas (CIMAT) in Guanajuato (Mexico) from 29 July to 2 August 2013. The workshop was sponsored by the International Council for Science (ICSU), CIMAT, IMU, IUGG IUTAM, and the International Council for Industrial and Applied Mathematics (ICIAM). It was supported by the U.S. National Academy of Sciences, the Academia Mexicana Ciencias, the ICSU Regional Office of Latin America and the Caribbean (ROLAC), and two International Scientific Program Committees: Integrated Research on Disaster Risk (IRDR) and World Climate Research Program (WCRP).

The members of the Scientific Committee were Susan Friedlander (University of Southern California/IMU), Paul Linden (University of Cambridge/IUTAM) and Ilya Zaliapin (University of Nevada, Reno/IUGG). Together with Christiane Rousseau (University of Montreal/IMU), they also formed the Organizing Committee. The workshop was attended by 39 participants (28 regular participants, 8 invited speakers, and 3 organizers). The targeted participants were from Latin America and some of the participants came from elsewhere in the world. There were 17 participants from Latin America, 8 from the United States, two from Israel and one from Germany. In addition, several local CIMAT scientists attended the workshop on a regular basis. The participants had different backgrounds that ranged from mathematics to physics, geophysics, statistics and engineering.

The scientific program consisted of eight mini-courses of three hours, each given by a thematic specialist, as well as a poster session, poster presentation and two round tables. The three themes covered by the lectures were (i) methodology of the climate and natural hazards research; (ii) climate change and environmental hazards; and (iii) socio-economic implications of climate change and extreme hydro-meteorological hazards. Most lecturers stayed on site for the whole workshop and interacted with the participants. The lecturers were G. Canzani (Argentina), M. Ghil (France), O. V. Fuentes (Mexico), E. Kalnay, R. Mechoso, G. Philander, B. Rajaratnam, E. Tziperman (all USA), and C. Rousseau (Canada). Nine posters by the participants were presented during the workshop duration and they were all of exceptional quality. Three students were asked to present their poster in front of the group.



*Workshop participants (photo: N. Cortés).*

It is the opinion of the organizers that such a workshop is very useful, and really fills a need inside the scientific community. This is particularly true for the scientists from Latin Americas and the Caribbean, as well as other developing regions, whose direct contact with the field leaders in regular meetings is limited due to monetary and logistic issues. At the final round table, most of the participants said that they learnt a lot and that the workshop achieved the goal of being educational and capacity building, since it allowed them to make contacts to field leaders as well as to get familiar with the current research trends and challenges. The rigor of the lecturers was appreciated, as well as the fact that the lecturers were conscious of the weaknesses of the models. To them, the lecturers behave ethically, by not presenting science as a religion and pointing out the weak points and the areas where more work or better models are needed. The workshop lectures have been recorded by a professional company, will be posted on YouTube, and will be made accessible from the websites of CIMAT, MPE, and IMU. The organizers enthusiastically suggest exploring a possibility of holding a follow-up workshop. The report was received from Christiane Rousseau (IMU Vice President)

### **Report on the G@GPS Workshop and Training Course**

The 2013 Groundwater @ Global Palaeoclimate Signals (G@GPS) Workshop and Training Course, G@GPS Africa: Long-term recharge of large groundwater basins, was held in Bobole, Mozambique, 14–19 October 2013. The meeting was organized by the International Union for Quaternary Research (INQUA), International Geoscience Program (IGCP), and Groundwater Resources Assessment under the Pressures of Humanity and Climate Change (GRAPHIC) of UNESCO, and co-sponsored by the International Council for Science (ICSU) and IUGG. Set in rural Africa, the workshop revolved around identifying rates and times of recharge, for the dual purposes of seeking information about past climates and determining aquifer vulnerability. Participants from 15 countries on five continents discussed a variety of topics, with particular emphasis on development and water resource management issues in African nations. The topics covered were: (i) groundwater-surface water interaction; (ii) strategies for mapping hydrogeologic basins in developing countries; (iii) sustainability assessments; (iv) distinguishing temperature and amount effects in isotopic data; and (v) identifying variations in recharge in large groundwater basins.

The meeting also served as a training course on use of isotopes in hydrologic studies, determining groundwater recharge rates from isotopic and geochemical studies, and determining groundwater age. Nearly half of the meeting participants had limited experience of using isotopes as tracers, making this an excellent capacity building opportunity. Basic theory and application examples were followed by hands-on demonstrations and practice sampling in the conference centre. A day-long trip was organized to provide practical experience sample regional monitoring wells within the critical Maputo



groundwater basin. The first well sampled was located in a school yard, much to the amusement of the local children. Combined with additional samples collected after the meeting by meeting participants, these samples will be analyzed for a wide range of major and trace elements, and stable and radioactive isotopes to provide one of the first views of groundwater age in a basin that provides water to over 3 million people. To complete the training course, participants were required to develop a proposal to identify recharge locations and rates in a potential water supply aquifer of interest, with the assistance of more experienced mentors.

Finally, the meeting provided the opportunity to assess progress towards identifying changes in climate and recharge on broad spatial and temporal scales. The G@GPS group is working to collect this information from large groundwater basins with long residence times around the world. Efforts in several large basins were updated, followed by discussions that provide a framework for the group to move forward. Possible cross-basin climate correlations were discussed, although several important issues and gaps exist that still prevent definitive identification of regional/global changes in paleoclimate patterns. Issues include needing better control and understanding of the origin of the oxygen isotopic signature, and better understanding of how mixing within different aquifers would affect correlations. Unfortunately, very little information from aquifers in the Middle East or South America was available. Closing this gap will be part of the focus of the next workshop and training course, which will be held in Argentina in 2014. Overall, the organizing committee did an excellent job managing a variety of meeting goals and provided an environment conducive to learning and fostering collaboration. The report was received from Randy Stotler (IAHS International Commission on Groundwater).

## **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 GU 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 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).

### **GeoUnions Business Meeting**

#### ***Paris, 28 April***

The Steering Committee of GeoUnions met in Paris, France, to coordinate scientific activities of the Unions, to exchange ideas, and to promote scientific research of common interest. The meeting was organized by Alik Ismail-Zadeh, IUGG Secretary General and Vice Chair of the Steering Committee, with a local support from Jean-Paul Cadet, Honorary President of the Commission for the Geological Map of the World. The meeting was held in the Maison de la Géologie and hosted by the French Geological Survey (BRGM). Representatives of eight Unions attended the meeting and welcomed several distinguished guests: Gordon McBean, President-Elect of the International Council for Science (ICSU); Steven Wilson, ICSU Executive Director; Howard Moore, ICSU Senior Advisor; and Jane Rovins, Executive Director of the Integrated Research on Disaster Risk (IRDR). The meeting was chaired by Ron Abler, IGU Past President and Chair of the Steering Committee.

The representatives of GeoUnions updated each other on the activities of the Unions since the last meeting in Istanbul, Turkey, April 2012, and discussed joint actions of the GeoUnions, namely, (i) the International Year for Global Understanding (<http://global-understanding.info/>) led by the International Geographical Union (IGU), (ii) the VALID project (<http://www.un-spider.org/VALID-stakeholder-assessment-I>) led by ISPRS and UN-SPIDER, (iii) the International Year of Deltas (<http://www.iyds-2013.org/>) co-sponsored by IUGG, IGU, ISPRS, IUGS as well as by the International Geosphere-Biosphere Program (IGBP) and the World Climate Research Program (WCRP), and (iv) new ISPRS project proposal on global land cover data and information. GeoUnions discussed the aspects of communication between ICSU and the Unions, the Unions' role in ICSU committees and interdisciplinary bodies and in the ICSU Regional Scientific programs. Special emphasis was given to the role of GeoUnions in "Future Earth: Research for Global Sustainability" (<http://www.icsu.org/future-earth>), a new ICSU major program. They received a report from the IRDR Executive Director on the new research topics on the assessment of integrated research on disaster risk and FORIN (Forensic Investigation of Disasters), and discussed their involvements in the IUGG-IRDR initiative on negotiations about setting up an intergovernmental panel on disaster risk assessment. The participants discussed the future of scientific publications and how scientific advice can underpin decision-making.

### ***Antalya, 16-18 November***

The GeoUnions (GUs) is a network of representatives of 8 international scientific unions of the International Council for Sciences (ICSU) dealing with Earth and space sciences. The GUs established a Steering Committee in 2004 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.

At the GUs meeting in Paris, France (28 April 2013), GUs representatives accepted an invitation by Orhan Altan (First Vice President of the International Society for Photogrammetry and Remote Sensing, ISPRS) to hold an "extraordinary" meeting in Antalya, Turkey (16-18 November 2013) in conjunction with the ISPRS scientific conference. Representatives of 6 Unions participated at the meeting of the Steering Committee of GUs in Antalya. Ron Abler (Past President of the International Geographical Union) chaired the Steering Committee. Alik Ismail-Zadeh represented IUGG at the GUs meeting.

The members of the Steering Committee provided updates on the activities of the unions for the last six months and discussed the issues related to the forthcoming General Assembly of ICSU to be held in Auckland, New Zealand (31 August - 3 September 2014). Among the meeting agenda topics were joint GUs projects/initiatives related to the Future Earth Scientific Program, disaster risk assessment and management, the International Year of Global Understanding (IYGU), and some others. Particularly, the Steering Committee considered the proposal of the International Union of Geological Sciences (IUGS) on Resourcing Future Generations and the ISPRS proposal on Global Land Cover Information, discussed the IUGG initiative on building actions toward setting up a high-level intergovernmental body to assess disaster risk, and the ISPRS initiative on Application of Geoinformation to Enhance Disaster and Risk Management. Also GUs considered and approved the working procedures of the Steering Committee and agreed to launch the GUs webpage.

### **Report on the VALID Booklet Launch**

On 3 September 2013, the ICSU GeoUnions, JBGIS and UNOOSA/UN-SPIDER presented a new report which shows the economic, humanitarian and organizational benefits of applying geoinformation to disaster management. The report "The Value of Geo-Information for Disaster and Risk Management (VALID): Benefit Analysis and Stakeholder Assessment" was edited by O. Altan and a team of Editors (R. Backhaus, P. Boccardo, F. G. Tonolo, J. Trinder, N. van Manen, and S. Zlatanova). The publication aims to raise awareness and to help setting priorities in research and development. The VALID report is built on a success of the previous publication "Geoinformation for Disaster and Risk Management – Examples and Best Practices" by the Joint Board of Geospatial Information Societies (JBGIS) and UNOOSA/UN-SPIDER, which compiled case studies providing information on what can be done with geoinformation in support of disaster and risk management –

methods, systems, applications, and experiences. It analyzed cases and offered an expert stakeholder assessment.



*The launch of the VALID booklet (photos: O. Altan)*

The launch event at the Vienna International Centre was a big success. Speakers at the presentation included M. Othman, Director of the United Nations Office for Outer Space Affairs (UNOOSA) and Deputy Director-General of the United Nations Office in Vienna (UNOV); O. Altan, the First Vice President of the International Society for Photogrammetry and Remote Sensing (ISPRS); G. Gartner, President of the International Cartographic Association and representative of JBGIS; A. Ismail-Zadeh, the IUGG Secretary-General and a representative of the Joint Board of ICSU GeoUnions; R. Backhaus and L. St-Pierre of the United Nations Platform for Space based Information for Disaster Management and Emergency Response (UN-SPIDER). The report was received from Orhan Altan (editor of the Valid Booklet, ISPRS President, 2007-2011).

### **GeoUnions launch new website**

The GeoUnions is a network of representatives of the eight international scientific unions of ICSU dealing with Earth and space sciences. At the recent meeting of the GeoUnions Steering Committee (Antalya, Turkey, 16-18 November 2013), it was agreed to develop a website of the GeoUnions to inform scientific community about joint activities of the unions. A new website is now launched: <http://icsu-geounions.org/>. The network's aim is to promote sciences worldwide, to communicate and to coordinate scientific activities of individual unions. Current key areas of the network's activities are: (i) Extreme Natural Hazards and Societal Implications (ENHANS), (ii) The Value of Geo-Information for Disaster and Risk Management (VALID); (iii) International Year of Global Understanding (IYGU); and (iv) International Year of Deltas (IYD). GeoUnions were involved in the recent past in the joint project and programs related to Health and Wellbeing, Geosciences in Africa, International Year of Planet Earth and some others.

## **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](http://www.cryosphericciences.org)

### **ABSTRACT**

The International Association of 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. In 2013, the major activity of IACS was the organisation of the Davos Atmosphere and Cryosphere Assembly 2013, the joint IAMAS/IACS Scientific Assembly “DACA-13” ([www.daca-13.org](http://www.daca-13.org)). This took place in Davos, Switzerland, from 8-12 July 2013. The theme of the conference was *Air, Ice and Process Interactions*. The conference attracted more than 950 attendees from 52 countries. Together, IACS and IAMAS supported many young scientists from developing countries to attend this conference. In addition to DACA-13, IACS was involved in supporting four further cryospheric events in 2013, in Grenoble (France), Ilulissat (Greenland), Zermatt (Switzerland), and Yuzhno-Sakhalinsk (Russia). These included inter-association activities (with IAG), an IACS Working Group meeting, a glaciology summer school run by the World Glacier Monitoring Service (WGMS, an IACS service), and an international symposium on snow science. IACS Standing Groups continue to make good progress in maintaining and progressing some of the most important glacier monitoring work on Earth (via the Global Terrestrial Network of Glaciers, GTN-G steering committee), and at disciplinary boundaries within the Glacier and Permafrost Hazards in Mountains (GAPHAZ) Standing Group (joint with the International Permafrost Association) and the IAVCEI/IACS Joint commission on Volcano-Ice Interactions. Looking forward, we have promised support to six cryospheric conferences/workshops associated with IACS in 2014, and have begun planning for the IUGG General Assembly to be held in Prague in 2015.

### **INTRODUCTION**

The International Association of 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. IACS held its most recent bureau meeting 13-15 July 2013 in Davos, Switzerland. In attendance were Charles Fierz (President-Elect), Olga Solomina (Vice President), Cunde Xiao (Vice President), Cecilie Rolstad Denby (Head, Glaciers and Ice Sheets), Hiroyuki Enomoto (Head, Marine and Freshwater ice), Valérie Masson-Delmotte (Head, Cryosphere, Atmosphere, and Climate), and Ralf Greve (Head, Planetary and other Ices of the Solar System). Ian Allison (President), and Ethan Greene (Head, Snow and Avalanches) joined part-time via Skype, and remaining bureau members provided input in advance of our meeting. On behalf of the President, Vice-President Olga Solomina handed the presidency over to Charles Fierz at the end of this Bureau Meeting. The input of Ian Allison as Immediate Past President will nevertheless be most valuable and appreciated over the next two years.

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 WG on “Flow law for polycrystalline ice” (2010-2014) and the WG “From quantitative stratigraphy to microstructure-based modelling of snow” (2012–2016).

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). This SG also oversees the operation of the World Glacier Monitoring Service (WGMS), a service of IACS (see below).

## ACTIVITIES

### DACA-13, a major IUGG event

The Davos Atmosphere and Cryosphere Assembly 2013, the joint IAMAS/IACS Assembly “DACA-13” ([www.daca-13.org](http://www.daca-13.org)) took place in Davos, Switzerland 8-12 July 2013. The theme of the conference was *Air, Ice and Process Interactions*. More than 950 attendees from 52 countries on five continents participated in 21 self-contained joint atmosphere-cryosphere symposia/sessions. In addition, four world-leading experts Thomas Stocker (University of Bern), Valérie Masson-Delmotte (LSCE Paris), Ronald B. Smith (Yale), and Georg Kaser (University of Innsbruck) delivered well-attended keynote presentations. Posters were on display during the whole event and six “poster distinctions” were presented to early career scientists at the end of DACA-13. A full report is available in the 2013 September issue of the IUGG e-Journal ([www.iugg.org/publications/ejournals](http://www.iugg.org/publications/ejournals)).



*Organizers of the Davos Atmosphere and Cryosphere Assembly 2013 “Air, Ice & Process Interactions, an IUGG (IAMAS & IACS) Event” (photo: D. Wasser).*

## Sponsorship of meetings and symposia during 2013

- The IACS WG From quantitative stratigraphy to microstructure-based modelling of snow organized “The Snow Grain Size Workshop - Measurements and Applications” in Grenoble, France, 2-5 April 2013 <http://snowgrain2013.sciencesconf.org/>. Co-sponsored by IACS, this event attracted more than 50 snow scientists to discuss issues around the meaning of “grain size” in snow science. For more detailed info on this and other activities of the WG, please visit [www.cryosphericsscience.org/wg\\_quantStratMicroMod.html](http://www.cryosphericsscience.org/wg_quantStratMicroMod.html).
- IACS co-sponsored the IAG/IACS symposium on “Reconciling observations and models of elastic and viscoelastic deformation due to ice mass change” that took place in Ilulissat, Greenland, 30 May-2 June 2013 ([www.dtu.dk/subsites/iag.aspx](http://www.dtu.dk/subsites/iag.aspx)).
- IACS co-sponsored the summer school on “Mass Balance Measurements and Analysis”, run by WGMS in Zermatt, Switzerland, 2-7 September 2013 ([www.wgms.ch/mb\\_summerschool.html](http://www.wgms.ch/mb_summerschool.html)). The course was restricted to about a dozen participants from the Andes and Asia who are involved with ongoing mass balance programs in their region. The participants were trained in both field and office work by an international team of experts in glacier monitoring and capacity building. On behalf of Cecilie Rolstad-Denby, the chair of the GTN-G steering committee, Charles Fierz delivered a short introduction to IACS and IUGG at the beginning of the event.
- Finally, IACS co-sponsored the international symposium on “Physics, chemistry and mechanics of snow”, in Yuzhno-Sakhalinsk, Russia, 23-28 September 2013 ([snowphysics.fegi.ru/en/main.html](http://snowphysics.fegi.ru/en/main.html)). 138 scientists and experts from eight countries attended the conference. Two keynotes “Global Problems of Snow Science” (Dr. A. Sato) and “Dielectric properties of snow” (Professor N. Maeno), 34 oral presentations, and 24 posters formed the scientific program. On behalf of IACS, Dr Sergey Sokratov awarded two prizes for the best presentations by the young researchers H. Matsushita (Civil Engineering Research Institute for Cold Region, Sapporo, Japan) and D.A. Bobrova (Laboratory of avalanche and debris-flow processes research of Sakhalin Department of Far East Geological Institute FEB RAS, Yuzhno-Sakhalinsk, Russia).



*Group photograph from “The Snow Grain Size Workshop - Measurements and Applications” held in Grenoble, France, 2-5 April 2013. This was the inaugural meeting of the IACS Working Group “From quantitative stratigraphy to microstructure-based modelling of snow” (photo: D. Lecorps).*

## The IACS Standing Group ‘Global Terrestrial Network for Glaciers’ (GTN-G)

The Global Terrestrial Network for Glaciers (GTN-G), created in 1998, is jointly run by three operational glacier monitoring bodies: the World Glacier Monitoring Service (WGMS), the US National Snow and Ice Data Center (NSIDC), and the Global Land Ice Measurements from Space (GLIMS) initiative. To formalize the link with IACS, the GTN-G Steering Group has been made a Standing Group of IACS ([www.cryosphericsscience.org/standingGroups.html](http://www.cryosphericsscience.org/standingGroups.html)). The advisory board consists of representatives from data user and producer communities, as well as from international organizations, while officers of WGMS, NSIDC, and GLIMS form the executive board. The latter met twice in 2013, first on 11 April during the 2013 EGU General Assembly in Vienna, second on 11 July during DACA-13 in Davos, Switzerland. A major challenge remains the strongly limited capacities currently available at NSIDC for the maintenance and update of glacier datasets, such as the World

Glacier Inventory, the GLIMS database, and the Glacier Photograph Collection. As a result, important projects such as the finalization of the new version of the GTN-G meta-data browser or the attribution and integration of additional glacier outlines from the Randolph Glacier Inventory dataset into the GLIMS database are pending.

### **The IACS Standing Group ‘Glacier and Permafrost Hazards in Mountains’ (GAPHAZ)**

By the end of 2012, all officer positions of this group were successfully filled, achieving a reasonable balance in terms of geographic representation, thematic competencies, and representation of IACS- and IPA- affiliated individuals. Both Associations confirmed the nominated officers in 2013. The group is active in convening sessions at major conferences and is considering organizing a workshop on “on glacier and permafrost hazards” in 2014. Furthermore, during EGU 2013, GAPHAZ officers and members of the Advisory Committee met, in order to define activities in the near future.

### **The ‘IAVCEI/IACS Joint commission on Volcano-Ice Interactions’ (CVII)**

CVII is particularly active in organizing sessions at major and relevant conferences. The website gives more info on all activities of the joint commission [http://volcanoes.dickinson.edu/iavcei\\_iacs\\_viic/](http://volcanoes.dickinson.edu/iavcei_iacs_viic/).

### **IACS representation at international scientific meetings during 2013**

Head of the IACS Division “Glaciers and Ice Sheets”, Cecilie Rolstad Denby, attended both GTN-G Executive Board Meetings (see above). Head of Division “Marine and Freshwater Ice” Hiroyuki Enomoto represented IACS at the Arctic Science Summit Week in Kraków, Poland, 13-19 April 2013. There the Memorandum of Understanding with the International Arctic Science Committee (IASC) and the Scientific Committee on Antarctic Research (SCAR) was renewed for a further 5 years. Ian Allison, IACS President, provided representation for ICSU within a steering group of scientists from organisations with polar interests who are undertaking initial concept planning for a possible new long-term polar science initiative. In January 2013, President Charles Fierz joined in an Executive Committee meeting of the Association of Polar Early Career Scientists in Tromsø, Norway, and attended both the first CryoNet team meeting and the first Global Cryosphere Watch Steering Group meeting in Reykjavik, Iceland; GCW is a WMO initiative which IACS has agreed to participate in.

## **FUTURE ACTIVITIES**

### **IACS will co-sponsor the following scientific meetings in 2014**

- Intercomparison of Snow Grain Size Measurements Workshop, 9-14 March 2014 in Davos, Switzerland, and a follow-up workshop 4-5 August 2014 in Reading, UK ([http://www.wsl.ch/dienstleistungen/veranstaltungen/veranstaltungskalender/Snow\\_Grain/index\\_EN](http://www.wsl.ch/dienstleistungen/veranstaltungen/veranstaltungskalender/Snow_Grain/index_EN)). Both events run in the framework of the IACS WG “From quantitative stratigraphy to microstructure-based modelling of snow”.
- International Symposium on Sea Ice in a Changing Environment, Hobart, Tasmania, Australia, 10-14 March 2014 ([seaice.acecrc.org.au/igs2014/](http://seaice.acecrc.org.au/igs2014/)).
- 44th Annual International Arctic Workshop, 15-16 March 2014, Boulder, Colorado, USA <http://instaar.colorado.edu/aw/about/index.html>.
- Model-data workshop for the Late Pleistocene evolution of the Greenland and Antarctic ice sheets, 22-24 May 2014, Grenoble, France (<http://www.physics.mun.ca/MOCA/IceSheetModelandData2014.html>).
- International Workshop on Calving, 1-2 June 2014, Grenoble, France (<http://www-igge.obs.ujf-grenoble.fr/calving2014/theme.html>).
- Third International Summer School in Glaciology, organized by the University of Alaska and to be held in McCarthy, Alaska, USA, 6-16 August 2014.

Submitted by  
Charles Fierz, IACS President  
Andrew Mackintosh, IACS Secretary General





## **International Association of Geodesy (IAG)**

*<http://www.iag-aig.org>*

### **INTRODUCTION**

Geodesy deals with the measurement and representation of the Earth's geometry, gravity and rotation including their temporal variations. The history of IAG can be traced back to 1862, when the European Arc Measurement (Mitteleuropäische Gradmessung) project was initiated. The mission of the IAG is the advancement of geodesy by furthering geodetic theory through research and teaching, collecting, analyzing, modelling and interpreting observational data, stimulating technological development, and providing a consistent representation of the Earth's time-dependent figure, rotation, and gravity field.

The IAG is structured into four Commissions, the Inter-Commission Committee on Theory (ICCT), fifteen International Scientific Services, the Global Geodetic Observing System (GGOS), and the Communication and Outreach Branch (COB). The Commissions are divided into Sub-commissions, Projects, 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. GGOS has as one of its roles the coordination of the work 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 monthly Newsletter and the IAG Website.

The administration of the IAG is supervised by the Council and delegated to the Executive Committee, the Bureau and the Office. The membership of the Council consists of delegates appointed by the adhering bodies; the Bureau comprises the IAG President, Vice-President and Secretary General; and the Executive Committee consists of the Bureau and other members elected by the Council; the Office assists the Secretary General. The detailed program of the IAG is published in the quadrennial Geodesist's Handbook, and reports are published in the bi-annual Travaux de l'IAG.

### **ADMINISTRATION**

#### **IAG Council**

The IAG Council typically meets during the IUGG General Assembly. In the interim period it is informed by the Secretary General on current activities. In 2013 the Council met on the occasion of the celebration of IAG's 150<sup>th</sup> anniversary in Potsdam, Germany, 1-6 September 2013. The main discussion was related to the periodic (every eight years) review of the Statutes and Bylaws.

#### **IAG Executive Committee (EC)**

The IAG EC held two meetings in 2013, namely in Vienna, Austria, 7 April, and in Potsdam, Germany, 1 September, during the celebration of IAG's 150<sup>th</sup> anniversary. Most important topics were the reports of all IAG components (Commissions, ICCT, Services, GGOS, COB) and the preparation of the IAG Scientific Assembly, in Potsdam, Germany, 1-6 September 2013. Meeting summaries are published in the IAG Website ([www.iag-aig.org](http://www.iag-aig.org)).

## **IAG Bureau**

The IAG Bureau held monthly teleconferences to facilitate day-to-day decisions. The IAG President, the Vice-President and the Secretary represented IAG in various scientific meetings (see below) and gave oral presentations, particularly with regard to the 150<sup>th</sup> anniversary.

## **IAG Office**

The main activities of the IAG Office were the preparations for IAG's 150<sup>th</sup> anniversary and the 2013 Scientific Assembly. Travel grants were awarded to young scientists for participation in several symposia. The individual IAG membership was regularly updated. IAG Council and EC meetings were organized, including detailed minutes for the participants and meeting summaries for publication in the IAG homepage and IAG Newsletters.

## **ACTIVITIES**

### **Commissions, Inter-Commission Committee, and Services**

The four IAG Commissions, the Inter-Commission Committee on Theory (ICCT), and the fifteen Services maintain their individual Webpages (all accessible via the IAG Homepages). Several Services and sub-components (Sub-Commissions, Working and Study Groups) held their administrative meetings (Coordinating, Directing or Governing Board), and symposia and workshops (see below).

### **Global Geodetic Observing System (GGOS)**

GGOS established its new structure according to the 2012 Terms of Reference, which includes the Consortium of representatives of the Commissions and Services, the Coordinating Board as the decision-making body, the Executive Committee, and the Science Panel. The outreach is done via the GGOS Portal, Webpages ([www.ggos.org](http://www.ggos.org)), brochures and books. GGOS represents the IAG in the Group on Earth Observation (GEO). Meetings of the GGOS Consortium and the Coordinating Board, respectively, took place on 6 April 2013 in Vienna, Austria.

### **Scientific Assemblies, Symposia and Meetings in 2013**

- 21st European VLBI for Geodesy and Astrometry Working Meeting, Helsinki, Finland, 6-8 March 2013.
- 17th Int. Symposium on Earth Tides "Understand the Earth", Warsaw, Poland, 15-19 April 2013.
- International Symposium on "Mobile Mapping Technology", Tainan, Taiwan, 30 April-2 May 2013.
- Seventh IVS Technical Operations Workshop, Westford, Massachusetts, USA, 6-9 May 2013.
- IERS Workshop on Local Ties and Co-locations, Paris, France, 21-22 May 2013.
- IAG Sub-Commission 1.3a "EUREF" Symposium 2013, Budapest, Hungary, 29-31 May 2013.
- International Symposium on "Reconciling Observations and Models of Elastic and Viscoelastic Deformation due to Ice Mass Change", Ilulissat, Greenland, 30 May-2 June 2013.
- GNSS Precise Point Positioning Workshop: Reaching Full Potential, Ottawa, Canada, 12-14 June 2013.
- VIII Hotine-Marussi Symposium, Rome, Italy, 17-21 June 2013.
- Int. Conference on "Earth Observations and Societal Impacts", Tainan, Taiwan, 23-25 June 2013.
- International Symposium on Planetary Sciences (IAPS2013), Shanghai, China, 1-4 July 2013.
- IAG Scientific Assembly, Potsdam, Germany, 1-6 September 2013.
- 2nd Joint Int. Symposium on Deformation Monitoring, Nottingham, UK, 9-11 September 2013.
- IAG Third Symposium on "Terrestrial Gravimetry: Static and Mobile Measurements (TGSM-2013)", St Petersburg, Russian Federation, 17-20 September 2013.
- Scientific Developments from Highly Accurate Space-Time Reference Systems, Observatoire de Paris, Paris, France, 16-18 September 2013.
- ITU/BIPM Workshop on "The Future of the International Time Scale", Geneva, Switzerland, 19-20 September 2013.
- 2nd International VLBI Technology Workshop, Seogwipo, South Korea, 10-12 October 2013.
- IAG Subcommission 1.3b "SIRGAS" Symposium, Panama City, Panama, 24-26 October 2013.

- 18th International Workshop on Laser Ranging, Fujiyoshida, Japan, 9-15 November 2013.



*Opening Session of the IAG Scientific Assembly on the occasion of the 150<sup>th</sup> Anniversary of IAG  
(photo: <http://jalbum.net/a/1406747>).*



*Impression from the IAG Scientific Assembly, Potsdam, Germany, 1-6 September 2013  
(photo: <http://jalbum.net/a/1406747>).*

### **Schools organized by the IAG**

- EGU-IVS Training School for the Next Generation Geodetic and Astrometric VLBI, Helsinki, Finland, 2-5 March 2013.
- 11th Int. School of Geoid Service: Heights and Height Datum, Loja, Ecuador, 7-10 October 2013.
- School on Reference Systems, Crustal Deformation and Ionosphere Monitoring, Panama City, Panama, 21-23 October 2013.

### **Communication and Outreach Branch (COB)**

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

## **Cooperation with other Organizations**

Close cooperation of the IAG is maintained with several organizations outside IUGG. There were meetings with the Advisory Board on the Law of the Sea (ABLOS, together with IHO), Group on Earth Observation (GEO, with IAG as a participating organization), International Standards Organization (ISO, with IAG represented in TC211 Geographic Information / Geomatics), Joint Board of Geospatial Information Societies (JBGIS), United Nations Offices for Outer Space Affairs (UNOOSA, with participation in Space-based Information for Disaster Management and Emergency Response, UN-SPIDER, and International Committee on Global Navigation Satellite Systems, ICG).

## **Publications**

The monthly issues of the Journal of Geodesy, the proceedings of the IAG Symposium on Reference Frames for Applications in Geosciences (IAG Symposia Series, Vol. 138), and the IAG Mid-Term Reports (Travaux de l'AIG, Vol. 38) were the main publications in 2013.

## **Awards, Anniversaries, Obituaries**

24 travel awards were granted in 2013 to young scientists for participation in several symposia. The IAG Young Author Awards were granted for excellent publications in the Journal of Geodesy to Thomas Arzt (Germany) and Manuela Seitz (Germany).

Submitted by  
Hermann Drewes, IAG Secretary General



## **International Association of Geomagnetism and Aeronomy (IAGA)**

[www.iugg.org/IAGA/](http://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 Organization, 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**

IAGA is organized in five Divisions and three Inter-divisional Commissions, each led by a Chair and a Co-Chair. Each Division/Commission may form Working Groups in given specialized topics and elects officers to run the business of the Working Groups. During the XXV IUGG General Assembly in Melbourne 2011, Earth on the Edge: Science for a Sustainable Planet, IAGA renews its officers. The links below lead directly to lists of the Division/Commission leadership and the Working Group names and officers:

[http://www.iugg.org/IAGA/iaga\\_pages/science/sci\\_structure.htm](http://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. 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:

[http://www.iugg.org/IAGA/iaga\\_pages/science/sci\\_structure.htm](http://www.iugg.org/IAGA/iaga_pages/science/sci_structure.htm)

## ACTIVITIES

The highlights of the IAGA year have to be the excellent Scientific Assembly in Mérida, Mexico, the very first IAGA summer school, and the successful launch of ESA's Swarm constellation in late November.

### The IAGA 2013 Scientific Assembly

The IAGA 2013 Scientific Assembly took place 26-30 August 2013 in Mérida, Mexico, under the motto "Living on a magnetic planet". The meeting was attended by 459 participants from 43 countries, a smaller number than expected and probably caused by the recent economic restrictions in the USA and southern Europe. 871 papers (609 oral and 262 posters) were presented in 51 sessions organized by the five IAGA Divisions and the two Inter-divisional Commissions. In Merida, it was a pleasure to recognize the achievements of IAGA scientists at all stages of their careers at the Open and Awards ceremony. The new Shen Kuo Medal for Interdisciplinary Achievements was awarded for the first time to Jean-Louis Le Mouél (France), the IAGA Long Service Medal honored Evgeny Kharin (Russia) and Michel Menvielle (France), and the IAGA Young Scientist Award was given to Henrique Aveiro (USA), Laura Holt (USA), Cristina Garcia-Lasanta (Spain) and Ilya Kuzichev (Russia). Participants enjoyed the very comfortable, safe and therefore relaxed environment of Mérida city and the charm and kindness of the local people. The IAGA EC members and the National Delegates warmly thanked the LOC and particularly its chair, Harald Böhnelt, for the meeting organization.

### 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, 27 August 2013, 1600-1810, and the second on Friday, 30 August, 0830-1005. Both meetings were attended by 25 of the Chief Delegates from the 35 voting member countries that had sent accreditation letters. A very brief summary of the topics discussed and decisions and recommendations made can be found in *IAGA Newsletters no 50*.

### EC meetings

Three meetings of the IAGA Executive Committee (EC) were held in Merida, the first (EC-1) on Sunday, 25 August 2013, 1200-1715, the second (EC-2) on Tuesday, 27 August, 1900-2150, and the third (EC-3) on Saturday, 31 August, 1000-1200. The main decisions of these meetings are indicated in the last *IAGA Newsletters issue*.



*IAGA XII motto (photo: M. Purucker).*



*Opening and Award Ceremony (photo: E. Petrovsky).*



*First IAGA school: Students and lecturers during the field trip (photo. M. Manda).*

### **First IAGA Summer School**

The first IAGA School took place also in Mérida, Mexico, before the IAGA Scientific Assembly, from 19-27 August 2013. 20 pre- and post-graduate students from 11 countries worldwide (including China, Russia, Mexico, Brazil, Peru, USA, France, and Austria) attended the event. These attendees included students nominated for the IAGA Young Researcher Award, and nominated by the IAGA Division and Working Group leaders. The event was also open to any interested people able to fund themselves. 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 IAGA Assembly. Their attitude and mutual support was evident also during scientific sessions, when very often a group of students attended talks and posters given by their colleagues, with lively discussion ensuing. The Summer School's success depended on Eduard Petrovsky'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 22 November 2013. The three spacecraft shall deliver data that will provide new insight into the Earth's system by improving our understanding of the Earth's interior as well as the near Earth electro-magnetic environment important for space weather effects. The very first high-accuracy and high spatial resolution measurements of the strength, direction and time variations of the magnetic field, complemented by precise navigation, accelerometer and electric field measurements, will provide the required observations to model the various sources of the geomagnetic field.

### **Sponsored Topical Meetings**

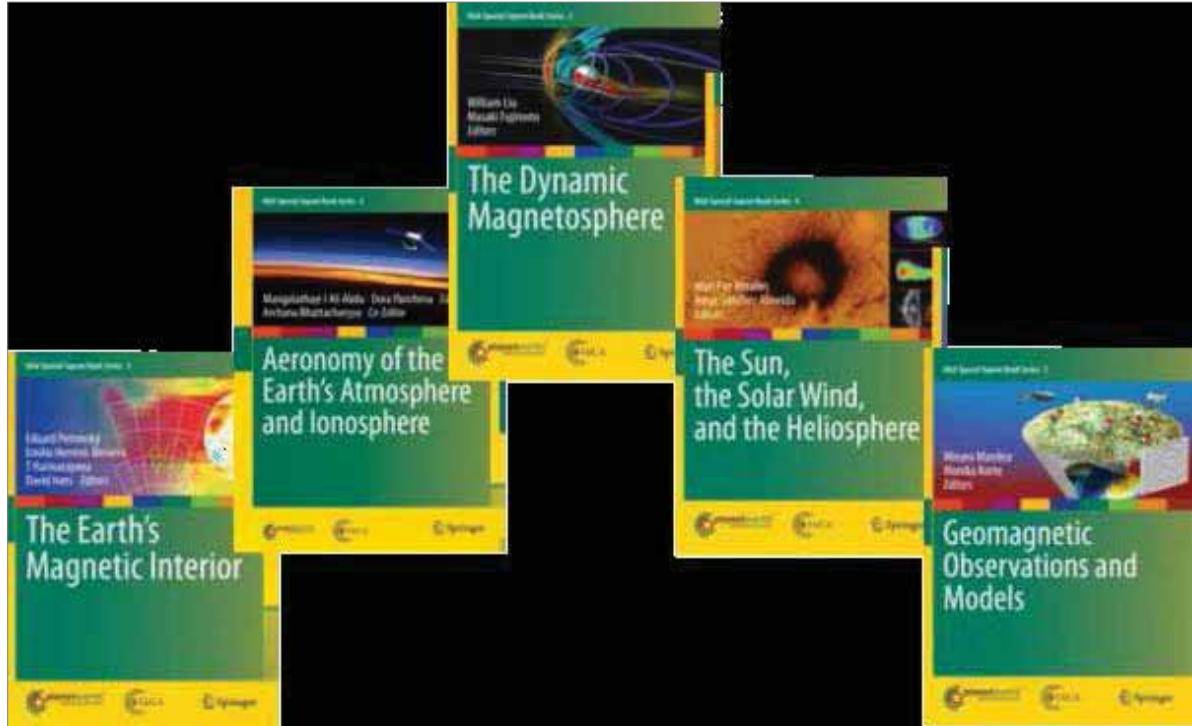
IAGA sponsored a topical meeting during 2013:

23-25 October, Montevideo, Uruguay	Third Biennial Meeting of the Latin American Association of Paleomagnetism and Geomagnetism - LatinMag
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## Publications

### *IAGA books*

One of the most important achievements of IAGA in recent years 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.



*Front covers of the five volumes describing the state-of-the-art of IAGA science, one for each Division of the Association.*

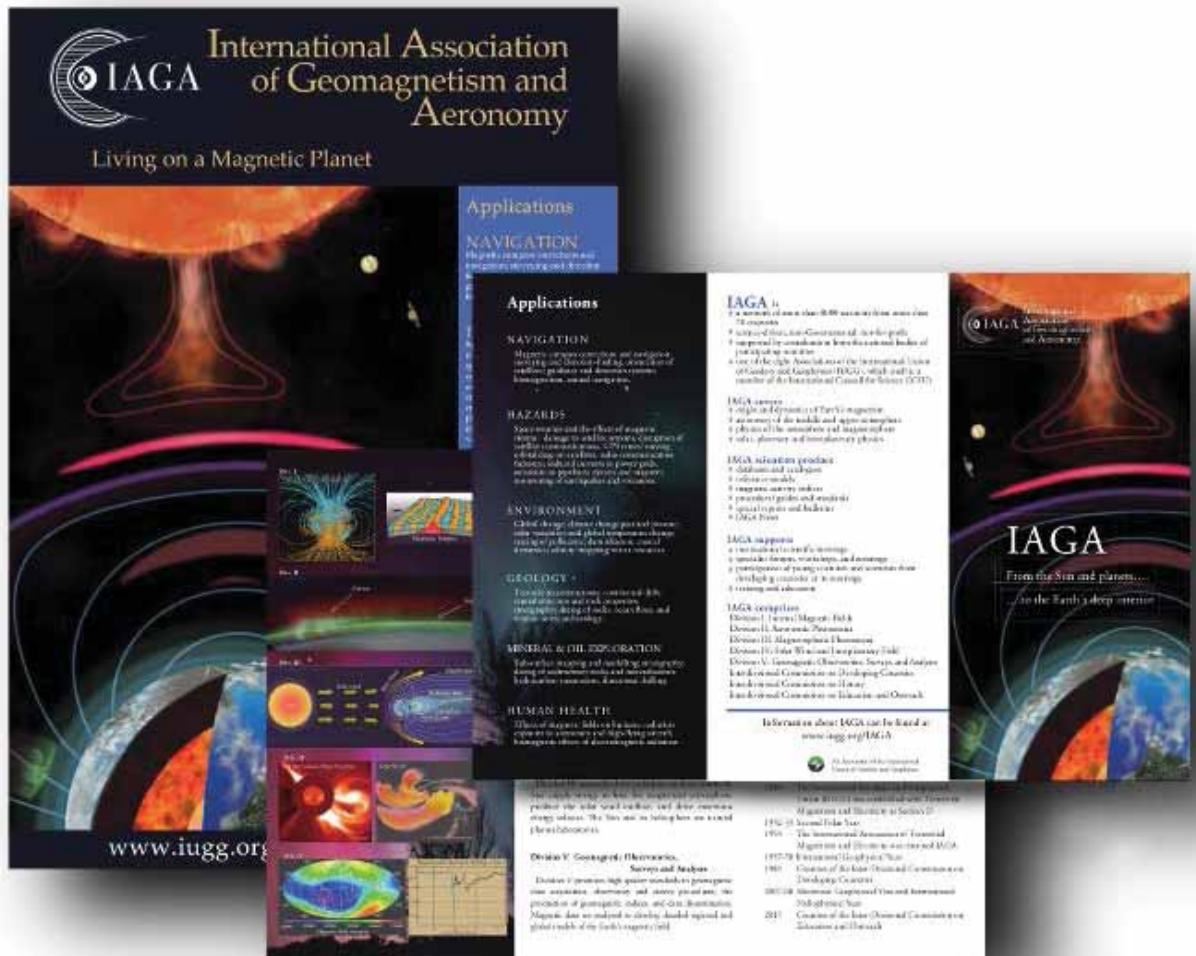
### *IAGA Newsletters 50*

The last issue of IAGA Newsletters was distributed at the end of December 2013. It can be downloaded from the IAGA web site [www.iugg.org/IAGA](http://www.iugg.org/IAGA). Among other things, reports from EC and CoD meetings can be found there.



## New Flyer and Poster

During the XXIIth SA the final version of the new IAGA flyer was agreed upon by the EC.



The new IAGA flyer.

## Preparations for IAGA2017

Conference of Delegates approved the proposal to hold a joint Scientific Assembly with IAMAS and IAPSO in Cape Town in 2017, the other two Associations having already taken the decision to meet there. The organization 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.

## FUTURE ACTIVITIES

The XXVI General Assembly of the IUGG will take place in Prague from June 22 to July 2, 2015. IAGA works on the scientific programs in order to offer to its members an exciting multi-disciplinary conference.

Submitted by  
Mioara Manda, IAGA Secretary General



## **International Association of Hydrological Sciences (IAHS)**

<http://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, with the Hydrology and Water Resources Programme of the World Meteorological Organisation (WMO), with UN-Water as well as with other partners of the NGO and UN spheres.

### **ADMINISTRATION**

The following International Commissions and working groups of IAHS initiate and conduct conferences, symposia, workshops, courses, publications 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)
- Working Group on Precipitation
- Working Group on Education and capacity building
- Working Group on Monitoring the XXIth Century (MOXXI) set up in 2013
- The decadal initiative Panta Rhei set up in 2013

### **ACTIVITIES**

The main event of 2013 has been the Joint IAHS-IAPSO-IASPEI Scientific Assembly which took place in Gothenburg, Sweden, locally organized by the University of Gothenburg, 21-26 July. 1,135 delegates participated, including 350 with an IAHS affiliation. IAHS organized four joint symposia with IAPSO and IASPEI, and 15 strictly hydrological symposia. Red books in the IAHS series have been pre-published as proceedings of some of these symposia.

The IAHS Scientific Decade 2013-2022 “Panta Rhei – Everything flows” has been launched during the Gothenburg assembly and already much advertised and made concrete at several conferences over the year (especially EGU Assembly, Vienna, Austria, April; joint Stahy, Hydrofractals and EGU Leonardo Conference, Kos, Greece, October; AGU fall Assembly, San Francisco, USA, December).

Dedicated webpages are available from [www.iahs.info](http://www.iahs.info) and the scientific rationale and agenda have been published as an open access article (Montanari *et al.*, 2013) in *Hydrological Sciences Journal* 58(6).

The IAHS Scientific Decade 2003-2012 on “PUB – Prediction un Ungauged Basins” allowed two major synthesis outputs: one book at Cambridge University Press (Blöschl *et al.*, 2013) and one open access article (Hrachowitz *et al.*, 2013) in *Hydrological Sciences Journal* 58(6).

The Gothenburg Scientific Assembly also allowed to have an IAHS key lecture at the joint opening plenary by K. Takeuchi, and a much attended IAHS Plenary session. Key lectures have been given by E. Foufoula-Georgiou (AGU), B. Stewart (WMO) and A. Montanari (IAHS, Panta Rhei). The IAHS Plenary session also included the annual Prize Ceremony. G. Blöschl (Austria) has been awarded the IAHS-UNESCO-WMO International Hydrology Prize *for pioneering work on linking patterns and processes in catchment hydrology and for his inspirational leadership in advancing predictions in ungauged basins*. F. Lombardo and E. Volpi (Italy) received the Tison Award for young scientists for their paper *Rainfall downscaling in time: theoretical and empirical comparison between multifractal and Hurst-Kolmogorov discrete random cascades*, in *Hydrological Sciences Journal* 57(6). Funds from Taylor and Francis, the Swedish State, WMO and IUGG allowed provision of the Tison Award amount and grants for delegates from developing countries and invited speakers.

In addition to the Scientific Assembly, many scientific events have been organized, sponsored or supported by IAHS and its Commissions and Working Groups in 2013. Among them we would like to quote the followings: CIRED, Algiers, Algeria, 24-25 February; Groundwater Quality GQ13, Gainesville, USA, 21-26 April; HydroEco'13, Rennes, France, 13-16 May; Water and environmental dynamics, Koblenz, Germany, 3-7 June; IPC11 11<sup>th</sup> Precipitation conference, Wageningen, The Netherlands, 1-3 July; Facets of uncertainty 5<sup>th</sup> Leonardo Conf.-Hydrofractals'13-Stahy'13 joint conference, Kos, Greece, 17-19 October.



*Facets of uncertainty 5<sup>th</sup> Leonardo Conference, Hydrofractals '13, Stahy'13: IAHS Poster session on the archaeological site of Kos, Greece, October 2013 (photo: C. Leduc).*

In 2013 IAHS Press published eight issues of the *Hydrological Sciences Journal*.

IAHS Press also published 6 Red Books and 1 Book in the “Benchmark Papers in Hydrology” Series:

- Floods: From risk to opportunity. Edited by A. Chavoshian *et al.*, IAHS Publication 357.
- Deltas: Landforms, ecosystems and human activities. Edited by G. Young *et al.*, IAHS Publications 358.

- Climate and land-surface changes in hydrology. Edited by E. Boegh *et al.*, IAHS Publications 359.
- Cold and mountain region hydrological systems under climate change: towards improved projections. Edited by A. Gelfan *et al.*, IAHS Publications 360.
- Understanding freshwater quality problems in a changing world. Edited by B. Arheimer *et al.*, IAHS Publications 361.
- Considering hydrological change in reservoir planning and management. Edited by A. Schumann *et al.*, IAHS Publications 362.
- Palaeohydrology. Edited by V.R. Baker, IAHS Benchmark 9.

The *IAHS TFDC* (Task Force for Developing Countries) continued its action and distributed free of charge all IAHS publications (Hydrological Science Journal and the Books) to more than 60 selected Universities and Research Institutions of Africa, Asia, South-America and Eastern Europe. Three issues of the *IAHS Newsletter* have also been published and widely digitally disseminated. A new website has been set up and launched.

The close cooperation of IAHS with UNESCO, WMO and the UN-Water coordination mechanism has been continued. We have attended the annual steering committee meeting of UN Water, the steering committee of GRDC, the WMO CHy advisory board meeting, events of 2013 The International Year of Water Cooperation, the IAHR Congress, IUGG meetings.

### **FUTURE ACTIVITIES**

From 2013-2022 IAHS will focus on the new Scientific Decade "Panta Rhei – Everything flows". This is discussed under "Activities". The main activity in 2015 is the IUGG General Assembly, Prague, Czech Republic, 22 June-2 July.

Submitted by  
Christophe Cudennec, IAHS Secretary General



## **International Association of Meteorology and Atmospheric Sciences (IAMAS)**

*<http://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**

The Bureau and Executive Committee (EC) did not change during 2013. The EC had two regular sessions during the joint Assembly with our cryospheric sister association IACS during the Davos Atmospheric and Cryospheric Assembly (DACA-13; cf. [www.daca13.org](http://www.daca13.org)). Most IAMAS commissions held their business meetings during DACA-13. Barbara Hale (USA) was elected chairwoman of CNAA (cf. below).

During the year Bureau members cooperated closely via email and regular telephone conference calls. President and Sec.-Gen. met in April at EGU in Vienna, Austria, and in September at the IUGG EC-meeting in Prague, Czech Republic. Both also attended in September the IAG-assembly in Potsdam, Germany. Furthermore, the Sec.-Gen. attended as guest the IAPSO EC-meeting in Gothenburg, Sweden (September).



Young scientists on the stage at DACA-13. *Left:* John Screen (UK) receiving the IAMAS Early Career Scientist Medal from president Athena Coustenis during the opening ceremony (photo: M. Senft). *Right:* recipients of young scientist oral and poster presentation prizes during the closing ceremony: Saehee Lim (France), Rianne Giesen (Netherlands), Franziska Koch (Germany), Fabiano Monti (Switzerland), Narendra Ojha (India), Heather Archambault (USA; from left; photo: H. Volkert).

## ACTIVITIES

The primary activity of the Sec.-Gen. during the first half of 2013 was representing IAMAS and its commissions in the final planning for DACA-13. He joined four meetings of the Swiss National Organizing Committee, assisted the placement and fine tuning of the 63 topical sessions within 21 scientific symposia, which eventually brought nearly 1,000 participants to the renowned resort of Davos, Switzerland. During the opening ceremony John Screen (Univ. Exeter, UK) was awarded with the first IAMAS Early Career Scientist Medal for his “for his extraordinary contributions to meteorology and atmospheric physics, in particular with respect to the workings of the two polar regions”. The closing ceremony brought six young scientists onto the stage, four women and two men working on three continents, who received Swiss prizes for the best oral and poster presentations (cf. photos above). More details can be found in the IUGG e-journal, Sept. 2013, item 1 ([www.iugg.org/publications/ejournals/IUGGej1309.pdf](http://www.iugg.org/publications/ejournals/IUGGej1309.pdf)).



Reunion of past and current IAMAS officers on 7 July at DACA-13: five presidents – Michael MacCracken (2003-07), Guoxiong Wu (2007-11), Brian Hoskins (1991-95), Huw Davies (1999-2003; standing, from left); Athena Coustenis (2007-2015) – and two secretaries general – Hans Volkert (2007-2015), Roland List (1995-2007; sitting, from right; photo: F. Darin).

The EC adopted a resolution in recognition of the establishment of “Future Earth” by ICSU (cf. [www.iamas.org/Pdfs/IAMAS-Resolution\\_FutureEarth-2013.pdf](http://www.iamas.org/Pdfs/IAMAS-Resolution_FutureEarth-2013.pdf)), approved a statement on ‘Radiation Management Climate Engineering (cf. <http://www.iamas.org/Pdfs/IAMAS-Statement-RadiationManagement.pdf>), and accepted the South-African bid to host a three association assembly

in Cape Town, South Africa, at the end of August 2017 jointly with the sister associations for aeronomy, IAGA, and the oceans, IAPSO.

Here, a brief selection of activities is reported by IAMAS commissions; the full compilation of commission reports will be posted on [www.IAMAS.org/Reports](http://www.IAMAS.org/Reports). Information is also available on the specified websites. A brief statement concerning the liaison to SCOR (*Scientific Committee on Oceanic Research*) and to WMO (*World Meteorological Organization*) conclude the report.

***IAMAS-ICACGP*** ([www.icacgp.org](http://www.icacgp.org))

Besides symposia at DACA-13, commission members were actively involved in the organization of the ACCENT-plus conference in Urbino, Italy, in Sept. 2013 ([www.accent-network.org/](http://www.accent-network.org/)) and in the planning of the 13th quadrennial ICACGP symposium in Aug. 2014 in Natal, Brazil ([www.igac-icacgp2014.org/](http://www.igac-icacgp2014.org/)).

***IAMAS-ICAE*** (<http://icae.jp>)

The commission compiled and released Volume 24 of their regular and detailed newsletter (2 issues), organized the publication of a special issue in *Atmospheric Research* (Vol. 135/136, pp. 207-465, containing a preface and 21 articles first presented at 14th ICAE in 2011), and planned their 15th quadrennial ICAE symposium scheduled for 2014 in Oklahoma, USA (<http://icae2014.nwc.ou.edu>).

***IAMAS-ICCL*** ([www.iccl-iamas.net](http://www.iccl-iamas.net))

The commission organized an Expert Assessment Workshop on “Decadal Climate Variability and Cross-Scale Interactions” in Beijing, China on 16-17 April 2013 bringing together 11 keynote speakers from four continents ([www.iccl-iamas.net/show.asp?id=21](http://www.iccl-iamas.net/show.asp?id=21)), contributed symposia to DACA-13, and continues to be instrumental in furthering the new IUGG-commission on Climatic and Environmental Change (CCEC; cf. <http://ccec-iugg.org/content/1st-ccec-meeting>).

***IAMAS-ICCP*** ([www.iccp-iamas.org](http://www.iccp-iamas.org))

The commission organized a workshop on “Measurement problems in ice clouds” with 50 participants from nine countries at ETH, Zurich, Switzerland, during the week prior to DACA-13. After intensive discussions about geo-engineering by radiation management a summarizing statement was released ([http://www.iccp-iamas.org/pdf/ICCP\\_RadiationManagement\\_Statement.pdf](http://www.iccp-iamas.org/pdf/ICCP_RadiationManagement_Statement.pdf)), which also served as starting point for a discussion within the IAMAS EC.

***IAMAS-ICCP/CNAA*** ([www.icnaa.org](http://www.icnaa.org))

The Committee on Nucleation and Atmospheric Aerosols held its 19th International Conference on Nucleation and Atmospheric Aerosols in June (<http://chem.atmos.colostate.edu/icnaa>). Barbara N. Hale (Univ. Missouri, USA) took over the committee chair from long serving Colin O’Dowd and Paul DeMott.

***IAMAS-ICDM*** (<http://icdm.atm.ucdavis.edu/ICDM.html>)

The commission organized several symposia at DACA-13. Four new members were elected. Planning continues for an international workshop jointly with ICPM and the WWRP/WMO polar prediction project scheduled for spring 2015 in Norway.

***IAMAS-ICMA*** ([www.icma-iamas.org](http://www.icma-iamas.org))

The commission contributed to a ‘spring school’ (<http://sun2climate.sciencesconf.org>) in Thessaloniki, Greece and the 11th workshop on layered phenomena in the mesopause region workshop in Leeds, UK ([www.lpmr.leeds.ac.uk](http://www.lpmr.leeds.ac.uk)).

***IAMAS-IO3C*** (<http://ioc.atmos.illinois.edu>)

The commission contributed to symposia at DACA-13, actively supported research initiatives with the Integrated Global Atmospheric Chemistry Observations (IGACO-O<sub>3</sub>; cf. [www.igaco-o3.fi/en/](http://www.igaco-o3.fi/en/)) and issued two press releases (about geo-engineering and solar radiation management as well as about the Montreal protocol anniversary; cf. [http://ioc.atmos.illinois.edu/press/press\\_releases.html](http://ioc.atmos.illinois.edu/press/press_releases.html)).

***IAMAS-ICPAE*** ([www.atm.ox.ac.uk/icpae](http://www.atm.ox.ac.uk/icpae))

The commission organized symposia at DACA-13, elected new members, and initiated a further special issue in the research journal *Planetary and Space Sciences*.

***IAMAS-ICPM*** ([www.icpm-iamas.aq](http://www.icpm-iamas.aq))

The commission co-convened two joint symposia at DACA-13 and is planning and started planning of the Antarctic Meteorological Observing Modelling and Forecasting Workshop (AMOMFW) to be held from 9-11 June 2014 in Charleston, USA.

***IAMAS-IRC*** ([www.irc-iamas.org](http://www.irc-iamas.org))

The commission published the complete Proceedings from the quadrennial International Radiation Symposium 2012 as Open Access publication (970 pp. in total including a detailed Autor Index; cf. <http://scitation.aip.org/content/aip/proceeding/aipcp/1531>; a limited edition of printed copies was sponsored by NASA). It also co-convened symposia at DACA-13. Commission members took note of the geo-engineering statements by ICCP and IO<sub>3</sub>C and endorsed it in full.

**Reports of IAMAS liaisons to other organization**

**SCOR:** Athena COUSTENIS attended the 41<sup>th</sup> SCOR Executive Committee Meeting (Wellington, New Zealand; 25-27 Nov. 2013; cf. [www.scor-int.org/mtgs\\_past.htm](http://www.scor-int.org/mtgs_past.htm)). She introduced the activities bundled in the ten IAMAS commissions and identified the closest links to ocean issues within ICACGP via programs as SOLAS (Surface Ocean Lower Atmosphere Study) and IGBP (International Geosphere-Biosphere Programme). She also took on an active role in the reviewing of proposals about new SCOR working groups.

**WMO:** Hans VOLKERT attended in May 2013 a Management Group meeting of WMO'S Commission of the Atmospheric Sciences in Geneva, Switzerland. He highlighted structural and traditional similarities between WMO and IAMAS and assisted in the early planning of the "The World Weather Open Science Conference", which is scheduled for 16-21 August 2014 in Montreal, Canada (cf. [www.wwosc2014.org](http://www.wwosc2014.org)).

**FUTURE ACTIVITIES**

Planning for major international meetings in 2014 is well underway, as the quadrennial symposia of ICACGP (in Natal, Brazil) and of ICAE (in Oklahoma, USA). Many members of IAMAS commissions and the executive committee are involved in constructing the programme for the 26th General Assembly of IUGG, scheduled for summer 2015 in Prague, Czech Republic ([www.iugg2015prague.com](http://www.iugg2015prague.com)). The next IAMAS assembly will be jointly held with IAGA and IAPSO in Cape Town, South Africa, from 28 August to 2 September 2017.

Submitted by  
Hans Volkert, IAMAS Secretary General





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

*<http://iaps0.iugg.org>*

### **ABSTRACT**

Three of IUGG's constituent Associations, IAHS, IAPSO and IASPEI, met for a Joint Scientific Assembly in Gothenburg, Sweden, during the week 22-26 July 2013. The title of the Assembly, "Knowledge for the Future", was chosen in order to highlight the importance of improved knowledge in hydrology, oceanography and seismology in addressing the challenges posed by climate change and the risks of natural disaster events. The Assembly attracted 1,321 participants from 66 different countries. About 320 registered as IAPSO scientists. 49 scientists, most of them young and from developing countries, got grants, one or more of registration fee, on site costs and travel.

A Joint Committee on the Properties of Seawater, JCS (with SCOR and IAPWS) was formed during 2013. This was a result of the work within WG 127. Chair: Prof. Rich Pawlowicz, Vice Chair: Prof. Trevor McDougall and Vice Chair: Dr. Rainer Feistel.

Professor Arnold L. Gordon from Lamont-Doherty Earth Observatory, USA was selected in 2013 as the winner of the Prince Albert I Medal for "his outstanding work on ocean dynamics".

The Eugene LaFond medal was awarded to Issufo Halo, a student of the Cape Town University, originally from Mozambique for his talk titled "Eddy Properties in the Mozambique Channel: a comparison between Satellite altimetry observations and two numerical Ocean circulation models".

### **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 (i) biennial scientific assemblies; (ii) working groups; (iii) commissions; (iv) services and (v) 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://iaps0.iugg.org/>.

### **ADMINISTRATION**

The IAPSO office has been situated at Gothenburg University, Sweden since July 2007, and the day-to-day business has been managed by the Secretary General (SG) Johan Rodhe, Sweden. The Bureau of IAPSO comprises of the President, Eugene Morozov, Russia, the Past President, Lawrence Mysak, Canada, the SG, Johan Rodhe, and the Treasurer, Fred Camfield, USA. The SG has been responsible for the IAPSO website.

In 2013, there were three IAPSO business meetings and meeting of the EC during the Assembly in Gothenburg. The other IAPSO discussions were maintained by means of e-mail communication. It was decided to join IAMAS and IAGA for an assembly in Cape Town, South Africa, in 2017.

## ACTIVITIES

Three of IUGG's constituent Associations, IAHS, IAPSO and IASPEI, met for a Joint Scientific Assembly in Gothenburg, Sweden, during the week 22-26 July 2013. The title of the Assembly, "Knowledge for the Future", was chosen in order to highlight the importance of improved knowledge in hydrology, oceanography and seismology in addressing the challenges posed by climate change and the risks of natural disaster events. The Assembly attracted 1,321 participants from 66 different countries. About 320 registered as IAPSO scientists. 49 scientists, most of them young and from developing countries, got grants, one or more of registration fee, on site costs and travel.

The Assembly's opening day was marked by a joint plenary session with a lecture from each Association:

- James Mori (Japan), the plenary lecturer for IASPEI described the ambitious JFAST expedition, which aimed to study the causes of the major earthquake that caused the 2011 tsunami. The expedition set new records, drilling over 800 metres into the seafloor at a water depth of 8,000 metres.
- Kathryn Kelly (United States), the plenary lecturer for IAPSO, focused on meridional heat transport in the Atlantic Ocean, a key component of the global climate system. She combined different data sources to review the heat budget and anomalies in the heat transport, indicating a southern source for the anomalies.
- Kuniyoshi Takeuchi (Japan), the plenary lecturer for IAHS, emphasized the key role for geosciences in a proactive approach to disaster risk reduction. He warned that disasters occur when we ignore nature and the lessons of the past, leading to the take-home message "there is no such thing as a natural disaster".

Each Association offered a broad programme of lectures and posters, with up to 11 parallel sessions at any one time. The lecture programme was organized into 48 Association symposia (11 IAPSO), together with nine joint symposia focusing on areas such as land-ocean interactions, advanced applied statistics, and tsunamis. Two of the joint symposia were organized by IAPSO and the rest were co-sponsored by IAPSO. This programme was complemented by two afternoon poster sessions. Some highlights from the Association's programmes:

- IASPEI's Milne lecture on the history of British seismology was delivered by Roger Musson (UK). This was followed by a documentary film on the life of John Milne, the English scientist who played a leading role development of seismology as a scientific discipline. Dr. Robin Adams was awarded the first IASPEI Medal, for sustaining IASPEI goals and activities and for scientific merits.
- The highlight of the IAPSO programme was the presentation of the Albert I Medal. The medal was presented to Albert L. Gordon (USA), who then delivered the Albert I Memorial Lecture describing his research on the Indonesian Throughflow, the link between the Pacific and Indian Oceans.
- Deltas were a significant focus of the IAHS programme, including a plenary lecture by Efi Foufoula-Georgiou (USA) where she described an international initiative to develop and deliver the knowledge base for understanding and protecting these vulnerable coastal systems. Several prizes and medals were awarded during the week.

In September, Vice President Denise Smythe-Wright and SG Johan Rodhe participated in the IUGG EC meeting and the SPC meeting (JR only) in Prague, Czech Republic. Most important were the planning of the IUGG General Assembly 2015 in Prague, Czech Republic.

Denise Smythe-Wright also participated in the SCOR EC Meeting, 25-28 November, in New Zealand. The SCOR meetings review the progress of current SCOR Working Groups, evaluate proposed new WGs, and decide which to fund. A number of international SCOR-related scientific programmes were also discussed. Details can be found at the SCOR website ([www.scor-int.org](http://www.scor-int.org)). Two new SCOR WGs, out of 11 proposals, were approved: (i) WG 143 Dissolved N<sub>2</sub>O and CH<sub>4</sub> measurements: Working towards a global network of ocean time series measurements of N<sub>2</sub>O and CH<sub>4</sub> and (ii) WG 144

Microbial Community Responses to Ocean Deoxygenation. These two new WGs got an “intellectual support” from IAPSO.



*The present and the four past IAPSO presidents. From left to right: Eugene Morozov, President 2011-2015; Lawrence Mysak, President 2007-201; Shiro Imawaki, President 2003-2007; Paola Rizzoli, President 1999-2003; Robin D. Muench, President 1991-1995 (photo: P. Malanotte-Rizzoli).*

## Working groups

Information about SCOR activity and WGs is at the IAPSO webpage.

The following SCOR/IAPSO WGs, which have received funding from IAPSO, have been active during the last years and have published important books and/or special journal issues:

- SCOR/IAPSO WG 127 “The Thermodynamics and Equation of State of Seawater” (Chaired by T.J. McDougall) was reorganized into a special IACS-IAPSO Commission on Seawater.
- SCOR/WCRP/IAPSO WG 136 (Co-chaired by L. Beal and A. Biastock): “The Climatic Implications of the Greater Agulhas System” continued their activity.

## IAPSO Commissions and Services

- A Joint Committee on the Properties of Seawater, JCS (with SCOR and IAPWS) was formed during 2013. This was a result of the work within WG 127. Chair: Prof. Rich Pawlowicz, Vice Chair: Prof. Trevor McDougall and Vice Chair: Dr. Rainer Feistel.
- Commission on Mean Sea Level and Tides (CMSLT), President: Gary T. Mitchum. Website: [www.psmsl.org/](http://www.psmsl.org/).
- Tsunami Commission (Joint with IASPEI and IVACEI). Chair: Dr. Vasily V. Titov. Website: [www.iaspei.org/commissions/JCT.html](http://www.iaspei.org/commissions/JCT.html)
- GeoRisk Commission (Joint with IAMAS, IAHS, IASPEI and IAVCEI). Website: [www.iugg-georisk.org/](http://www.iugg-georisk.org/).
- Permanent Service for Mean Sea Level, hosted by Proudman Oceanographic Laboratory, UK. Contact: Dr. Lesley Richard. Website: [www.psmsl.org/](http://www.psmsl.org/).
- IAPSO Standard Seawater Service, hosted by OSIL, Havant, Hampshire, UK. Director: Paul, Ridout; Website: [www.osil.co.uk](http://www.osil.co.uk).

The working groups commissions and services report to IAPSO. These reports are posted on the IAPSO website <http://iapso.iugg.org/working-groups>.

### **Prince Albert I Medal**

IAPSO and Monaco Royal Family established the Prince Albert I Medal for excellence in physical and/or chemical oceanography. The winner is selected every two years and the ceremony is held during the Assemblies. Professor Arnold L. Gordon from Lamont-Doherty Earth Observatory, USA was selected in 2013 as the winner of the Prize for “his outstanding work on ocean dynamics”. During the Assembly in Gothenburg he was awarded with the medal and presented a memorial lecture on the currents in the Indonesian straits (Indonesia throughflow). The Lecture can be downloaded from the IAPSO website.

### **Eugene LaFond Medal**

This Medal, created in honour of Eugene LaFond who was a former SG of IAPSO, is awarded to a scientist from a developing world country for an oral or poster presented at an IAPSO Assembly. IAPSO forms a special commission to select the winner. In 2013, the medal was awarded to Issufo Halo, a student of the Cape Town University, originally from Mozambique for his talk titled “Eddy Properties in the Mozambique Channel: a comparison between Satellite altimetry observations and two numerical Ocean circulation models”.

### **Members of IAPSO Executive Committee (EC) for 2011-2015:**

President: Dr. Eugene Morozov (Russia) Secretary General: Prof. Johan Rodhe (Sweden) Past President: Prof. Lawrence Mysak (Canada) Treasurer: Dr. Fred Camfield (USA) Vice President: Dr. Isabelle Ansong (South Africa) Dr. Denise Smythe-Wright (UK) EC Members: M.Sc. Silvia Blanc (Argentina) Prof. Toshiyuki Hibiya (Japan) Dr. Chris Meinen (USA) M.App.Sc. Ken Ridgway (Australia) Dr. Satheesh Shenoi (India) Dr. Stefania Sparnocchia (Italy)

### **FUTURE ACTIVITIES**

The main future activities are the IUGG General Assembly 2015 in Prague, Czech Republic and the Association Assembly in 2017.

Submitted by  
Eugene Morozov, IAPSO President  
Johan Rodhe, IAPSO Secretary General



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

*<http://www.iaspei.org>*

### **INTRODUCTION**

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

IASPEI main efforts during 2013 were directed towards the joint IAHS-IAPSO-IASPEI 2013 Scientific Assembly in Gothenburg (Sweden). The Assembly was successfully held during 22-26 July. However, a few important scientific meetings have been also sponsored by IASPEI and several ongoing projects continued.

### **ADMINISTRATION**

#### **EC & Bureau meetings**

The IASPEI Bureau has met during the joint IAHS-IAPSO-IASPEI 2013 Scientific Assembly in Gothenburg in July. Several e-mails regarding important questions on financial support or business to be solved immediately have been exchanged with the members of the Bureau and EC throughout the year.

#### **Changes in administration**

(setting up of new Commissions, Working Groups, etc., or termination of old Commissions, Working Groups, etc.)

During the Gothenburg Scientific Assembly, Johannes Schweitzer has been appointed as IASPEI Assistant Secretary to work for the next two years with the IASPEI Secretary-General. The new Chair of the Commission on Earthquake Source Modeling and Monitoring for Prediction is Vladimir Smirnov (Russian Federation), the first Chair of the newly established Latin American and Caribbean Seismological Commission (LACSC) is Carlos Vargas, (Colombia) and the new Chair of the International Federation of Digital Seismograph Networks (FDSN) is Göran Ekström (USA).

#### **Other matters**

Website: The IASPEI website, hosted by the BGS in Edinburgh, has been updated continuously, mainly with the help of the IASPEI webmaster Alice Walker.

Newsletters: Also the IASPEI Newsletter has been regularly sent as pdf file attachment to e-mails. The Newsletters are also available for downloading from the website. Four issues were distributed in 2013.

## ACTIVITIES

### Scientific Assemblies, Workshops/Symposia etc.

The 37th IASPEI General Assembly was organized as a Joint Assembly of the three Associations IAHS, IAPSO and IASPEI in July 2013 in Gothenburg, Sweden (<http://iahs-iapso-iaspei2013.com/>). The 454 participants from 48 countries contributed to the success of the assembly by presenting 330 contributions and 200 posters within 36 symposia. 75 participants were supported with grants by IASPEI.

The Assembly started on Monday, 22 July with the IASPEI Opening Plenary ([http://www.iaspei.org/gothenburg\\_2013/plenary\\_presentations\\_2013.html](http://www.iaspei.org/gothenburg_2013/plenary_presentations_2013.html)). During the Plenary, the first IASPEI medal was awarded to Robin Adams. In addition, two keynote lectures were presented by IASPEI President Domenico Giardini on GEM and by Roger Musson on the History of British Seismology. A third keynote lecture was given in the afternoon during the Joint Plenary by James Mori on drilling the plate boundary in the source region of the 2011 Tohoku-Oki earthquake. All three keynote lectures can be downloaded from [http://www.iaspei.org/gothenburg\\_2013/keynote\\_lectures\\_2013.html](http://www.iaspei.org/gothenburg_2013/keynote_lectures_2013.html). During the Assembly, the IASPEI Commissions and the IASPEI sponsored bodies also had their business meetings. Commission reports and reports from different working groups can be found on the Commission web-pages, respectively (<http://www.iaspei.org/commissions/commissions.html>).

On Friday, July 26, a round table discussion was held on "The role of scientists in the communication of risk: lessons from L'Aquila and international perspectives". Domenico Giardini presented an overview on the actual status of the L'Aquila case while Kenji Satake (Japan) and David Jackson (USA) explained how authoritative information to administrations and the public are organized in their countries in the case of an earthquake crisis. All three presentations can be found at [http://www.iaspei.org/gothenburg\\_2013/LAquila\\_Trial.html](http://www.iaspei.org/gothenburg_2013/LAquila_Trial.html). They were followed by a lively debate, for which the allocated time window in the assembly program proved to be too short.

### Activities of Association Commissions, Working Groups, Divisions, Services etc.

#### *Global Earthquake Model*

The IAEE-IASPEI Joint Working Group on the International Alliance of Seismology and Earthquake Engineering Professional Associations activities were related to one of its missions: the GEM project, a global risk assessment initiative. Domenico Giardini, IASPEI President and GEM Foundation Governing Board member, attended several Board meetings in 2013 on behalf of IASPEI. The GEM initiative is progressing well, moving now to more engineering aspects of seismic hazard.

#### *IASPEI-IAG-IAGA Monitoring crustal deformation and the ionosphere by GPS in the Caribbean project*

In the frame of the IUGG Grants Program, the project *Monitoring crustal deformation and the ionosphere by GPS in the Caribbean* was given a grant for the term 2012-2014. This project is further sponsored by IASPEI, IAG, and IAGA. The main objective of this initiative is to invite the Caribbean countries to participate actively in geodetic and geophysical projects going on in the Central and South American region, in order to enable the use the acquired data for practice and science in their countries, and to promote geosciences. This includes capacity building activities providing the basis for profound education and sustainable development as well as the establishment of international and interdisciplinary contacts to participate in research projects at regional and global scales. According to this, a capacity building called *School on Reference Systems, Crustal Deformation and Ionosphere Monitoring* was carried out in Panama City, Panama, from 21-23 October 2013. 145 participants from 28 countries attended the School. An extension of the Project duration was approved by IUGG.

### IASPEI has sponsored also the following workshops/symposia held in 2013:

- The "13th International Workshop on Modelling of Mantle and Lithosphere Dynamics", held in Norway at Klækken Hotel in the vicinity of Oslo. 95 scientists attended the workshop, among which 32 graduate students and 17 postdoctoral researchers, from Europe, North America and

Japan. Thirteen keynote speakers gave overviews and discussed latest developments in subduction dynamics, plume dynamics, numerical techniques, surface and deep processes and dynamics of planetary interiors.

- IRIS Seismological Workshop “Managing Waveform Data and Related Metadata for Seismic Networks”, Kuwait City, Kuwait, 14-18 January 2013. More information can be found at [http://www.iris.edu/workshops/2013/kuwait\\_metadata/](http://www.iris.edu/workshops/2013/kuwait_metadata/).
- The International Workshop “Training course in full waveform inversion for moment tensors and multiple source models” was held at Brasilia University in December, organized by the Seismological Observatory. 20 Latin American geoscientists from eight different countries attended the course. At its end, all participants presented a seminar discussing the results of the inversion of their own data. All participants were strongly encouraged to continue working on the code to improve their regional studies and present their results in the First LACSC General Assembly in Bogota, Colombia, July 2014.

### **Scientific Programmes, Projects, Publications**

The IDEA (International Digital Earthquake Archives) project of the Committee for Preservation of WWSSN and Historical Seismograms (also called simply *Seismoarchives: Seismogram Archives of Significant Earthquakes of the World*), is continuing under the guidance of Willie Lee. IRIS is archiving the scanned seismograms. A new Project for scanning old Batavia seismograms has been initiated.

The IUGG-funded IASPEI-ISC Project *Networking of world seismologists (Improving Geophysical Science Link to the Society during Natural Extreme Events, Especially in Developing Countries)* was completed in 2013.

Several publications are available from the IASPEI Secretariat. IASPEI on approval distributes free copies of its publications to institutional libraries in less developed countries.

- *IASPEI: Cooperation for Better Understanding of the Earth*
- *International Handbook of Earthquake and Engineering Seismology (Part A and B)*
- *New Manual of Seismological Observatory Practice*

### **Awards/Anniversaries/Obituaries**

- The first *IASPEI medal* was awarded to Robin Adams during the IASPEI Scientific Assembly in Gothenburg, Sweden.
- *Anniversaries* of several important seismologists of the past were commemorated with special articles in the IASPEI Newsletters.
- *Obituaries* for prominent scientists are also regularly published in the IASPEI Newsletters.

### **PLANNED FUTURE ACTIVITIES**

In 2014 three *Regional commission assemblies* will be held:

- LACSC will hold its first General Assembly in Bogota, Colombia, July 23-25.
- The 34th General Assembly of the European Seismological Commission will be held in Istanbul, Turkey, on 24-29 August 2014. This Assembly will become the second to be held jointly with the General Assembly of the European Association of Earthquake Engineering.
- The 10th General Assembly of the ASC will be held in Makati City (near Manila), The Philippines, during 17-21 November 2014.

In January 2014 the founding meeting of the African Seismological Commission will be held in Johannesburg, South Africa.

Submitted by  
Peter Suhadolc, IASPEI Secretary General & Treasurer



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

*<http://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:

- Arc Magmatism
- Chemistry of Volcanic Gases
- Cities on Volcanoes
- Collapse Calderas
- Explosive Volcanism
- Kimberlites
- Large Igneous Provinces
- Monogenetic Volcanism
- Statistics in Volcanology
- Tephra Hazard Modelling
- Volcanic Lakes
- Volcanogenic Sediments
- The International Volcanic Health Hazard Network (IVHHN)
- World Organization of Volcano Observatories

### **ADMINISTRATION**

#### **IAVCEI Executive Committee (EC) activities**

- Revision of IAVCEI Finances, funding support, and potential funding sources and strategies.
- Completion of the revision 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.
- Completion of the revision and renewal of the Editorial Board of Bulletin of Volcanology
- EC meeting during the IAVCEI Scientific Program for the Scientific Assembly in Kagoshima, Japan in June 2013.



## **Foreseen EC activities for 2014**

- EC meeting during the IAVCEI Cities on Volcanoes 8 Conference to be held in Yogyakarta, Indonesia, 9-13 September 2014.
- Publication of 4 IAVCEI newsletters.
- Revision of Statutes and By Laws.
- Preparation of the Scientific Program for the IAVCEI GA to be held in Prague, Czech Republic, in 2015 during with the IUGG GA.

## **ACTIVITIES**

### **Members**

In 2013 the number of IAVCEI individual members was 2,174, 82 of them being Life Members, 1,676 non-donor members, and 498 donor members.

### **Website**

The IAVCEI web page has been updated and includes new sections.

### **Newsletters**

Four issues of the newsletter "IAVCEI News" have been published through the website, during 2013.

### **Awards**

During the IAVCEI Scientific Assembly – 2013 held in Kagoshima, Japan, 20-24 July 2013, we celebrated the awarding ceremony.

### **Medal Awardees**

Kraft Medal: Shigeo Aramaki (Japan)

Thorarinsson Medal: Barry Voight (USA)

Wager Medal: Antonio Costa (Italy) and Fidel Costa (Singapore)

George Walker Award: Heather Wright (USA)

New IAVCEI Honorary members

Prof. Servando de la Cruz-Reyna (Mexico)

Prof. Sergei Fedotov (Russia)

Prof. Grant Heiken (USA)

Prof. Izumi Yokoyama (Japan)

### **IAVCEI 2013 Scientific Assembly**

The IAVCEI 2013 Scientific Assembly was held from 20-24 July 2013 in Kagoshima, Japan. The IAVCEI 2013 was the largest IAVCEI conference ever held with 1,069 registered participants from 43 countries and regions. The main theme of the conference was "Forecasting Volcanic Activity: Reading and translating the messages of nature for society". There were 37 scientific sessions with 1,209 presentations (651 oral and 558 posters) given at 8 oral session rooms and poster halls.

Two pre-conference field trips were conducted which were the Unzen and Aso volcanoes field trip (15-19 July) and Suwanosejima field trip (15-18 July). Three workshops were also conducted on 19 July. These were the volcano monitoring, PLUTONS, and volcanic ash falls and gas dispersions workshops. An awarding ceremony followed the opening ceremony to present the IAVCEI medals and new honorary members. The awardees and new honorary members were the following:

IAVCEI Medal Awardees: Kraft Medal: Shigeo Aramaki (Japan), Thorarinsson Medal: Barry Voight (USA), Wager Medal: Antonio Costa (Italy) and Fidel Costa (Singapore), George Walker Award:

Heather Wright (USA), New IAVCEI Honorary members, Prof. Servando de la Cruz-Reyna, (Mexico), Prof. Sergei Fedotov (Russia), Prof. Grant Heiken (USA), Prof. Izumi Yokoyama (Japan).

Five workshops were held after the conference. These were the following: VHub (25 July), Benchmarking numerical models of volcanic mass flows (26 July), Rheological magmatic properties (25 July), Volcano Lake (25-31 July) and Volcano Acoustics (25-26 July). Four post-conference field trips were held which were the following: Active volcanoes in NE Japan (26-30 July), Kirishima and Sakurajima volcanoes (25-27 July), Kikai caldera and southern Kyushu (25-29 July) and Changbaishan Tianchi volcano, China (26-29 July). During the closing ceremony it was announced that the next IAVCEI Scientific Assembly will be held in 2017 in Portland, USA.

### **2013 Meetings, workshops and courses**

The following meetings, workshops, and courses have been (co-) organized or sponsored by one (or more) of the IAVCEI commissions in 2013:

- **BASALT: Link between rift, tectonism and intracontinental volcanism** – May 2013, Saxony, Germany. E-mail: [Joerg.Buechner@senckenberg.de](mailto:Joerg.Buechner@senckenberg.de), Website: [www.senckenberg.de/basalt2013](http://www.senckenberg.de/basalt2013). Sponsored by the IAVCEI Commission on Monogenetic Volcanism and Volcanogenic Sediments.
- International workshop Pan-American Advanced Studies Institute: Magma-Tectonic Interactions in the Americas, León, Nicaragua, 5-17 May 2013.
- 8th Workshop on Volcanic Lakes, Japan 2013, Aso volcano, Kumamoto and Noboribetsu spa, Hokkaido Japan, 25-31 July 2013, <http://www.sc.u-tokai.ac.jp/ohbalab/English/CVL2013/index.html>.
- IAVCEI Scientific Assembly - 2013: Forecasting Volcanic Activity: reading and translating the messages of nature for society (Kagoshima, Japan), Date: 20-24 July 2013, Venue: Kagoshima Public Access Center, Kagoshima City, Japan. Website: <http://www.iavcei2013.com>.
- 2nd VOBP – Volcano Observatory Best Practices workshop “Communicating Hazards” Erice, Sicily, 2-6 November, 2013.
- 2nd workshop on Ash Dispersal Forecast and Civil Aviation, (with support and sponsoring from Univ. of Geneva, IAVCEI, IUGG, WMO, ICAO and U.K. Met. Office) at WMO headquarters, Geneva Switzerland, 18-20 November 2013. <http://www.unige.ch/sciences/terre/mineral/CERG/Workshop2.html>.
- 2nd International Conference on Active Volcanism & Continental Rifting with special focus on the Kivu rift zone (AVCOR2013), Hotel Serena, Gisenyi, Rwanda, 12-14 November 2013.
- Course: Italian Association for Volcanology (AIV) 2013 International School in Volcanology: The Explosive Volcanism of Mafic-Alkaline Magmas.
- 2nd International Post-graduate Course of Volcanology, Olot, Girona, Spain, 14-27 October 2013 [http://www.gvb-csic.es/CURSO/CURSO\\_OLOT/Home.html](http://www.gvb-csic.es/CURSO/CURSO_OLOT/Home.html).
- XX Central Andes Volcanological Field Course, Universidad Nacional de Salta, Salta, Argentina, 11-21 November 2013, <http://www.unsa.edu.ar/~geonorte/cursos/curvol2013.htm>.

### **FUTURE ACTIVITIES**

#### **Forthcoming meetings, workshops and courses in 2014:**

- 1st International Workshop on Volcano Geology, Madeira, Portugal, 7-11 July 2014, Venue: Madeira, Portugal. Contact: Joan Marti ([joan.marti@ictja.csic.es](mailto:joan.marti@ictja.csic.es)).
- 21st General Meeting of the International Mineralogical Association (IMA2014), Johannesburg, South Africa, 1-5 September 2014, Web: <http://www.ima2014.co.za/>.
- Cities on Volcanoes 8, Yogyakarta, Indonesia, 9-13 September 2014, Web: <http://citiesonvolcanoes8.com/>.
- XX Congress of Carpathian Balkan Geological Association, 24-26 September 2014, Tirana, Albania, Volcanological Special Sessions, Web: <http://www.cbga2014.org/>.
- 5th International Maar Conference, Queretaro, Mexico, 17-22 November 2014, Contacts: Gerardo Carrasco, [gerardoc@geociencias.unam.mx](mailto:gerardoc@geociencias.unam.mx), Jorge Aranda, [jjag@geociencias.unam.mx](mailto:jjag@geociencias.unam.mx).

Sponsored by the IAVCEI Commission on Monogenetic, Volcanism and Volcanogenic Sediments.

- Georisk 2014: “IMPROVING GEOPHYSICAL RISK ASSESSMENT, FORECASTING, AND MANAGEMENT”, Madrid, Spain, 18-21 November 2014, Contact: Joan Martí ([joan.marti@ictja.csic.es](mailto:joan.marti@ictja.csic.es)), Web: <http://www.georisk2014.com>.
- 8th International Symposium on Eastern Mediterranean Geology, Mugla, Turkey, 2014 (date to be confirmed), Contact: Dr. Gonca GENÇALIOĞLU KUŞCU, Muğla Sıtkı Koçman University Department of Geological Engineering, Kötekli-Muğla TR-48000, TÜRKİYE, Email: [gkusc@mu.edu.tr](mailto:gkusc@mu.edu.tr), Sponsored by the IAVCEI Commission on Monogenetic Volcanism.
- V Collapse Caldera Workshop “Caldera Volcanism and Society”, 7-11 December 2014, Taupo, New Zealand, Web: <http://staff.aist.go.jp/geshi-nob/CCC/webs/main.htm>.
- 3rd INTERNATIONAL POST-GRADUATE COURSE IN VOLCANOLOGY (in Spanish), 13-26 October 2014, Olot, Spain, e-mail: [agevertraver@gmail.com](mailto:agevertraver@gmail.com), Web: <http://www.gvb-csic.es/CURSO/Home.html>.

Submitted by  
Joan Martí, IAVCEI Secretary General

## 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)

[ccec-iugg.org/](http://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 fulfill 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. Appendix 1 gives the CCEC objectives and summarizes the governance structure.

During 2013 the work of CCEC was threefold:

- To prepare an IUGG position statement for Future Earth.
- To plan for the Inaugural CCEC Meeting and Future Earth workshop to be held in Beijing in April 2014.
- To advance the Weather, Climate and Food Security (WeatCliFS) initiative.

#### ACTIVITIES

##### Future Earth

CCEC prepared a statement on possible IUGG involvement in Future Earth and supplied it to the IUGG Secretariat as given in Appendix 2. The final version of the IUGG statement as supplied to ICSU differs slightly from the version given in the Appendix, mainly in the ordering of the content.

The statement makes the following points.

IAMAS has issued a statement in relation to Future Earth. IAHS envisages that Panta Rhei could be a Future Earth activity. CCEC envisages that WeatCliFS could be a Future Earth activity. The relationship between IUGG and Future Earth could be undertaken by CCEC being accorded the status of a Future Earth Committee, analogous to a National Committee.

##### First CCEC Meeting

The 1st CCEC meeting will be held in Beijing, China on 11-12 April 2014.

Aims:

- To strengthen internal IUGG linkages.
- To examine how CCEC can link in to Future Earth.
- To further investigate linkages outside of IUGG.
- To plan for the 2015 IUGG.

In addition to the CCEC members, and Prof. Guxiong Wu, a member of the ICSU Executive Board, the following external speakers have agreed to present:

Prof. Tetsuzo Yasunari – Member of the Future Earth Science Committee

Prof. Chen Jun – President ISPRS

Prof. Pingfan Rao – President IUFoST

and we still await responses from other invitees.

### **Weather, Climate and Food Security (WeatCliFS)**

CCEC was instrumental in persuading a consortium of international scientific unions to undertake an initiative on weather, climate and food security.

WeatCliFS intends to catalyse an integration of activity of many existing programs on hydrometeorology, on natural hazards and extreme events, on agriculture and food security and on disaster risk reduction to develop a research program through networking. To this end, specially targeted advanced research workshops and symposia were held in each of the geographic areas covered by the ICSU Regional Offices, to draw together experts working on relevant issues (see *Table*).

At the WeatCliFS session (U52A) of the AGU Meeting of the Americas the quality of the speakers and of their papers was outstanding, and the session was attended by an audience that varied from 50 to 70 people. The paper on Ancient Mayan Agriculture, presented by Mark Pagani, was the highlight of the session.

*Table. A list of scientific meetings that incorporated, or will incorporate WeatCliFS.*

Location	Theme	Linked to	Date
Symposium Cancun, Mexico	Weather, Climate and Food Security : American and Global Perspectives	AGU Meeting of the Americas <a href="http://moa.agu.org/2013/">http://moa.agu.org/2013/</a>	14-17 May 2013
Workshop Nairobi, Kenia	Weather, Climate and Food Security : African and Global Perspectives	First Africa Food Security Conference <a href="http://www.foodsec.aaknet.org/">http://www.foodsec.aaknet.org/</a>	20-21 August 2013
Workshop Brisbane, Australia	Weather, Climate and Food Security : Regional and Global Perspectives	AOGS Annual Meeting <a href="http://www.asiaoceania.org/aogs2013/">http://www.asiaoceania.org/aogs2013/</a>	24-28 June 2013
Open Forum Granada Spain	Weather, Climate and Food Security : Global Perspectives	General Assembly of IUNS <a href="http://www.icn2013.com/">http://www.icn2013.com/</a>	20 September 2013

The WeatCliFS session (IG12) of the AOGS Annual Meeting in Brisbane was convened by James Terry (National University of Singapore) and Tom Beer. This was scheduled for 1100-1230 Friday 28 June. Papers were given by Albert McGill, representing IUFoST, the International Union of Food Science and Technology; and Mark Howden of the CSIRO Climate Adaptation Flagship and Tom Beer (CCEC). A panel discussion was held following the three presentations. Audience participation was excellent (about 25 people attended).



*Speakers at the WeatCliFS Session at the AGU Meeting of the Americas – 1020 to 1230 Friday 17 May 2013. From left to right: Alik Ismail-Zadeh, Jaime Fucugauchi, Brian Toon, Katya Kontar, Tom Beer, Mark Pagani (photo: T. Beer).*

At the IUNS 20th International Congress of Nutrition held in Granada, Spain, 15-20 September 2013 the WeatCliFS Session was linked to the IUNS IUNS Task Force on Urbanization, Climate Change and Nutrition Insecurity (IUNS Task Force T7-7.4). This Task Force was established specifically to make the connection between IUNS and the ICSU Program on Health and Well-Being in the Changing Urban Environment. The combined symposium was held on Friday 20 September from 1030 to 1200 under the title: Urbanization, Climate Change and Nutrition Insecurity. The meeting was chaired by Godwin D. Ndossi, Tanzania and Osman Galal, University of California, USA, and the program consisted of five speakers in total with two speakers from the WeatCliFS initiative (McGill, Beer) and three speakers from the IUNS Task Force (Atinmo, Tacoli and Wahlqvist):



*Albert McGill – IUFoST addresses the IUNS symposium (photo: T. Beer).*

## **APPENDIX 1 – CCEC OBJECTIVES AND GOVERNANCE**

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.

### **Objectives**

- 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.

### **The following are current officers of the Commission:**

Chair: Tom Beer (Australia)

Vice Chair: Jianping Li (China)

Secretary-Treasurer: Keith Alverson (USA)

Administrative activities during 2012 included approval of a logo (as above) and the development of a web site at: <http://ccec-iugg.org>.

that was launched on 14 January 2013. Information about CCEC is also available on the main IUGG web page at: <http://www.iugg.org/about/commissions/ccec.php>.

## **APPENDIX 2 – IUGG AND FUTURE EARTH**

The following text was prepared by CCEC and supplied to the IUGG Secretariat. The final version of the IUGG statement differs slightly from the version given below.

### **Possible IUGG Contributions to Future Earth**

#### ***Introduction***

IUGG consists of eight international scientific associations and a number of scientific commissions. They were all requested to provide information as to their possible interaction with Future Earth. In some cases the associations point out that they can see areas of relevant science but that their plans are at an early stage. For example:

In the case of IACS, the International Association of Cryospheric Sciences, their ideas are still in very early stages of development. IACS is thinking of installing working groups on topics such as Glacier Mass Balance as well as Dust & Black Carbon on glaciers (and snow). These activities are in a very early stage of planning but may both have societal impacts as outcomes and could thus lead to potential contributions to Future Earth.

IAGA, The International Association of Geomagnetism and Aeronomy, has discussed how IAGA science is involved and noted that currents flowing and magnetic fields generated in the magnetosphere and ionosphere can disrupt satellite operations and communications on which modern technology-based life depends, and that the weakening of the magnetic field generated in the Earth's deep interior has increased the impact of this disruption locally (the 'South Atlantic Anomaly'), and threatens to do so

globally. IAGA also notes that the question as to whether solar magnetic activity impacts the Earth's climate is not fully resolved.

The Future Earth activities of the International Association of Geodesy (IAG) are coordinated by its Global Geodetic Observing System (GGOS, [www.ggos.org](http://www.ggos.org)). GGOS Theme 2 is dedicated to new technologies for disaster monitoring and management, and GGOS Theme 3 is studying sea level change, variability and forecasting. The International Altimetry Service (IAS) is operating an Open Altimeter Database ([openadb.dgfi.badw.de](http://openadb.dgfi.badw.de)) providing global and regional sea level changes derived from various satellite altimetry missions. Several IAG Working Groups are dedicated to atmosphere (ionosphere and troposphere), hydrosphere and cryosphere studies using data from satellite gravity field missions and geometric surface scanning.

### ***IUGG – Projects of Relevance to Future Earth***

In the case of IAMAS, the International Association of Meteorology and Atmospheric Sciences these plans have advanced to a sufficient stage that IAMAS has passed a resolution [http://www.iamas.org/Pdfs/IAMAS-Resolution\\_FutureEarth-2013.pdf](http://www.iamas.org/Pdfs/IAMAS-Resolution_FutureEarth-2013.pdf).

IAHS, the International Association of Hydrological Sciences, and the IUGG Commission on Climate and Environmental Change (CCEC) are further advanced in activities that they consider would provide useful contributions to Future Earth. This document thus concentrates on these two activities.

### ***Panta Rhei***

The main IAHS contribution to Future Earth is Panta Rhei that is a decade-long research program that was launched in July 2013. Information about Panta Rhei can be found at their website: <http://www.iahs.info/pantarhei/> that provides links to the call for proposals for research themes and working groups (due by 31 January 2014), the science plan, agenda-setting paper and the key science questions.

The Chair of Panta Rhei is Prof. Alberto Montanari of the University of Bologna, and the leadership is presently structured in terms of three Targets:

- Target 1 - Understanding:
- Target 2 - Estimation and prediction:
- Target 3 - Science in Practice:

whose rationale is presented in the science plan and the agenda-setting paper available at: <http://www.iahs.info/pantarhei/?q=node/2>

### ***The activities of Panta Rhei aim to address the following science questions:***

- What are the key gaps in our understanding of hydrologic change?
- How do changes in hydrological systems interact with and feedback on natural and social systems driven by hydrological processes?
- What are the boundaries of coupled hydrological and societal systems? What are the external drivers and internal system properties of change? How can boundary conditions be defined for the future?
- How can we use improved knowledge of coupled hydrological-social systems to improve model predictions, including estimation of predictive uncertainty and assessment of predictability?
- How can we advance our monitoring and data analysis capabilities to predict and manage hydrologic change?
- How can we support societies to adapt to changing conditions by considering the uncertainties and feedbacks between natural and human-induced hydrologic changes?

### ***WeatCLiFS (Weather, Climate and Food Security)***

The Food Security recommendations of the Rio+20 Forum on Science, Technology and Innovation for Sustainable Development included a statement that it is necessary “To understand fully how to measure, assess and reduce the impacts of production on the natural environment including climate change, recognizing that different measures of impact (e.g. water, land, biodiversity, carbon and other greenhouse gases, etc.) may trade-off against each other...”.



To seek to operationalize such a recommendation within the geophysical community, the IUGG Union Commission for Climate and Environmental Change (CCEC), in conjunction with the International Union of Food Science and Technology (IUFoST) and the International Union of Nutrition Sciences (IUNS) during 2013 ran a scoping activity concerning research activity in relation to weather, climate and food security.

From the broader point of view the topic addresses, *inter alia*, issues such as water, health, and agriculture and links environmental, social and economic dimensions of sustainable development in relation to the nexus between rainfall deficiency, drought, food production decline, food scarcity and famine as well as the nexus between extreme weather, disasters, food distribution and food logistics. IUNS has a particular interest in urbanisation and nutritional security and the role that climate change may play in this.

Within the IUGG community this activity brought together the specialists from IAMAS in climate and weather – especially severe weather – with the experts from cognate geophysical disciplines that produced events that would impact on food security. Thus the effects on food availability, food distribution and food logistics as a result of: volcanic eruptions were relevant to IAVCEI, earthquakes to IASPEI, floods to IAHS, landslides to IAG, avalanches to IACS, tsunamis and storm surges to IAPSO.

WeatCliFS intends to catalyse an integration of activity of many existing programs on hydrometeorology, on natural hazards and extreme events, on agriculture and food security, on disaster risk reduction to develop a research program through networking.

#### ***IUGG-Future Earth Networking***

It is to be hoped that the Scientific Committee of Future Earth (FE-SC) sees some or all of these IUGG initiatives as falling within their remit and adopt them as part of the Future Earth science program (with IUGG as the implementing agency). If this occurs, then a possible means of maintaining liaison between IUGG and Future Earth would be through CCEC.

In fact, IUGG should seek to explore the possibility of CCEC becoming a Future Earth Committee, analogous to National Committees.

The feasibility of such an idea will depend on how the relevant organisations (IUGG and Future Earth) see the role and, of course, if such a possibility were to eventuate it would require the agreement of all parties. Considerations are that if IUGG wishes to encourage internal activity related to Future Earth then having a committee, analogous to a Future Earth National Committee, may be a better way to encourage liaison than designating a single liaison officer.

A possible disadvantage of such a procedure will be that of unclear or conflicting chains of command. The suggestion is predicated on the assumption that FE-SC is willing to adopt existing IUGG activities as FE activities and thus have a method for bringing IUGG activities into FE.

Submitted by  
Tom Beer, CCEC Chair

## Commission on Mathematical Geophysics (CMG)

<http://www.iugg.org/about/commissions/cmг.php>

### ABSTRACT

During 2013, the CMG had actively participated in the global program *Mathematics of Planet Earth 2013* (<http://mpe2013.org/>) by co-organizing and convening a series of scientific events of international scope. An educational and capacity-building workshop on “*Mathematics of Climate Change, Related Hazards and Risks*” took place during 29 July 29-2 Aug at Centro de Investigación en Matemáticas (CIMAT), Guanajuato, Mexico. The workshop was attended by 25 early career scientists from Latin Americas and the Caribbean, Europe, and Israel, who presented their research in a poster session and participated in round table discussions. A YouTube channel was created with workshop materials for broader knowledge dissemination. Two research workshops on Statistical Seismology were held at the prime international mathematical centers: the Banff International Research Station (BIRS), Canada (<http://www.birs.ca/>); and the Statistical and Applied Mathematical Sciences Institute (SAMSI), USA (<http://www.samsi.info/>). The workshops built and strengthened newly emerging links between active research groups in different scientific areas – statistics/probability, mathematics, physics, geodesy, seismology and computer science – toward achieving a solid understanding of seismicity patterns and structures and a physical theory for earthquake dynamics. The workshops highlighted the key role of the mathematical sciences in studying seismicity dynamics in relation to properties of faults and the crust as an essential component of this interdisciplinary research endeavor. The workshops were attended by over 40 scientists. The commission continued the work on organizing the next CMG biennial meeting to take place during June 2-6, 2014 in Merida, Yucatan, Mexico.

### INTRODUCTION

During 2013, the CMG had co-organized and convened an educational and capacity-building workshop on Mathematics of Climate Change within the global program Mathematics of Planet Earth 2013; and two research workshops on Statistical Seismology at prime international mathematical centers. The commission continued the work on organizing the next CMG biennial meetings in 2014 in Mexico.

### ADMINISTRATION

There was no change in the CMG administration during 2013:

Chair: Yehuda Ben Zion (USA); Vice-Chair: Eli Tziperman (USA); Secretary: Claudia Pasquero (Italy); Past Chair: Dan Rothman (USA)

### ACTIVITIES

#### Education and capacity-building workshop on Mathematics of Climate Change

CMG had co-organized and co-conducted a Workshop on Mathematical Geophysics: “Mathematics of Climate Change, Related Hazards and Risks” during July 29-Aug 2<sup>nd</sup> at Centro de Investigación en Matemáticas (CIMAT), Guanajuato, Mexico. The workshop was a part of the global program *Mathematics of the Planet Earth 2013* (<http://mpe2013.org/>) and a satellite activity of the Mathematical Congress of Americas 2013 (<http://www.mca2013.org>).

The workshop featured eight distinguished speakers who discussed the mathematical aspects of understanding and modeling the changing climate: Graciela Canziani (Universidad Nacional del Centro de la Provincia de Buenos Aires, Argentina), Michael Ghil (École Normale Supérieure, Paris, France), Oscar Velasco Fuentes (Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California, México), Eugenia Kalnay (University of Maryland), Carlos R. Mechoso (University of California Los Angeles), George Philander (Princeton), Bala Rajaratnam (Stanford), and Eli Tziperman (Harvard). The workshop was attended by 25 early career scientists from Latin Americas and the

Caribbean, Europe, and Israel, who presented their research in a poster session and participated in round table discussions.

Workshop website: <http://www.mca2013.org/en/workshop-on-mathematics-of-climate-change.html>.

Workshop YouTube channel: <http://www.youtube.com/channel/UCq4ZArLhYqop3H-vmiItcIQ>.

### **Research workshops on Statistical Seismology**

The main goal of the workshops was to build and strengthen newly emerging links between active research groups in different scientific areas – statistics/probability, mathematics, physics, geodesy, seismology and computer science – toward achieving a solid understanding of seismicity patterns and structures and a physical theory for earthquake dynamics. The workshops highlighted the key role of the mathematical sciences in studying seismicity dynamics in relation to properties of faults and the crust as an essential component of this interdisciplinary research endeavor.

- Workshop 1: “Statistics and Triggering of Earthquakes” during 30 August-1 September 2013 was a part of global program *Mathematics of the Planet Earth 2013* at the Banff International Research Station (BIRS), <http://www.birs.ca/>.

The invited speakers are I. Zaliapin, M. Naylor, J. Fineberg, P. Johnson, D. Zigone, A. Velasco, V. Durand, X. Meng, D. Eaton, N. van der Elst. The workshop organizers are Yehuda Ben-Zion (USC – IUGG representative), Joern Davidsen (U of Calgary), and Robert Schsherbakov (U of Western Ontario).

Workshop website: <http://www.birs.ca/events/2013/2-day-workshops/13w2171>.

- Workshop 2: “Dynamics of Seismicity, Earthquake Clustering and Patterns in Fault Networks” during 9-11 October 2013 was a part of global program *Mathematics of the Planet Earth 2013* at the Statistical and Applied Mathematical Sciences Institute (SAMSI), <http://www.samsi.info/>.

The invited speakers are: Egill Hauksson (Caltech), Tomas Parsons (USGS), Antoinette Tordesillas (University of Melbourne), Bala Rajaratman (Stanford), Philip Stark (Berkeley), David Harte (Statistical Research Associates, New Zealand), Karin Dahmen (University of Illinois - Urbana-Champaign). The workshop organizers are Yehuda Ben-Zion (USC – IUGG representative), Joern Davidsen (U of Calgary), and Ilya Zaliapin (U of Nevada Reno – IUGG representative).

Workshop website: <http://www.samsi.info/workshop/2013-dynamics-seismicity-earthquake-clustering-and-patterns-fault-networks-october-9-11-2013>

### **FUTURE ACTIVITIES**

#### **CMG biennial meeting 2014**

CMG is working on organizing the next CMG biennial meeting to take place during 2-6 June 2014 in Merida, Yucatan, Mexico. The applications to external support were submitted to NSF and EGU. The program has been finalized and abstract submission is now open. The meeting website is: <http://eventos.iingen.unam.mx/IUGG2014/>

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

# Commission on Geophysical Risk and Sustainability (GRC)

<http://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

### Membership

There was one appointment into the Georisk Commission Executive Committee during 2013: Dr. Andreas Kaab from the University of Oslo, nominated by IACS. The Executive Committee now has improved representation from across the IUGG Unions. Note that Paula Dunbar remains as Treasurer despite having completed two terms in this role. This is because a new Treasurer could not be found, despite the best efforts of the Executive Committee (EC). Ms Dunbar has agreed to remain in the role until a new Treasurer can be found.

Kuniyoshi Takeuchi	IAHS	Chair	kuni.t@pwri.go.jp
Vladimir Kossobokov	IASPEI	Vice-Chair	volodya@mitp.ru
John Labrecque	IAG	Vice-Chair	john.labrecque@nasa.gov
Diana Greenslade	IAPSO	Secretary	d.greenslade@bom.gov.au
Paula Dunbar	IAPSO	Treasurer	Paula.Dunbar@noaa.gov
Alik Ismail-Zadeh	IASPEI	Past Chair	Alik.Ismail-Zadeh@kit.edu
David Jackson	IASPEI	EC Member	djackson@ucla.edu
David Boteler	IAGA	EC Member	David.Boteler@NRCan-RNCan.gc.ca
Joan Marti	IAVCEI	EC Member	joan.marti@ija.csic.es
Servando de la Cruz Reina	IAVCEI	EC Member	sdelacr@geofisica.unam.mx
Alan Thomson	IAGA	EC Member	awpt@bgs.ac.uk
Andreas Kaab	IACS	EC Member	kaeaeb@geo.uio.no
Gerd Tetzlaff	IAMAS	Member	tetzlaff@rz.uni-leipzig.de
Hermann Drewes	IAG	Member	drewes@dgfi.badw.de
A. Jayawardena	IAHS	Member	hrecjaw@hkucc.hku.hk
Yevgeniy Kontar	IAPSO	Member	ykontar@findlay.edu
Susan McLean	IAGA	Member	Susan.Mclean@noaa.gov
Kosuke Heki	IAG	Member	heki@mail.sci.hokudai.ac.jp
Steve McNutt	IAVCEI	Member	steve@giseis.alaska.edu
Martin Funk	IACS	Member	Funk@vaw.baug.ethz.ch
Tom Beer	IAMAS	Honorary Member	tom.beer@csiro.au
Ramesh Singh	IASPEI	Honorary Member	rsingh@chapman.edu
Harsh Gupta	IASPEI	Advisory Board Member	harshgupta@nic.in
Viacheslav Gusiakov	IAPSO	Advisory Board Member	gvk@sscc.ru
Uri Shamir	IAHS	Advisory Board Member	shamir@tx.technion.ac.il
Gordon McBean		Advisory Board Member	gmbean@uwo.ca

## **Terms of Reference**

The Terms of Reference for the Georisk Commission were modified in order to remove some ambiguities and clarify some details relating to membership of the Commission. The modified Terms of Reference were approved by the IUGG Executive Committee in September 2013.

## **ACTIVITIES**

### **Website**

A new website for the Commission was designed and all content from the existing website has been transferred to the new website. The new website will be launched in the first quarter of 2014.

### **Second IUGG GeoRisk conference**

A call for Expressions of Interest to host the second IUGG GeoRisk Commission conference was issued and Executive Committee members voted for a proposal from Joan Marti to hold the conference in Madrid, Spain, from 18-21 November 2014. The theme of the conference will be "Improving Geophysical Risk Assessment, Forecasting, And Management". A number of provisional scientific sessions have been developed and a conference website has been established at <http://www.georisk2014.com>.

### **Awards**

Several Georisk Commission members were acknowledged with prestigious awards during 2013:

- Kuniyoshi Takeuchi was awarded the International Hydrology Prize on 22 October 2012 in Delft, the Netherlands on the occasion of the 90th anniversary of IAHS. The International Hydrology Prize is awarded annually by IAHS, with UNESCO and WMO, to a person who has made an outstanding contribution to hydrological science.
- John LaBreque was awarded AGU's Edward A. Flinn III Award, which is presented to one awardee annually, for individuals who personify the Union's motto "unselfish cooperation in research" through their facilitating, coordinating, and implementing activities.
- The U.K. Royal Astronomical Society elected Alik Ismail-Zadeh as an Honorary Member of the Society. Honorary Memberships are made in recognition of services to astronomical and geophysical sciences such as distinguished leadership of a school, observatory or laboratory; outstanding services to national or international scientific organizations; exceptionally important work in editing scientific publications; influential work in education and public outreach in these sciences; or specially outstanding distinguished work in the history of these sciences.

## **PLANNED FUTURE ACTIVITIES**

The main activity for 2014 will be the organisation of the second IUGG GeoRisk conference in Madrid, Spain, in November 2014.

The GeoRisk Commission will organize a Union symposium on Extreme Natural Hazards and Integrated Disaster Risk Science (tentative title) at the XXVI General Assembly of the Union (to be held in Prague, Czech Republic, from 22 June to 2 July 2015). This will be undertaken in close cooperation with IAHS (as the Lead Association) and other Union Associations as well as with the IRDR Scientific Committee.

Submitted by  
Diana Greenslade, GRC Secretary

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

<http://www.sedigroup.org>

## ABSTRACT

As SEDI organizes a biennial international symposium, we did not have an international symposium this year. However, some interesting sessions related to SEDI's study area were held at IASPEI 2013 in Gothenburg, Sweden, which are "Structures in the Mantle and Core" and "Dynamical Processes in the Mantle and Core". There were also numerous SEDI sponsored sessions at the AGU and EGU meetings. The preparations for SEDI 2014 are smoothly under way. Its website is already opened at <http://www.geo.titech.ac.jp/sedi2014/>, where one can find that the construction of a scientific program is almost completed. Currently, SEDI2014 has been supported by Science Council of Japan, Japan Geoscience Union, and approved by Japan Agency for Marine-Earth Science and Technology and Society of Geomagnetism and Earth, Planetary and Space Sciences, and financially supported by Inoue Foundation for Science.

To encourage the community of deep Earth research in Japan, the LOC had a domestic symposium on 27-29 September 2013. This symposium comprised a poster session in every evening and three half-day talk sessions focusing on the mantle, core, and planets. The program and abstracts can be available from the web site of pre-SEDI 2013 (<http://www.geo.titech.ac.jp/presedi2013/>).

As a post activity of SEDI2012 in UK, the proceedings of SEDI 2012 has been published on October 2013 as a special issue of Physics of the Earth and Planetary Interiors (Volume 223, Pages 1-96), edited by Chris Jones, which are consisted of nine papers. This issue covers important scientific topics on the inner and outer cores as well as the mantle.

## 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, for example, in the study of mantle plumes or structure and dynamics of lithosphere. The scientific questions and problems of interest to SEDI include: (i) the investigation of the origin, evolution, structure, geochemical and mineralogical composition of the inner core, outer core, mantle and crust (on a planetary scale), (ii) the investigation of core magnetohydrodynamics at all time scales, both from a theoretical point of view (dynamo theory, magnetohydrodynamic waves) and from an observational point of view (as provided by modern, historical, archeomagnetic and paleomagnetic data), and of more general fluid rotational dynamics that can affect the core (such as precessional effects and short time scale instabilities), (iii) the investigation of mantle dynamics, both from a theoretical point of view (solid state convection in the presence of complex rheology and phase transitions, role of plumes and descending slabs) and observational point of view (global 3D reconstruction of mantle convection from surface, seismological, geochemical and geodetic observations), (iv) 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 (nature, shape, role), (v) 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 Satoru Tanaka (JAMSTEC, Japan), vice-chaired by Jonathan Aurnou (UCLA, USA), with Michael Bergman (Simon's Rock College, USA) acting as Secretary-General. It has a membership of about 605, as recorded on the email list used to broadcast information related to SEDI activities, upcoming meetings, funding opportunities, and academic openings.

## **ACTIVITIES**

As SEDI organizes a biennial international symposium, we did not have a symposium this year. However, some interesting sessions related to SEDI's study area were held at IASPEI 2013 in Gothenburg, Sweden, which are "Structures in the Mantle and Core" and "Dynamical Processes in the Mantle and Core". There were also numerous SEDI sponsored sessions at the AGU and EGU meetings. The preparations for SEDI 2014 are smoothly under way. Its web site is already opened at <http://www.geo.titech.ac.jp/sedi2014/>, where one can find that the construction of a scientific program is almost completed. The registration will be started soon. Currently, SEDI2014 has been supported by Science Council of Japan, Japan Geoscience Union, and approved by Japan Agency for Marine-Earth Science and Technology and Society of Geomagnetism and Earth, Planetary and Space Sciences, and financially supported by Inoue Foundation for Science.

To encourage the community of deep Earth research in Japan, the LOC had a domestic symposium on 27-29 September 2013, where we had 39 participants. This symposium comprised a poster session in every evening and three half-day talk sessions focusing on the mantle, core, and planets. In the mantle session, Masao Nakada gave a keynote talk on the viscosity in the mantle, Akiko Takeo and Takashi Nakagawa gave research talks on seismic anisotropy in the uppermost mantle and thermo-chemical numerical simulation for the Earth revolution, respectively, and Satoru Tanaka led general discussion also incorporating six posters. In the core session, Satoshi Kaneshima gave a keynote talk on the top of the Earth's outer core, Shigehiko Tateno and Shin-ichi Takehiro gave research talks on high-pressure experiments at inner core conditions and inner core dynamics, respectively, Hisayoshi Shimizu led general discussion incorporating 11 posters. In the planets session, Masahiro Ikoma gave a keynote talk on giant planets, Makiko Ohtake and Hideo Tsunakawa gave research talks on chemical composition and magnetic anomaly of moon, respectively, Futoshi Takahashi led general discussion incorporating two posters. The program and abstracts written in English can be available from the web site of pre-SEDI 2013 (<http://www.geo.titech.ac.jp/presedi2013/>).

As a post activity of SEDI2012 in UK, the proceedings of SEDI 2012 has been published on October 2013 as a special issue of Physics of the Earth and Planetary Interiors (Volume 223, Pages 1-96), edited by Chris Jones, which are consisted of 9 papers. This issue covers important scientific topics on structure and dynamics of the inner and outer cores as well as mantle convection.

## **FUTURE ACTIVITIES**

A one-day meeting named UKSEDI2014 will be held in London, UK, on 7 March 2014.

The international symposium SEDI2014 will be held at Shonan Village Center, Japan on 3-8 August 2014.

Submitted by  
Satoru Tanaka, SEDI Chair  
Jonathan Aurnou, SEDI Vice-Chair  
Michael Bergman, SEDI Secretary-General

## Commission for Data and Information (UCDI)

<http://www.iugg-ucdi.org/UCDI/Home.html>

### INTRODUCTION

In 2008 the IUGG established the Union Commission on Data and Information (hereafter UCDI) to provide IUGGs eight Associations an entity to deal with data and information issues at the Union level and engage with similar bodies in other Unions and Societies.

The Commission provides a focused and sustainable organizational structure that supports and strengthens IUGG science through integrated scientific information activities in order to ensure the availability of modern data and information systems and services. These services are globally distributed, provide universal open access, and must be sustainable.

The UCDI objectives are to:

- provide a focus and single voice within IUGG, spanning all IUGG Associations and inter-Association bodies.
- connect IUGG and its scientists to other bodies/agencies/initiatives that have interest and responsibility on matters of geo-data.
- advocate and facilitate research and development in the growing field of informatics to improve data and information systems and practices.
- promote open access to data and adoption of inter-operable data sets.

### ADMINISTRATION

#### Membership

UCDI continues to solicit informal membership/expressions of interest for the Union Commission ([http://www.iugg-ucdi.org/UCDI/UCDI\\_member2011.html](http://www.iugg-ucdi.org/UCDI/UCDI_member2011.html)).

#### UCDI executive

(performs most of the UCDI outreach and representation)

<i>Chair:</i>	Peter Fox ( <a href="mailto:pfox@cs.rpi.edu">pfox@cs.rpi.edu</a> )	USA
<i>Vice-Chair:</i>	Charles Barton ( <a href="mailto:charles.barton@anu.edu.au">charles.barton@anu.edu.au</a> )	AUSTRALIA
<i>Secretary:</i>	Adelina Geyer Traver ( <a href="mailto:ageyertraver@gmail.com">ageyertraver@gmail.com</a> )	SPAIN
<i>Members:</i>	Tim Ahern ( <a href="mailto:tim@iris.washington.edu">tim@iris.washington.edu</a> )	USA
	Maria Assunção F. Silva Dias ( <a href="mailto:mafdsdia@model.iag.usp.br">mafdsdia@model.iag.usp.br</a> )	BRAZIL
	Pierrick Givone ( <a href="mailto:pierrick.givone@cemagref.fr">pierrick.givone@cemagref.fr</a> )	FRANCE
	Ruth Neilan ( <a href="mailto:ruth.e.neilan@jpl.nasa.gov">ruth.e.neilan@jpl.nasa.gov</a> )	USA
	Mark Parsons ( <a href="mailto:parsom3@rpi.edu">parsom3@rpi.edu</a> )	USA
	Bernd Richter ( <a href="mailto:richter@iers.org">richter@iers.org</a> )	GERMANY
	Anatoly Soloviev ( <a href="mailto:a.soloviev@gcras.ru">a.soloviev@gcras.ru</a> )	RUSSIA
Satheesh Shenoi ( <a href="mailto:shenoi@incois.gov.in">shenoi@incois.gov.in</a> )	INDIA	

### ACTIVITIES

In the year to date, members of the UCDI executive have been present in a number of international settings including: new data alliances, committees, task/working groups, conferences, as well as organizing sessions and promoting the work and aims of UCDI. The sessions were really successful with very interesting talks and discussion time.



## **2013 UCDI EC Meetings**

Three EC Meetings have been arranged coinciding with international conferences (partial attendance):

- EGU General Assembly 2013, 7-12 April 2013 (Vienna, Austria)
- RDA Plenary Assembly 2013, (Gothenburg, Sweden)
- AGU Fall Meeting 2013, 9-12 December 2013 (San Francisco, USA)

## **2013 UCDI Web Presence**

UCDI hosts members via the webpage (<http://www.iugg-ucdi.org/UCDI/Home.html>) where there is a form to become a “members” of the Union Commission.

UCDI’s survey to assess state-of-the-art on data and information in the different IUGG Associations is active at [http://www.iugg-ucdi.org/UCDI/UCDI\\_survey2011.html](http://www.iugg-ucdi.org/UCDI/UCDI_survey2011.html). It has been released to the public via the UCDI webpage and the Association’s mailing lists.

A new wiki site to facilitate more collaborative contributions was added to the website and is being developed for UCDI: [http://www.iugg-ucdi.org/wiki/index.php/Main\\_Page](http://www.iugg-ucdi.org/wiki/index.php/Main_Page). In 2014 more content and users will be added.

## **2013 World Data System Participation**

Ruth Neilan continues as an active member of the World Data System Scientific Committee. The volume from the first conference was released in Jan. 2013, and is available from the Data Science Journal website. Many people with IUGG attended and contributed to this meeting.

Peter Fox and Mark Parsons are participating as external consultants/community representatives in the WDS – Knowledge Network and Metadata Catalog working group (Chaired by Wim Hugo and Kim Finney). Activities began in early 2013 and run through late 2013.

WDS Executive Director Mustapha Mokrane has agreed to co-convene a UCDI motivated union session for the 2015 IUGG General Assembly (see 2014 Activities).

## **2013 CODATA Participation**

Mark Parsons and Alexei Gvishiani continued as IUGG co-delegates to CODATA and Anatoly Soloviev continues as vice-chair (Gvishiani is chair) of the CODATA Task Group on “Earth and Space Science Data Interoperability”. Soloviev represented IUGG at the 2012 Taipei CODATA Assembly and his 2012 CODATA Meeting and General Assembly and continued as vice-chair of CODATA Task Group on “Earth and Space Science Data Interoperability” (report from the Assembly was included in the 2012 UCDI report).

Peter Fox and Mark Parsons continued informal interactions with the Task Group on “Data Citation Standards and Practices” via its co-chairs (Brase, Callaghan, Borgman).

New CODATA Executive Director Simon Hodson has agreed to co-convene a UCDI motivated union session for the 2015 IUGG General Assembly (see 2014 Activities).

## **2013 RDA Participation**

The Research Data Alliance (RDA; <http://rd-alliance.org>) is aimed to build the social and technical bridges that enable open sharing of data. RDA enables data to be shared across barriers through focused Working Groups and Interest Groups, formed of experts from around the world – from academia, industry and government.

RDA launched its search for a Secretary General in late 2013 requesting a suitably experienced leader, Mark Parsons was elected the first Secretary General of the Research Data Alliance (RDA). In this capacity Mark Parsons has agreed to co-convene a UCDI motivated union session for the 2015 IUGG General Assembly (see 2014 Activities).

In October 2013, Peter Fox was elected to the RDA Technical Advisory Board (TAB). The TAB “provides technical expertise and advice to the Council. It also assists in developing and reviewing RDA Working Groups to promote their impact and effectiveness. The Technical Advisory Group is responsible for the development, maintenance and evolution of the RDA Technical Roadmap document.”

These intersections highlight both a synergy between RDA and UCDI but the value being brought to RDA by IUGG affiliated participants.

### **Liaison with Peer Organizations**

In addition to CODATA, WDS, and RDA, UCDI continued interaction with international organizations such as IUGS/CGI (Commission on Geoscience Information), IAU/WGAD (Working Group on Astronomical Data), EGU/ESSI (Earth and Space Science Informatics), and AGU/ESSI (Earth and Space Science Informatics).

### **2013 UCDI Science Meetings**

(UCDI/IUGG representation)

- *2013 Research Data Alliance Plenary Assembly, Mar 16-18, Gothenburg, Sweden.*  
Peter Fox presented the opening science keynote “Can it get any more important than this?” at the first RDA Plenary Assembly in the session: “Towards an Open Access Research Data without Barriers or Borders – RDA Mission” Chair: John Wood, Secretary General, The Association of Commonwealth Universities and RDA Council  
Mark Parsons, Executive Director for the U.S. RDA program office, attended the Plenary.
- *2013 Now and Future of Data Publishing, May 22, Oxford, UK.*  
Peter Fox gave the first Keynote “The Now and Now for Data: Metaphors for Making Data Publicly Available” (based on work by Parsons and Fox) and represented IUGG science interests.
- *2013 Research Data Alliance Plenary Assembly, Sep. 16-18, Washington, DC, USA.*  
Mark Parsons, Executive Director for the U.S. RDA program office, attended the Plenary and represented IUGG science and data interests.
- *AAAI Fall Symposium: Semantics and Big Data, Nov. 15-16, Arlington, VA, USA.*  
Peter Fox gave a Keynote talk: “Geosemantics for weird data; mediation, integration, heterogeneity and vocabularies” and represented IUGG science and data interests.
- *ICSTI Workshop “Data and no-data integration”, Oct. 16, 2013, Ottawa, Canada.*  
Peter Fox gave a keynote talk: “Progress in Open-World, Integrative, Web-based Collaborative Research Platforms” in this workshop organized by the International Council for Scientific and Technical Information, explicitly representing UCDI.
- *Climate and Weather of the Sun-Earth System II Closing Symposium, Nov. 18-22, Nagoya, Japan*  
Peter Fox presented an invited tutorial entitled: “eScience and Informatics for International Science Programs.” CAWSES II (2009-2013) included all major science areas of IUGG. Fox also complete the term as co-chair of the eScience and Informatics task group ([www.cawses.org](http://www.cawses.org)).

### **UCDI Session at European Geosciences Union 2013**

- *Data Science/Informatics and Data Assimilation in Geosciences*  
Convener: A. Geyer  
Co-Convener: P.Fox

## 2013 Association Meetings

- IAVCEI Scientific Assembly 2013 special session: “*Databases in Volcanology*”  
Convener: A. Geyer; B. Andrews  
Co-conveners: M. Bursik, A. Folch, G. Valentine, S. Sparks, C. Newhall, G. Jolly, B. Andrews, S. Loughlin, P. Papale

## FUTURE ACTIVITIES

- Planning for a 2014-5 Commission (UCDI) Assembly possibly joint with IUGS/CGI.
- UCDI Session in European Geosciences Union 2014: Data Science/Informatics and Data Assimilation in Geosciences. Convener: A. Geyer Co-Convener: P. Fox.
- UCDI Session in American Geophysical Union 2014: International Collaboration in Data Science, Informatics and Data Analytics in Geosciences. Convener: A. Geyer Co-Convener: P. Fox.
- Continue eGY Africa activities.
- Increase IUGG/UCDI participation in the Research Data Alliance.
- Continue liaisons with CODATA and WDS, via existing mechanisms.
- Submit UCDI session to SciDataCon, and encourage session submissions and participation from IUGG participants.
- Planning for Union Session (U04) at IUGG General Assembly in 2015. Title: Data Science and Analytics in Geodesy and Geophysics-Research and Education Progress and Opportunities. Lead conveners: Peter Fox (RPI: [pfox@cs.rpi.edu](mailto:pfox@cs.rpi.edu)), Adelina Geyer Traver (Institute of Earth Sciences "Jaume Almera" (CSIC): [ageyertraver@gmail.com](mailto:ageyertraver@gmail.com)), Mark Parsons (RDA), Simon Hodson (CODATA), Mustapha Mokrane (WDS-IPO). Co-conveners from IUGG Associations are being sought.
- Further Association meeting sessions are being planned.

Submitted by  
Peter Fox, UCDI Chair  
Adelina Geyer, UCDI Secretary General

## Working Group on History (WGH)

### INTRODUCTION

The primary task for the WGH during 2013 was to identify Representatives from each of the eight IUGG Associations in accordance with the Terms of Reference following the establishment of the WGH by the Executive Committee of the IUGG in November 2012.

### ADMINISTRATION

The following are the current officers and members of the Union Working Group on History:

Chair: Edward W. Cliver (USA)

Vice Chair: Hans Volkert

#### *Association Representatives*

IACS: Mark Carey (USA)

IAG: József Ádám (Hungary)

IAGA: Edward W. Cliver (USA)

IAHS: Maurits W. Ertsen (Netherlands)

IAMAS: Hans Volkert (Germany)

IAPSO: W. John Gould (UK)

IASPEI: Roger M.W. Musson (UK)

IAVCEI: Grant Heiken (USA)

#### *Historian Advisors*

Ron Doel (USA)

Gregory Good (USA)

### ACTIVITIES

Even before the full membership was in place, the WGH, through individual member initiative, sponsored history symposia at joint or individual Association meetings:

- The joint IAMAS-IACS Assembly in Davos, Switzerland from 8-12 July 2013 held a symposium entitled “*A Century of international Cooperation in Geophysics: Examples from IACS and IAMAS*”. Two solicited and five contributed presentations on such topics as the role of geophysics in scientific internationalism, Jacob Bjerknes, the World Weather Watch, and international cooperation in the geosciences were followed by a general discussion about the aims and intended modes of operation of the WGH. During the extended break between the sessions two posters were discussed and copies of IAMAS Publication Series Nos. 1 and 2 (Bolle, 2008; Bojkov, 2012) with historic content were distributed to interested participants.

#### References:

Bolle, H.-J., 2008: International Radiation Commissions 1896 to 2008: Research into atmospheric radiation from IMO to IAMAS. IAMAS Publication Series no. 1, iv + 141 pp.

Bojkov, R., 2012: International Ozone Commission: History and activities. IAMAS Publ. Series no. 2, iv +100 pp.

Involved WGH Members: Ron Doel, Hans Volkert

- The IAG Scientific Assembly in Potsdam, Germany from 1-6 September, 2014 featured a special History Session to commemorate the 150<sup>th</sup> anniversary of IAG's predecessor. Talks covered each of the key phases of IAG science during the last 150 years, followed by guided tours of the facilities at Telegrafenberg, videos from previous IAG Assemblies, and a barbeque.

Involved WGH Member: József Ádám

## **FUTURE ACTIVITIES**

### **Plans for 2014 include:**

- Hold the first (virtual) meetings of the WGH
- Sponsor/develop a Union-wide historical symposium in Prague, Czech Republic
- Inject historical content into scientific symposia in Prague, Czech Republic
- Establish a WGH worldwide web presence

Submitted by  
Ed Cliver, WGH Co-Chair  
Hans Volkert, WGH Co-Chair

# ACTIVITIES OF THE INTER-ASSOCIATIONS WORKING GROUPS

## Commission on Physics and Chemistry of Earth Materials

(Sponsors: IASPEI, IAVCEI, IAGA)

<http://www.iaspei.org/commissions/CPCEM.html>

### ADMINISTRATION

#### Membership of the Commission

The Commission was re-invigorated in 2013 with new membership from IASPEI, IAVCEI, and for the first time, from IAGA, as follows:

#### Chair

- Ian Jackson (IASPEI), Australian National University ([Ian.Jackson@anu.edu.au](mailto:Ian.Jackson@anu.edu.au), until March 2014).
- Jihua Chen (IASPEI), Florida International University ([chenj@fiu.edu](mailto:chenj@fiu.edu), from March 2014).

#### Co-chairs

- Anne Pommier (IAGA), Arizona State University ([Anne.Pommier@asu.edu](mailto:Anne.Pommier@asu.edu)).
- Tomoo Katsura (IAVCEI), Bayerisches Geoinstitut, University of Bayreuth ([Tomo.Katsura@uni-bayreuth.de](mailto:Tomo.Katsura@uni-bayreuth.de)).

#### Other members

- Joshua Feinberg (IAGA), University of Minnesota ([feinberg@umn.edu](mailto:feinberg@umn.edu)).
- Ian Jackson (IASPEI), Australian National University ([Ian.Jackson@anu.edu.au](mailto:Ian.Jackson@anu.edu.au), March 2014-July 2015), Sergio Speziale, Geoforschungszentrum Potsdam ([spezialegfz@gmail.com](mailto:spezialegfz@gmail.com)).
- Catherine McCammon (IAVCEI), Bayerisches Geoinstitut, University of Bayreuth ([catherine.mccammon@uni-bayreuth.de](mailto:catherine.mccammon@uni-bayreuth.de)).

### ACTIVITIES

#### *IAHS-IAPSO-IASPEI Joint Assembly Gothenburg, Sweden, July 2013*

No symposia dedicated to Physics and Chemistry of Earth Materials were organized – but contributions from this discipline were accommodated in other interdisciplinary symposia.

#### *IUGG General Assembly, Prague, June-July 2015*

The Commission will organise a single inter-Association symposium (details below) dedicated to physics and chemistry of earth materials and also liaise with the convenors of other symposia in order to accommodate presentations on earth materials elsewhere in the program, as appropriate.

*Symposium JS2 Physics and chemistry of earth materials with implications for earth structure and evolution (IASPEI, IAVCEI, IAGA, SEDI)*

Lead Convenor: Jihua Chen (IASPEI)

Co-convenors: Joshua Feinberg, Anne Pommier (IAGA), Ian Jackson, Sergio Speziale (IASPEI) Tomoo Katsura, Catherine McCammon (IAVCEI)

Advances in understanding the structure and evolution of the Earth's interior typically involve a combination of insights from field-based observations, the laboratory, and modeling. An interdisciplinary symposium is planned, involving new results from seismological and electrical sounding of the structure of the mantle and core (including discontinuities, anisotropy and attenuation),

observations of the Earth's magnetic field and its relationship to planetary heat-flow, related earth materials research (including phase equilibria, element partitioning, deformation and the development of texture, and the influence of volatiles on partial melting, seismic and electrical properties, and rheology), and numerical modeling of properties and processes on scales ranging from the atomic to geodynamic, and from accretion and core formation to the present.

Submitted by  
Ian Jackson, Inter-Association Commission on Physics and Chemistry of Earth Materials Chair

## **Commission on Volcano Seismology** (Sponsors: IASPEI, IAVCEI)

[http://volc\\_seis\\_commission.leeds.ac.uk/](http://volc_seis_commission.leeds.ac.uk/)

### **INTRODUCTION**

#### **Main Objectives:**

The fundamental aim of the commission is to promote volcano seismology as a tool to gain a better understanding of the dynamics of volcanoes and improve our ability to accurately predict their behavior. The goals of the Commission are fivefold:

1. To facilitate collaborations among scientists and institutions investigating volcanic processes and structures.
2. To facilitate the transfer of knowledge, tools and training between scientists and volcano observatories, especially in developing countries.
3. To promote the use of state-of-the-art seismic equipment, such as broadband sensors and high dynamic range data loggers, in routine volcanic monitoring and seismic experiments.
4. To promote conferences, seminars and high-level education aimed at familiarizing researchers with modern theoretical and experimental seismic methods used in the interpretation of volcanic processes and structures.
5. To promote funding from international organizations that could help defray travel and related expenses for the activities listed above.

### **ADMINISTRATION**

#### **List of Commission members:**

At our last meetings in Kagoshima, Japan and North Sulawesi, Indonesia we decided to charge each commission member with certain tasks:

- *Silvio De Angelis*: Co-ordination of tutorials
- *Jeff Johnson*: Co-ordination of workshops
- *Jess Johnson*: Co-ordination of social events/outreach
- *Art Jolly*: Education/outreach
- *Philippe Jousset*: Co-ordination of social events
- *Thomas Lecocq*: Co-ordination of creating and distributing software tools
- *Philippe Lesage*: Maintenance of literature list
- *Mario Ruiz*: Organisation of workshops
- *Benoit Taisne*: Organisation of on-line forum
- *Vyacheslav Zobin*: Maintenance of literature list
- *Diana Roman*: Organisation of on-line forum
- *Roberto Carniel*: Communication and maintenance of web-list
- *Jurgen Neuberg*: Chair and maintenance of web-site

## ACTIVITIES

### Recent meetings and workshops:

Since several years now, annual workshops are organized as a joint effort by the IASPEI/IAVCEI Inter-Association Commission on “Volcano Seismology” and the Working Group “Earthquakes and Volcanoes” of the European Seismological Commission.

These workshops are always organized in (or close to) a volcanic area and deal with general topics related to volcano seismology, but also stimulate the participation of researchers working in related fields, in order to push the integration of volcano seismology with other techniques and achieve a multi-disciplinary approach. This approach has become more evident in recent years as we extended the range of topics to general geophysical monitoring expertise but also included more and more themes like petrology, geology and volcanic risk management.

Every year the workshops focus the attention on a particular topic, indicated by the title of the specific annual workshop. The list of conveners always includes besides the working group leaders also local representatives of the scientific organization team. The participation of young researchers (Master level, PhD students and post-doctoral researchers) is particularly welcome. For this reason our workshops are the primary destinations for grants made available by the Bruno Martinelli Fund, named after the late former Secretary of the ESC Working Group, which supports the participation of young students and scientists in particular from Latin America and Caribbean countries. The grants are awarded by a committee completely independent from both the ESC Working Group and the IASPEI/IAVCEI Inter-Association Commission and are financially administered by the AGU.

### Workshops in 2012 and 2013 comprised:

- 14-21 September 2012, El Hierro, Canary Islands, Spain.  
Conveners: J. Neuberg (Leeds, UK), R. Carniel (Udine, Italy), A. Garcia (CSIC-UCM, Spain), R. Ortiz (CSIC-UCM, Spain).  
The workshop was a response to the recent submarine eruption off the coast of El Hierro island, hence the title “Geophysical and geodetic techniques for monitoring and analysis of submarine eruptions”.  
Number of participants: 24.
- 8-14 September 2013, North Sulawesi, Indonesia.  
Conveners: Surono (Center for Volcanology and Geological Hazard Mitigation Geological Agency, Bandung, Indonesia), Jurgen Neuberg (Leeds, UK) & Roby Carniel (Udine, Italy).  
Title: “Bringing geophysical volcano monitoring techniques to an operational level”.  
Number of participants: 20.
- July 20-24, 2013, Kagoshima, Japan.  
The IAVCEI 2013 Scientific Assembly. Title: Volcanic tremor, seismic events and volcanic conduit dynamics: understanding based on field observations, experiments, and modeling.  
Conveners: Minoru Takeo, Hiroyuki Kumagai, Haruhisa Nakamichi, Jurgen Neuberg, Jacopo Taddeucci, Gregory P. Waite).

Submitted by  
Jurgen Neuberg, Inter-Association Commission on Volcano Seismology Chair



## **International Heat Flow Commission (IHFC)**

*(Sponsors: IAPSO, IASPEI, IAVCEI)*

<http://www.geophysik.rwth-aachen.de/IHFC/>

The IHFC activity included relates to following principal objectives:

- Forming geothermic data banks, data processing and interpretation:
  - Heat flow (continental and marine data),
  - Borehole temperature
- Paleoclimate reconstructions and influence on crustal thermal regime,
- Formation thermal properties – measurements technique and database forming,
- Outreach,
- Applied geothermics for geothermal energy resources estimates, exploration and production,
- Applied geothermics for hydrocarbon resources estimates, exploration and production.

Acquisition of experimental data on heat flow density within the Global Heat Flow Data Base (GHFDB) continued. In 2013 the IHFC decided to migrate the data to the Pangaea data base ([http://www.iaspei.org/downloads/IHFC\\_20110623\\_QuadrienniumReport.pdf](http://www.iaspei.org/downloads/IHFC_20110623_QuadrienniumReport.pdf)). The Global Heat Flow Data Base (GHFDB) as available to date from website (<http://www.heatflow.und.edu>) will be incorporated into the data base Pangaea. The origin of the data will be visible as separate entry in the metadata. The special Agreement between IHFC and Pangaea was signed.

A global database of borehole temperatures was enhanced for the climate change research.

Experimental geothermic investigations in scientific deep wells and industrial ore, oil and geothermal wells in Finland, Sweden, India, Russia and other countries were coordinated to correct the previous regional experimental data obtained earlier in shallow wells and to implement cardinal changes in the geothermic research methodology happened during last decades. The workshop on methodology of geothermic research in deep scientific wells was organized in Freiberg, Germany. A special standard “Suggested Methods of Rock Thermal Property Measurements” with description of advanced measuring technologies was developed and transferred to the International Society of Rock Mechanics for its implementation.

A geothermic session “From surface heat flow mapping to geodynamic analysis and geothermal energy – 50 years of activity of the International Heat Flow Commission” (chairmen Profs. C. Clauser and Yu. Popov) was organized within the Assembly “Knowledge for the Future” - IAHS IAPSO IASPEI 2013.

The financial support (3,000 USD) for the Assembly “Knowledge for the Future” - IAHS IAPSO IASPEI 2013 was organized with a help of the oil/gas service company Schlumberger.

Two symposiums of IHFC are suggested to the Organizing Committee of the IUGG Assembly (2015, Prague, Czech Republic):

- Subsurface temperature signals and geothermal resources. Conv. Makoto Taniguchi
- Modern tectonics and terrestrial heat flow: continental and oceanic lithosphere. Conv. Massimo Verdoya.

Within workshops and conferences the IHFC stimulated the presentations with the information about necessary essential corrections in previous heat flow data, which were established from the scientific deep drilling projects, for the basin and petroleum system modeling to improve the reliability of the regional hydrocarbon reservoir predictions.

In 2013 the IHFC supported fast implementation of applied geothermics in hydrocarbon industry. New methods for high precision continuous non-destructive thermal property measurements on cores at bench and formation conditions were applied widely for fundamental geothermics and for enhancement of thermal methods of heavy oil recovery for heavy oil fields in Oman and Russia. New approaches to improve the rock thermal property databases for sedimentary rocks and integration of thermal property data in hydrodynamic simulators were suggested. Special courses “Geothermics” and “Applies Geothermics” were organized in universities and colleges in many countries.

Submitted by  
Yuri Popov, IHFC Chair

## **Joint Committee on the Properties of Seawater (JCS)**

*(Sponsors: SCOR, IAPSO, IAPWS)*

<http://www.teos-10.org/JCS.htm>

### **INTRODUCTION**

The Joint SCOR/IAPSO/IAPWS Committee on the Properties of Seawater (JCS) is the international first point of contact for issues related to the thermophysical properties of seawater. It is jointly sponsored by three scientific organizations directly concerned with the properties of seawater: the Scientific Committee on Oceanic Research, the International Association for the Physical Sciences of the Ocean, and the International Association for the Properties of Water and Steam. JCS thus acts as a permanent source of expertise to these parent organizations, and also provides a conduit for communications to other international scientific organizations like the BIPM, the WMO, and IUPAC. It may summarize progress to the community at large by issuing reports from time to time, suggests areas where gaps exist in the available knowledge, and acts to encourage and support research and standards-development activities related to seawater. It also maintain a repository of knowledge and software (via the website [www.teos-10.org](http://www.teos-10.org)).

JCS currently has 15 members including academic and government scientists, and industry representatives, with a 3 person executive consisting of R. Pawlowicz (Canada, Chair), R. Feistel (Germany, Vice-chair) and T. McDougall (Australia, Vice-chair).

### **ACTIVITIES**

JCS sponsored a series of workshops at the 16th International Conference on the Properties of Water and Steam (Greenwich, UK, 2-3 September 2013). Workshops were held on the topics of (i) pH in seawater (25 attendees), (ii) Salinity/Density relationships in seawater (30 attendees) and (iii) Relative Humidity (13 attendees). An important JCS goal is to work towards the development of standards that are traceable to the International System of Units (SI), which is controlled by Bureau International des Poids et Mesures (BIPM). Attending was R. Weilgosz, the executive director of the BIPM's Consultative Committee on the Amount of Substance (CCQM), and plans were made to continue discussions on this topic at the next CCQM meeting in April 2014.

### **FUTURE ACTIVITIES**

To continue work on a list of tasks developed at the September 2013 workshops.

Submitted by  
Rich Pawlowicz, JCS Chair

## **Tsunami Commission**

*(Sponsors: IAPSO, IASPEI, IAVCEI)*

<http://jisao.washington.edu/tsunamicommission/>

### **INTRODUCTION**

The IUGG Tsunami Commission (IUGG/TC) is an Inter-Association Commission responsible for international coordination of tsunami related meetings, research, and publications. It is jointly sponsored by IASPEI, IAPSO and IAVCEI and was established at the 12th General Assembly of IUGG in Helsinki, Finland in 1960 to promote the exchange of scientific and technical information about tsunamis. The IUGG/TC membership comprises an international group of scientists concerned with various aspects of tsunamis, including an improved understanding of the dynamics of generation, propagation and coastal run-up and the consequences to society of the tsunami hazard.

The IUGG/TC administrative affairs are handled by a Chair, two Vice Chairs, and a Secretary - currently Vasily Titov (USA), Fumihiko Imamura (Japan), Ahmet Yalciner (Turkey) and Phil Cummins (Australia), respectively. IUGG/TC activities include a biennial International Tsunami Symposium (ITS, held every four years as a session of the IUGG General Assembly), and organization of an ITS proceedings volume publication. In addition, IUGG/TC organizes and dispatches an International Tsunami Survey Team following important tsunami events, and forms working groups as needed to promote research activity or support outreach of research results.

### **ACTIVITIES**

During the past year IUGG/TC organized publication of two volumes of a special issue of Pure and Applied Geophysics, "Historical and Recent Catastrophic Tsunamis in the World" (PAGEOPH Vol. 170, Nos. 6-10, eds. K. Satake, A. Rabinovich, D. Dominey-Howes, and J. Borrero), comprising 39 papers arising from the 2011 ITS held at the IUGG General Assembly in Melbourne Australia.

The 26th ITS was also held 25-27 September in Gocek, Turkey. Over 150 scientists participated, presenting the latest advances in the tsunami research. The number and the quality of papers reflected grown awareness of the tsunami problem and significant progress in the science of tsunami after the series of catastrophic events of the last decade. For the first time, the number of papers presented required the ITS to be held in 2 parallel sessions, reflecting the dramatic growth in tsunami research over the past decade. Seven new members were nominated to the IUGG/TC during the business meeting held at the 2013 ITS.

### **FUTURE ACTIVITIES**

The next ITS will be held in 2015 in Prague, Czech Republic, as part of the IUGG General Assembly. During 2015, the ITS will organize publication of the proceedings of the 2013 ITS as a Topical Issue of Pure and Applied Geophysics journal (PAGEOPH), with working title "The 2004 Tsunami: Ten Years After", with Jose Borrero, Hermann Fritz, Eric Geist and Alexandar Rabinovich as editors.

Submitted by  
Phil Cummins, Tsunami Commission Secretary

## **Working Group 133: OceanScope** (Sponsors: IAPSO, SCOR)

[http://www.scor-int.org/Working\\_Groups/wg133.htm](http://www.scor-int.org/Working_Groups/wg133.htm)

### **INTRODUCTION AND ACTIVITIES**

The ocean is vastly under-observed, particularly below the ocean surface, where satellites cannot measure the ocean's properties. Observations below the surface depend on getting platforms (ships, moored buoys, floats, gliders, etc.) to locations far beyond the coasts, which can be expensive. Each of these technologies has their strengths and limitations, but where frequent repeat sampling is needed, commercial vessels have especial appeal because they traverse the same routes on a regular basis. As is well-known, the shipping industry has cooperated with the scientific community for more than 50 years to collect information on plankton community composition and distributions, meteorological measurements that are vital for weather forecasts, and measurements of water column heat content that are so useful for studies of climate variability. Ships have also been equipped with technology to measure currents directly, giving oceanographers a new and accurate handle on mass transport and its variability over time. These activities have given new important insights into the physics, chemistry and biology of the ocean that could not have been obtained by any other means. The time is ripe to explore the possibility of partnering with the merchant marine fleet to scale up these activities to institute a global ocean monitoring capability.

To address these possibilities, SCOR/IAPSO working group #133 was constituted with the objective of developing a road map for an expanded ocean observing capability in the future. Its final report (released March 2012) entitled "OceanScope" ([http://www.scor-int.org/Publications/OceanScope\\_Final\\_report.pdf](http://www.scor-int.org/Publications/OceanScope_Final_report.pdf)) proposes a partnership between the ocean observing communities and the maritime industries to provide the framework for an integrated interdisciplinary approach to monitoring the world ocean, and in so doing provide a fundamental contribution to the Global Ocean Observing System. The rationale is almost ridiculously simple: commercial ships have a presence on the high seas second to none and offer society a feasible and cost-effective opportunity to contribute to solving a serious observational deficiency. OceanScope is envisioned to operate as an independent international activity funded by member nations and private sources. Amongst its more important functions will be to serve as a single point of contact between the ocean-observing community and vessel operators, and to establish standardized methods and technologies. As recognition grows of what these "satellites orbiting at sea level" can contribute, it is intended that OceanScope provide the framework for the development new sensors and tools optimized specifically for commercial vessel operation, thereby further enhancing our ability to monitor the world ocean on a systematic basis.

### **FUTURE ACTIVITIES**

There have been numerous expressions of interest in OceanScope since the report's release in early 2012. While proposed concept has yet to be implemented in a formal sense, some version of OceanScope will likely be realized as the potential of OceanScope becomes more widely recognized. That is what the members of the OceanScope working group hope for. Industry is ready to partner when the ocean observing community is.

Submitted by  
Thomas Rossby, OceanScope Co-Chair

## **Working Group 136: On the Climatic Importance of the Greater Agulhas Current System**

*(Sponsors: SCOR, WCRP, IAPSO)*

[http://www.scor-int.org/Working\\_Groups/wg136.htm](http://www.scor-int.org/Working_Groups/wg136.htm)

Our Working Group terms of reference (TORs) are complete. We would like to take this opportunity to thank all our sponsors including SCOR, WCRP, IAPSO, IUGG, NOAA, NSF, Dutch institutes IMAU and NIOZ, ONR Global, IRD, and IOC Perth. Below is a list of our four TORs with a brief description of what we achieved.

### ***1. To facilitate collaborations between existing and planned studies of the region***

Our membership (Lisa Beal, Arne Biastoch, Meghan Cronin, Will de Ruijter, Juliet Hermes, Francis Marsac, Graham Quartly, Mike Roberts, Tomoki Tozuka, and Rainer Zahn) and associate membership was inclusive of all oceanographic disciplines and representative of many different countries. This resulted in many new scientific collaborations. In addition, through our second meeting in Mauritius joint with a DBCP workshop (Data Buoy Cooperation Panel), and our Chapman Conference in South Africa, we have developed a strong Agulhas community and improved links with regional partners in developing countries.

### ***2. Write a review paper on the climatic importance of the greater Agulhas***

Our review paper was accepted and published by Nature and currently has 86 citations.

Beal, L. M., W. P. M. de Ruijter, A. Biastoch, R. Zahn, and SCOR/IAPSO/WCRP Working Group 136 (2011), On the role of the Agulhas System in Ocean Circulation and Climate, *Nature*, 472, 429-436, doi:10.1038/nature09983.

### ***3. Science Plan for Sustained Observations in the Greater Agulhas System***

We developed a science plan which has subsequently been ratified by the CLIVAR Indian Ocean Panel to become part of the Global Ocean Observing System (GOOS/GCOS). The main elements of the plan are:

- ***A surface flux reference station.*** The Agulhas is a region of strong net heat loss from the ocean, which influences storm track development and rainfall over Africa. A reference station will provide in situ, high-resolution time series of episodic and long-term changes in regional climate and a means for improving and assessing errors in synthesis surface flux products. This would be the first such mooring in the Southern Hemisphere.
- ***A reference mooring in the Mozambique Channel.*** Flow through the Mozambique Channel is part of the global thermohaline circulation, linking inflow from the Pacific with the Agulhas Current. A decade of observations in the Channel (LOCO, INATEX) represent the only oceanic time series to exceed even one year in the region and have shown important changes linked to Indian Ocean Dipole events. A reference mooring (or two), in combination with satellite sea surface height data, can continue to provide information on decadal variability in the region.
- ***Monitoring array across the Agulhas Current.*** The volume, heat, and freshwater transports of the Agulhas provide a measure of the Indian Ocean gyre and overturning strengths, and are related to leakage fluxes into the Atlantic. Changes in Agulhas leakage have been implicated in past climate transitions, through influence on the Atlantic meridional overturning circulation. Sustained observations of the most significant Western Boundary Current in the Indian Ocean are a priority.

WG members Hermes, Beal, Roberts, and Ridderinkhof are collaborating to implement (3) through international resource-sharing and regional capacity building. A Memorandum of Agreement has been drafted.

**4. *Organize a Chapman Conference with participation of the African science community***

Our Chapman Conference was held 8-12 October 2012 in Stellenbosch, South Africa. It was the first of its kind on the African continent. Details of the conference program can be found at the AGU website: <http://www.agu.org/meetings/chapman/2012/ecall/index.php>. WG members raised \$95,000 towards conference costs and travel support for students and scientists from developing countries. The conference attracted 16 invited speakers, from Europe, the US, Japan, and Africa, and a total of 103 abstracts. The conference was opened by Dr. Gansen Pillay, Vice- President of the National Research Foundation in South Africa (NRF) and closed by AGU President Mike McPhaden. For a full report, see: de Ruijter, W., L. M. Beal, A. Biastoch, and R. Zahn, (2013) The Role of the Agulhas System in Regional and Global Climate, AGU Chapman Conference Report, Eos, Transactions American Geophysical Union, Volume 94, Issue 10, DOI: 10.1002/2013EO100005.

Submitted by  
Lisa Beal, SCOR/WCRP/IAPSO Working Group 136 Co-Chair  
Arne Biastoch, SCOR/WCRP/IAPSO Working Group 136 Co-Chair

# **Working Group on Electromagnetic Studies on Earthquakes and Volcanoes (EMSEV)**

*(Sponsors: IAGA, IASPEI, IAVCEI)*

*<http://www.emsev-iugg.org/emsev/>*

## **INTRODUCTION**

Since its foundation by IUGG in 2001, EMSEV Inter-Association on “Electromagnetic Studies of Earthquakes and Volcanoes” (<http://www.emsev-iugg.org/emsev/>) continuously develops new research and findings relating electromagnetic (EM) and other geophysical observations to the physics of the Earth, and volcanic and eruptive processes. By integrating electromagnetic methods with other geophysical techniques, EMSEV broadens the study of dynamical processes leading to fault rupture and volcanic eruptions.

EMSEV's objectives remain (i) the evaluation and the promotion of advanced studies in the electromagnetic field through international cooperation, conferences and regional workshops, as well as high levels international publications, (ii) the application of electromagnetic with other geophysical methods to the study of earthquakes and volcanic eruptions in developing or interested countries, (iii) the organization of international and regional workshops and the sponsorship of sessions at international meetings, and (iv) the participation to local educational programs.

## **ADMINISTRATION**

EMSEV is composed of a 4-years elected executive bureau, a nominated assembly of members and collaborators, EMSEV collaborators who are scientists contributing to EMSEV activities and working in Natural Hazards in any related field of research, and the community interested in electromagnetic phenomena, called corresponding members.

The new EMSEV collaborators body is very significant for the analysis of observations and understanding of physical processes from their respective analyzes.

Till IUGG-2015, the bureau is composed as follows. The Chairperson is J. Zlotnicki, the Vice-Chairperson is M.J.S. Johnston, and the Secretary is T. Nagao. IAGA, IAVCEI and IASPEI liaison members are J. Y. Liu, Y. Sasai, and M.J.S. Johnston, respectively, while IAGA WG1-2 corresponding liaison member is T. Harinarayana. Q. Huang (China), V. Lapenna (Italy), A. Meloni (Italy), V. Korepanov (Ukraine), and R. Singh (India-USA) are also bureau members. S. Uyeda is Past-Chairperson.

They are 32 working group members representing 16 different countries (China, France, Greece, India, Indonesia, Italy, Japan, Kyrgyzstan, Philippines, Poland, Romania, Russia, Taiwan, Turkey, Ukraine, and USA). All of them have great expertise in Natural Hazards and they exert a strong scientific activity in the EM field or in connected research fields.

EMSEV is now composed of more than 300 scientists who belong to IAGA, IAVCEI and IASPEI Associations. EMSEV is now attracting researchers of other disciplines of research for analyzing more accurately our new results.

During each biennial International EMSEV meeting, a large business meeting is held. Management of research, cooperation, activities, and new findings are widely discussed. This discussion gives rise to a rich list of new research prospects. Such last business meeting was held in 2012 during October EMSEV-2012 meeting at Gotemba, Japan (<http://www.emsev-iugg.org/2012program/index.html>). Similar business meeting will be held during the next EMSEV meeting in Warsaw, Poland (<http://emsev2014.cbk.waw.pl/>) in September 2014. Other business meetings are organized during General Assemblies (i.e. during 2013-IAVCEI General Assembly at Kagoshima, Japan ([http://www.iavcei2013.com/related\\_meetings/related\\_meetings.html](http://www.iavcei2013.com/related_meetings/related_meetings.html))).

Annual reports, minutes of the business meetings and activities on EMSEV Inter-Association can be found on EMSEV web site (<http://www.emsev-iugg.org/emsev/>).

## ACTIVITIES

In 2013, EMSEV was very active in: (i) a number important international meetings, and (ii) in promoting and implementing high level contributions to international cooperative studies.

### Meetings

A large number of sessions in international conferences were sponsored and organized by EMSEV members:

- EGU, April 7-12, 2013 (three sessions), Vienna, Austria
- IAVCEI General Assembly, July 20-24, 2013, Kagoshima, Japan
- AOGS, June 24-28, 2013, Brisbane, Australia
- AGU, December 9-13, 2013, San Francisco, USA
- Geophysical Observatories, GIS & Data Mining, Sept. 30-Oct. 2, 2013, Kaluga, Russia

### EMSEV activity on volcanoes

Since 2004, EMSEV and the Philippines Institute of Volcanology and Seismology (PHIVOLCS, <http://www.phivolcs.dost.gov.ph/>) tightly work together on the understanding of Taal volcano dynamism and on the monitoring of the activity by the means of electromagnetic and other geophysical methods. This is of critical importance since about 650,000 inhabitants are living in a radius of 20 km from the volcano summit.

At present, the cooperation involves a large international consortium with teams from Japan, France, USA, Greece, Italy, and Belgium. As far as possible, EMSEV and PHIVOLCS lead two field campaigns per year. The volcanic structure is now better known thanks to magnetic, self-potential, ground temperatures profiling, resistivity and magnetotelluric soundings, degassing mapping from the land and the Crater Lake. In addition, EMSEV has made a huge effort in installing real-time multi-parameters stations on the volcano. Four stations are now in operation recording electric and magnetic fields, tilt, seismic information and ground temperatures. The local observatory maintains the data acquisition system and takes care of daily data transfers to PHIVOLCS-headquarter and VEML servers (<http://www.phivolcs.dost.gov.ph/>, <http://virtual-electromagnetic-laboratory.com/etaal.html>). A JICA program has also supported the installation of 3 magnetic and electric stations. These data are recovered by satellite transmission (<http://vanpc02.iord.u-tokai.ac.jp/taalplot/>).

During the last three years, the Japanese team educated a Filipinos young scientist in magnetotelluric methods. This latter, P.A. Alanis, is to obtain his PhD degree in March 2014.

### EMSEV activity related to Earthquake Processes

Kyrgyzstan International Geophysical Centre (IGRC), located at Bishkek Research station and the Academy of Sciences (RAS) of Moscow are conducting active monitoring of underground electrical conductivity along the Kyrgyzstan range (42-43°N, 72-76°E) for more than thirty years. In particular, about 6 times a day, 600 A electric current is injected into the ground through a 4 km long electrical dipole. Residual electric signal can be received up to 70 km away. Observations show that (i) resistivity changes of a few per cent may be observed before EQs of magnitude above 4, (ii) a reduction in overall seismicity appears to result when increased small magnitude EQs were induced by the current system, and (iii) large injected currents generate an increase of low magnitude EQs during the days following injection.

In 2011, EMSEV and Bishkek Research station decided to focus more deeply on this experiment and on the natural and induced electromagnetic signals which may appear along the ridge.

During the Kick-off meeting held at the station on October 8 to 12, 2011, EMSEV and IGRC decided to ([http://www.gdirc.ru/en/index.php?option=com\\_content&view=article&id=16:-emsev-&catid=1:latest-news&Itemid=50](http://www.gdirc.ru/en/index.php?option=com_content&view=article&id=16:-emsev-&catid=1:latest-news&Itemid=50)) focus research on several important topics: (i) detection of signals possibly related to tectonic activity, (ii) independent evaluation of Seimo-Electric signals and comparison with results obtained in Greece, (iii) triggering effects of electric current injection and magnetic storms, and (iv) anisotropy of propagation of the electric signals through the faults system.



A 4-year agreement of cooperation between IGRC and EMSEV was signed in October 2011. Japanese and French passive EM stations (sampled at 100 Hz and 40 Hz, respectively) were installed at new field sites, 40 and 30 km away from the current system used by Kyrgyz colleagues. Since then, joint data processing systems are implemented.

The first data issued from the collaboration were shown at the 2012 EMSEV meeting. Huge amount of data are recorded, and, most importantly, signal to noise is good. Data are now being processed.

In March 2014, a workshop in Toulouse, France will gather teams involved in the cooperation, and detail analysis will be performed. In June 2014, Japanese and French team will benefit from the international symposium on “PROBLEMS OF GEODYNAMICS AND GEOECOLOGY OF INTRACONTINENTAL OROGENS” at Bishkek Research station for upgrading the stations, and implementing new experiments. Results will be presented at the 2014-EMSEV international meeting.

#### **PLANNED FUTURE ACTIVITIES**

In 2014, in addition to the management of sessions at imperative international meetings, as EGU, AOGS, and AGU, EMSEV will mainly organize a workshop on “Fundamental problems on the earthquake generation processes and the way to monitor them for hazard mitigation” in Toulouse, France (25-29 March, <http://www.emsev-iugg.org/emsev/page027.html>), and the 2014 international EMSEV meeting in Warsaw, Poland (22-26 September, <http://emsev2014.cbk.waw.pl/>). In 2014, EMSEV will continue to maintain a high level of collaboration in the Philippines on Taal volcano, and also will emphasize the cooperation on the relationships between earthquakes and EM signals with the Bishkek Research station in Kyrgyzstan.

Submitted by  
Jacques Zlotnicki, EMSEV Chair

# **VLF/ELF Remote Sensing of the Ionosphere and Magnetosphere (VERSIM)**

*(Sponsors: IAGA, URSI)*

<http://www.physics.otago.ac.nz/versim/>

## **INTRODUCTION**

VERSIM is an international group of scientists interested in studying the behavior of the magnetosphere and ionosphere by means of Extremely Low Frequency (300 Hz - 3 kHz) and Very Low Frequency (3-30 kHz) radio waves, both naturally and artificially generated.

## **ACTIVITIES**

Since we last reported (at the IUGG meeting in Melbourne in 2011) the VERSIM working group has:

- joined together for the 5th VERSIM workshop: São Paulo, Brazil, September 2012.
- provided information on VERSIM for the IAGA webpage.
- produced our yearly newsletter (20 research group reports from 17 countries).
- worked on a submission to the next SCOSTEP 5-year plan.
- prepared multiple sessions for the IAGA meeting in Merida, Mexico, August 2013.
- recently met for the 6th VERSIM workshop: Dunedin, New Zealand, Jan. 2013.
- the IUGG co-chair (Prof. Craig Rodger) stepped down after 10 dedicated years of service and was replaced by Dr. Jacob Bortnik. The URSI co-chair (Prof. Janos Lichtenberger) remains in his current role.

## **FUTURE ACTIVITIES**

The VERSIM group continues to enjoy robust levels of interest, particularly in light of the various international missions and projects that have come on-line in the past few years (including THEMIS, BARRELL, and Van Allen Probes). We are now planning our next meeting, which will be held in either India or South Africa. A goal of the new co-chair is to revamp the VERSIM website, and focus the community on producing a set of materials or resources for beginning students (or scientists) that delineate the basic knowledge required of a ELF/VLF radio-scientist.

Submitted by  
Jacob Bortnik, IUGG Co-Chair of VERSIM

# ACTIVITIES OF THE UNION STANDING COMMITTEES

## Committee on Capacity Building and Education

### INTRODUCTION

(including the Committee Terms of Reference)

The Committee was formed by the decision of the IUGG Executive Committee meeting held on 9-11 October 2009 in Melbourne (Australia) to

- examine current issues in science education and research on learning and disseminate knowledge about it.
- be in charge of the science education policy of the Union (e.g. K-12 level, university level, other);
- assist the Union officers in defining new fellowships and grants programs.
- identify funding sources for fellowships and grants.
- advocate, in partnership with other ICSU Unions and geophysical societies, for increased teaching of the geosciences in classrooms worldwide.
- be responsible for cooperation and exchange (via workshops, seminars, symposia, conferences) and collaborative programs and interdisciplinary projects (especially in the developing world) and for technology transfer issues.

The Committee members were selected on the principle of geographical and disciplinary balance. Chair:

Laszlo Szarka (HUNGARY), Members: Nasser Abou-Ashour (EGYPT), Tomas Halenka (CZECH REPUBLIC), Jadwiga Anna Jarzyna (POLAND), Shichang Kang (CHINA), José Sellés Martínez (ARGENTINA), Gerhard Navratil (AUSTRIA), Kathy Whaler (UK)

The communication among the members has been restricted to emails. Besides a few bilateral discussions, no “official” committee meeting could be organized.

### ACTIVITIES

(2010-2012)

The Committee discussed (by emails) all documents obtained from the Secretary General of IUGG:

- Draft Report of the ICSU Ad Hoc Review Panel on Science Education (version of 6 December 2010)
- List of ICTP geophysical educational program proposals for IUGG sponsorship
  - The proposals for 2012 (at the end of 2011)
  - The proposals for 2013 (at the end of 2012)

The ideas of the Committee members about the ToR were collected in 2010, but most of them remained ideas. At the same time, Committee members – as members or office-holders at their associations – have participated in planning, organizing and realizing various capacity building and educational programmes in their specific field of interest. For example, IAGA organises Summer School, Workshops run usually by the Working Groups. IAVCEI produces extremely interesting information on their website about volcanos to the broad society (e.g. the Statement on the Eyjafjallajökull eruption). In 2011, IACS contributed in the publication of the “Glossary of Glacier Mass Balance and Related Terms”.

There are plenty of available materials, and the associations are relatively active in this respect. It is a fact that capacity building and education activities of the Associations are isolated from each other. We did not succeed to make any breakthrough on IUGG level.

## **SOME THOUGHTS ABOUT HOW THE COMMITTEE'S WORK COULD BE IMPROVED AND WHAT ISN REQUIRED FOR THAT**

### **Strategic suggestions**

Considering the present situation (i.e. many valuable activities on Association levels, but isolated from each other), I recommend for the new Committee to focus in the new period on the Future Earth programme of ICSU, which will need an effective interdisciplinary collaboration, accompanied with an increased capacity building and education. It could be a common objective, a common framework not only for all IUGG associations, but also for IUGS, etc. The Future Earth programme will promote to put together a lot of mosaic-like knowledge from different disciplines.

The over-simplified climate change approach has led to ignorance of several simple, but more important factors than the CO<sub>2</sub> emission itself. Namely, that mankind requires more and more energy and materials from our finite planet, such as freshwater, raw materials, soil, and we occupy more and more land surface. All these activities have direct and multidimensional consequences in the long term: depletion of resources and saturation of sinks. Various environmental indicators, such as chemical pollution, change in geochemical global cycles, biodiversity loss, are due to the ever-increasing human activity. Climate change is merely one of many possible environmental indicators, and the main problem with it is that it is not exclusively of man-made origin. Therefore, instead of focusing on climate change, it would be advisable to turn our attention to much more burning environmental issues. The Future Earth programme seems to be a good opportunity for such a more complex approach.

It would be really important to co-operate with IUGS and International Geoscience Education Organization (<http://www.geoscienced.org/>). IUGG could perhaps back the International Earth Science Olympiad, the major initiative of IGEO, and encourage national IUGG bodies to translate the many existing materials produced by experts in science and science education.

### **Technical suggestions**

A personal meeting among the members at least at the start of the four-years term would be very important. It would be a good idea to renew the committee at the IUGG general assemblies, where the members can be selected from among the delegates. As the date of completion of mandate of the new Committee (to be nominated probably in autumn 2013), I would recommend 2015, the date of the Prague General Assembly.

Submitted by  
László Szarka, Capacity Building and Education Committee Chair

# Honors and Recognition Committee

## INTRODUCTION

The Honors and Recognition Committee is created to

- develop IUGG Fellows, Medals and Awards programs and maintain oversight of the programs;
- recommend changes to the policies in order to enhance the effectiveness of the IUGG honors and recognition programs;
- assure that the objectives of the medals and awards are well defined;
- review the procedures for the nomination and selection of Fellows, medalists and awardees;
- make recommendations to assure that sufficient and appropriate nominations for the Fellows, Medals and Awards are received; assure that the Union medals and awards are appropriate and current;
- review proposals for new recognitions and suggest other recognition possibilities;
- assure that IUGG scientists are nominated for appropriate external awards; and
- search for fund-raising opportunities for the Union honors and recognition programs.

The operation of the Honors and Recognition Committee is directed on increase of scientific authority of members of IUGG associations and stimulation of their activity.

## ACTIVITIES

(2010-2012)

The three following award proposals were developed in 2011-2012: (i) IUGG Medals (to be named after Vladimir Belousov or Sydney Chapman, both former IUGG Presidents), (ii) IUGG Honorary Membership, and (iii) the IUGG Best Young Researcher Award.

The medals and IUGG honorary membership dedicate to most experienced scientists in the field of geodesy and geophysics not especially to veterans but also to relatively young personas. The common requirement for nominees is 10 year scientific activity or more in these cases. The nominee of the IUGG best young researcher should not be older than 40 years. The following procedures and requirements were developed for implementation of the awards: award application procedure and requirements; award criteria, and assessment criteria. The formulation of procedures, requirements and criteria were done collectively by all members of Honors and Recognition Committee. Some active members of the Russian National Geophysical Committee have rendered the kind help in the task solution.

## Comments

- The youngest researchers have not an opportunity to be nominated on any IUGG awards destined to the only PhD owners. Probably it will better to propose the special price for the best bachelor, master, and/or PhD diploma/thesis or the best article by a young scientist. It will stimulate young researcher inflow into international activity in the frame of IUGG.
- Maybe a slight enhance by a few active members into Honors and Recognition Committee will help to improve the work on future award and honor development.

Submitted by  
Victor Savinych, Honors and Recognition Committee Chair

## Visioning Committee

The IUGG Visioning Committee was formed by the decision of the IUGG Executive Committee meeting held on 9-11 October 2009 in Melbourne (Australia) to

- manage a visioning process and prepare the vision plan with placing a particular emphasis to (i) grant challenges in geophysics and geodesy, (ii) involvements of young scientists and women in the Union activity, and (iii) relationship with external organizations, media and industry;
- study the ways in which IUGG operates and formulate ideas on improvement of IUGG activities and structures and on new ways of operations;
- examine (i) how IUGG science interacts with other geoscience disciplines, (ii) how IUGG science is relevant to societal needs, (iii) how to present IUGG to the rest of the world; and (iv) how IUGG can be involved in a decision-making process without losing its scientific rigour;
- develop IUGG strategic plans based on inputs from Union Associations and National Members; and
- prepare and revise IUGG major statements (e.g. vision, mission, goals, objectives, values etc.) and IUGG special statements on the scientific topics related to society (e.g. natural hazards, climate change, geoscience & geotechnology , etc).

The following members of the Committee were nominated: Eigil Friis-Christensen (EFC) and Harsh Gupta (HG). Eigil Friis-Christensen accepted the proposal by Tom Beer (TB) to lead the committee. There was some discussion about the membership of this committee, in particular the importance of involving young and women scientist in this work was emphasized. The initial suggestion by EFC - triggered by the discussion at the EC meeting - was to form a committee of young scientists from outside the current bureaus or executive committees. In order to ensure a disciplinary balanced committee EFC initiated discussions with the Association Presidents regarding proposals for young scientists and received some suggestions. The original idea was to form a committee with one young representative from each Association plus HG and EFC as the senior members in this process.

However it was also felt that the National Committees for IUGG should be given the opportunity to suggest nominations. The IUGG SG solicited such from the National Delegates. In March 2010 only three nominations from two member countries had been received from the National Delegates. TB subsequently invited one candidate from each country and in June 2010 TB received a positive response from Prof. Alexei Gvishiani (AG), whereas the acceptance from Prof. Zhengfu Guo (ZG) did not appear until October 2010, due to lost e-mails.

In order to start the work among the young scientists, however, TB and EFC agreed to continue with a double approach, namely a senior Visioning Committee consisting of HG, EFC, AG, and ZG and an Advisory Group of Young Scientists (AGYS), appointed by the Chair. For this effort it was finally decided to use HG's list of the nominations from the IUGG Associations for the Inter- Association Symposium on Early Career Scientists, which became available in May 2010. Positive responses from all were received during the summer of 2010, and initial work was in preparation after the Summer, assuming a positive response from Prof. Zhengfu Guo. In June 2010 HG, however, due to several other responsibilities with IUGG indicated a wish to withdraw from the Committee and TB decided to replace him in the committee, which therefore comprised the following.

Chair:	Eigil Friis-Christensen	DENMARK
Members:	Tom Beer ( <i>ex officio</i> )	AUSTRALIA
	Zhengfu Guo	CHINA
	Alexei Gvishiani	RUSSIA

Due to the delay in establishing the committee, however, the Bureau at its meeting in October 2010 felt that the scope of the committee's terms of reference were too wide and that some guidance in narrowing them down might be appropriate. The suggestion was thus that the committee should review the recent AGU Strategy Report and determine how it applies to IUGG. The Bureau was also very keen to use the Young People as a Forum to outline future directions for IUGG.

The AGYS accepted to continue the task according to the new guidelines from the Bureau. The details are described in the attached report of the result of the AGUS task but basically the idea was to rate the AGU vision statements in the framework of how IUGG is perceived among its scientists.

As it is evident from the response there is some spreading regarding the view on the priorities but a majority felt that 10 of the AGU vision statements could equally well be regarded as vision statements for IUGG. Those that did not seem appropriate for IUGG were number 6, 9, 10, and 12, all of which relate to the interaction with the surrounding society. But even for those some felt that it should be included in the vision statements for IUGG. Further discussion is probably needed to define if some extra effort – possibly at the expense of other issues, should be put into this. Since the visibility of IUGG seems to be regarded very important it is evidently a way forward to further emphasize these issues. On the other hand, from the additional comments from the AGYS members as listed in the attached report, it is evident that IUGG, in particular through its very strong Associations, does possess some unique possibilities that can be explored.

During the IUGG General Assembly in 2011 a draft report of the results was sent to the members of the Visioning Committee with a copy to the SG and to the candidates for the IUGG presidency, Harsh Gupta and David Jackson.

Although the response from AGYS is not unique, it contains some general statements worth reflection in a broader, political context within the IUGG Bureau. In my opinion such reflections regarding the comparison with the AGU vision statements should result in new guidelines for the next step regarding the work in the committee. In this context it should also be considered whether the current committee membership is adequate for the next phase or whether a change in the composition and/or extent is wanted.

Submitted by  
Eigil Friis-Christensen, Visioning Committee Chair



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

*<http://sclilp.gfz-potsdam.de>*

### **ABSTRACT**

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. Charged with promoting multidisciplinary research projects of interest to both the geological and geophysical communities, ILP seeks to achieve a fine balance between: “addressing societal needs” and “satisfying scientific curiosity”. According to the Terms of Reference published 2008 and renewed 2011 ILP is a body of IUGG and IUGS. The Task Forces and Coordinating Committees of ILP address aspects of the geoscience of global change, of contemporary dynamics and deep processes and of the continental and the oceanic lithosphere.

In 2013 a business meeting of ILP was held during the EGU GA in Vienna, Austria, 8 April and attended by most of the PIs in ILP as well as by guests from IUGS and IUGG. A bureau meeting of ILP was held on the occasion of the AGU GA in San Francisco, USA, 10th December, where current activities and future plans were discussed. Also the ILP SG reported on ongoing activities of the network at the IUGS EC meeting in Paris, France 19-21 February and at the IUGG EC meeting in Prague, Czech Republic, 21-23 September. The active Task Forces and Coordinating Committees have (co)organized 6 sessions at the EGU GA in Vienna and 7 sessions at AGU GA in San Francisco. Moreover, most of the Task Forces and Coordinating Committees organized thematic workshops and a strong presence of ILP members at numerous other international conferences can be reported. The international and interdisciplinary cooperation of the ILP network is documented by a significant number of ISI publications, many of them organized in thematic special volumes of leading scientific journals. ILP seed money was successfully used to raise funding for research in several large projects.

### **INTRODUCTION**

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 and geophysical communities. The ILP seeks to achieve a fine balance between: “addressing societal needs”, e.g. understanding natural catastrophes and other solid earth processes that affect the biosphere, providing information for improved resource exploration and environmental protection; and “satisfying scientific curiosity”. The ILP was established in 1980 by the International Council of Scientific Unions (ICSU) at the request of the International Union of Geological Sciences (IUGS) and the International Union of Geodesy and Geophysics (IUGG). According to the Terms of Reference published in 2008 and renewed in 2011 ILP is a body of IUGG and IUGS. ILP cooperates with IUGS and IUGG on the follow-up initiatives to the International Year of Planet Earth (IYPE); the ILP President was a member of the board of IYPE Corporation. In this context ILP was leading the IYPE theme Deep Earth, published in a special brochure and, in addition, is financially supporting IYPE. Now ILP takes again part in the forefront of development of new solid earth initiatives in research and its disseminations.



## **Task Forces & Coordinating Committees in the realm of major ILP themes:**

### I. Geoscience of global change

- TF 3: Bridging the gap from microseismicity to large earthquakes
- TF 10: The Unconventionals

### II. Contemporary dynamics and deep processes

- TF 4: Continental Collisional Orogens: from Atomic Scales to Mountain Building
- TF 9: DISC - Deep Into the Subduction Channel
- TF 11: Lithosphere dynamics: from models to data

### III. Continental lithosphere

- TF 1: CALE - Circum Arctic Lithosphere Evolution
- TF 2: Volcanoes and society: environment, health and public outreach
- TF 3: Bridging the gap from microseismicity to large earthquakes
- TF 4: Continental Collisional Orogens: from Atomic Scales to Mountain Buildings
- TF 5: LAPBOX - The lithosphere-asthenosphere boundary depth paradox
- TF 6: Sedimentary Basins
- TF 7: 3D Geomechanical modelling of geodynamic processes in the lithosphere

### IV. Oceanic lithosphere

- TF 1: CALE - Circum Arctic Lithosphere Evolution

### Coordinating Committees:

- TOPO-EUROPE
- ICDP
- MEDYNA - Mantle Dynamics and Plate Architecture Beneath North Africa

## **ADMINISTRATION**

ILP has an international Bureau with members from several countries that meet annually to monitor the progress and to select new research programs and activities in close consultation with the representatives of National Committees. The Bureau is chaired by the President with support from the Secretary General.

The Bureau was restructured in the course of 2013. The former Secretary General R. Oberhänsli has been elected as president of the IUGS and is now the representative of IUGS in the Bureau. In January 2013, M. Scheck-Wenderoth was appointed as new secretary general of ILP.

### **Bureau Members**

According to the LP Terms of Reference (clause 12), “the ILP is administered by a Bureau of seven members. These include the President and the Secretary General, who are named by agreement between IUGG and IUGS; two members appointed by IUGG; two appointed by IUGS; and one member appointed jointly by IUGG and IUGS. At least one Bureau member will normally represent a developing country. The Past President may attend meetings with voice but without vote. In addition, the National Members may elect a representative invited to attend ILP Bureau meetings with voice but without vote, although they may choose to elect a regular member of the Bureau to represent their interests.” 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

The ILP Secretariat is located in the German Research Centre for Geosciences in Potsdam, Germany (GFZ-Potsdam) and is headed by the Executive Secretary A. Rudloff (Germany)

ILP has several types of membership: Associate, Lifetime, and Honorary.

Associate Members:	J.-P. Burg	Switzerland
	H. Thybo	Denmark
	A. Morozov	Russia
	F. Roure	France
	M. Zoback	USA
	P. Mc Keever	UNESCO
Lifetime Members:	M. von Knorring	Sweden
	H. Gupta	India
Honorary President	A. Green	Switzerland
ILP Fellow	J.F.W. Negendank	Germany

### **Business meeting of ILP, Vienna, Austria, 8th April 2013**

The annual business meeting was held on the occasion of the EGU General Assembly and attended by most of the PIs in ILP as well as by guests from IUGS and IUGG. A short report has been given on the activities of all active Task Forces and Coordinating Committees, on current and planned activities. The guests informed the attendants about new developments in IUGG and IUGS. The E. P. Flynn-Award has been presented. The minutes were distributed among the Bureau Members and are available on request.

### **IUGS Executive Committee (EC) meeting in Paris, France 19-21 February 2013**

The SG of ILP attended the IUGS EC meeting as observer and reported on the current activities in ILP. The IUGS EC decided to increase the yearly funding of ILP to the same amount as provided by IUGG (15,000 \$ per year.)

### **IUGG Executive Committee (EC) meeting in Prague, Czech Republic, 21-23 September 2013**

The SG of ILP attended the IUGG EC meeting as observer and reported on the current activities in ILP. It was agreed that ILP will actively contribute to the program of the IUGG General Assembly that will take place 2015 in Prague

### **Bureau meeting of ILP, San Francisco, USA, 10th December 2013**

The annual bureau meeting was held on the occasion of the AGU General Assembly. The President and secretary general informed the attendants about current and planned activities of all active Task Forces and Coordinating Committees. After discussion of three new task force proposals a new Task Force 11 on Lithosphere dynamics has been established and future activities have been planned. The minutes were distributed among the Bureau Members and are available on request.

## **ACTIVITIES**

Full activity reports of Task Forces (TF) and Coordinating Committees (CC) are available on request.

### **Contributions to international meetings**

EGU General Assembly, Vienna, Austria, April 2013

- TF 2: Volcanoes: Tectonics, Deformation, Geodesy (GMPV36/TS3.4.), Conveners: V. Acocella, G. Puglisi, et al. The mechanics of volcanic and sub-volcanic systems: modelling, experiments and field observations. (GMPV30/NH2.2/TS3.5), Conveners: O. Galland, S. Burchardt, M. Kervyn, G. Gisler, E. Holohan.
- TF 5: Structure of the continental upper mantle, Conveners: U. Achauer and J. Plomerova et al.

- TF 6: Fluids-rocks-tectonics interactions in basins and orogens, and feed-back with geodynamics (TS2.5/GD2.8), Conveners: O. Lacombe, R. Swennen, M. Scheck-Wenderoth, et al.
- TF 9: Nature and physical properties of the plate interface in subduction zones: Cross-disciplinary views from Geodynamics-Geochemistry-Seismology-Modeling (TS6.6/GD5.6/GMPV20/SM5.3), Conveners: P. Agard, O. Oncken, T. Gerya, et al.
- CC TOPO-EUROPE: Coupled deep earth - surface processes, and their role in shaping Europe's topography (TS4.8/GM3.8), Conveners: S. Cloetingh, S. Willet et al.

AGU Fall Meeting, San Francisco, USA, December 2013

- TF 1: T11E: Circum-Arctic Lithospheric Evolution. Conveners: V. Pease, E. Miller  
Annual meeting of all regional teams.
- TF 2: ED023, Global Partnerships in Geoheritage and Improved Earth Science Literacy. Conveners: E. Vye, W. Rose, B. Van Wyk de Vries, C. Olive-Garcia.  
V13E. V13E. Mechanisms of Magma Ascent and Emplacement. Conveners: B. Taisne, V. Acocella, N. Le Corvec, G. Carazzo.  
V23C. V23C. Volcanic Flows, Blows and the Atmosphere: Effusive-Explosive Eruption Dynamics and Ash Cloud Processes. Conveners: K. Befus, B. Andrews, et al.  
V43B. V43B. Assessing Volcanic Processes Through Novel Monitoring Approaches. Conveners: S. Carn, B. Andrews.  
Experimental Modeling of Volcanic and Magmatic Processes II, Conveners: B. Taisne, E. Llewellyn, T. Menand, V. Acocella.
- TF 4: T12 & T20. Deformation processes: microstructure, rheology and the effects of fluids. Conveners: K. Michibayashi, H. Jung, J. Zhang, J. Warren, V. Le Roux, et al.

#### **Other International meetings and activities**

- TF1: Stanford University, California, USA, January 2013: Team C (Bering Strait);  
Halifax, Nova Scotia, Canada, March 2013: CALE Team A (Greenland & Ellesmere Island) and Team B (Arctic Canada);  
St. Petersburg, Russia, April 2013: Supergroup Teams E, F, & G (Taimyr, Timan, and N. Atlantic teams).
- TF2: IAVCEI 2013, Japan, Sessions 3C, 3D and 4 H.
- TF3: Seismological Society of America (SSA), Salt Lake City 2013;  
2nd ILP-Liebenberg Workshop: From Microseismicity to Large Earthquakes.
- TF4: China Geological Society and American Geological Society Joint meeting: "Roof of the World"; 17-19 June 2013, Chengdu, China, Session B-2;  
International Eclogitic Conference, Courmayer, Italy, 3-7 September 2013;  
Chukurova University, Adana, Turkey, 22-25 October 2013.
- TF5: Invited lecture at the BASALT 2013 meeting in Görlitz, Germany: "What is the lithosphere-asthenosphere boundary? – a quest for information";  
Two day symposium on the lithosphere-asthenosphere system at the College de France, 19-20 November 2013.
- TF6: 8th workshop of the Task Force on Sedimentary Basins: Lithosphere dynamics and sedimentary basins: The circum-Mediterranean Basins and analogues. Marseille, France, 14-18 October 2013.
- TF9: Invited talks at  
Goldschmidt Conference, Florence, Italy, August 2013;  
AGU Fall Meeting 2013, (P. Agard, / Into the subduction interface).
- TF10:  
AAPG, AAPG Hedberg;  
EAGE-European Unconventional Resources Conference & Exhibition;  
BBSPA Kiew Upstream & Investments Workshop;  
GEO2012 Middle East Geoscience Conference and Exhibition;  
World Shale Gas Asia, July 2012, Singapore.

- CC-TOPO Europe  
TOPO-EUROPE meeting Heidelberg, 6-8 June 2013;  
TOPO-EUROPE meeting Sienna, 9-11 October 2013, CC-TOPO Europe;  
Completion of the ESF EUROCORES TOPO-EUROPE, CC-TOPO Europe.
- CC-ICDP: ICDP Science Conference 2013, Potsdam, Germany 11-14 November 2013.



*Task Force 3 organized the 2nd Liebenberg workshop on Natural and Induced (Micro) Seismicity with task force chair Marco Bohnhoff (2<sup>nd</sup> from left front row) (photo: M. Bohnhoff).*



*Field trip with local organizers Juliette Lamarche and Marc Floquet at the 8<sup>th</sup> workshop of Task Force 6: Lithosphere dynamics and sedimentary basins: The circum-Mediterranean Basins and analogues, 14-18 October 2013 Marseille (photo: A M. Przybycin).*

## Most important publications 2013

- TF 1:  
Beranek, L.P., Pease, et al.: Detrital zircon geochronology of Ediacaran to Cambrian deep-water strata of the Franklinian basin, northern Ellesmere Island, Nunavut: implications for regional stratigraphic correlations. *Canad. Journ. of Earth Sciences*, 50, 1007-1018.  
Hegewald, A., Jokat, W.: Tectonic and sedimentary structures in the northern Chukchi region, Arctic Ocean. *Journal of Geophysical Research: Solid Earth*, 118, 3285-3296, doi:10.1002/jgrb.50282.  
Jokat, W., Ickrath, M., et al.: Seismic transect across the Lomonosov and Mendeleev Ridges: Constraints on the geological evolution of the Amerasia Basin. *Geophys. Res. Letters*, 40, 5047-5051.  
Marello, L., Ebbing, J., et al: Basement inhomogeneities and crustal setting in the Barents Sea from a combined 3D gravity and magnetic model. *Geophysical Journal International*, 193, 557-584.
- TF 2:  
Tibaldi A., F.L. Bonali, et al.: Structure of regional dykes and local cone sheets in the Midhyrna-Lysuskard area, Snaefellsnes Peninsula (NW Iceland). *Bull. Volcanol.*, 75, 764.  
Schaefer L.N., T. Oommen, et al: An integrated field-numerical approach to assess slope stability hazards at volcanoes: the example of Pacaya, Guatemala. *Bull. Volcanol.*, 75, 720.  
Croce A., M. Musa, et al.: Micro-Raman spectroscopy identifies crocidolite and erionite fibers in tissue sections. *J. Raman Spectroscopy*, 44, 10, 1440-1445.  
Dogan, A.U., Peate D.W., Dogan M., et al., 2013: Petrogenesis of mafic-silicic lavas at Mt. Erciyes, central Anatolia, Turkey. *J. Volcanol. Geoth. Res.*, 256, 16-28.
- TF 3:  
Bohnhoff, M., Bulut, F., Dresen, G., Malin, P.E., Eken, T., Aktar, M.: An earthquake gap south of Istanbul. *Nature Commun.*, 4:1999, doi: 10.1038/ncomms2999.  
Ickrath, M., Bohnhoff, M., Bulut, F., Dresen, G., Stress rotation and recovery in conjunction with the 1999 Izmit Mw7.4 earthquake. *Geophys. J. Int.*, doi: 10.1093/gji/ggt409.  
Kwiatek, G. Bulut, F., Bohnhoff, M., Dresen, G.: High-resolution analysis of seismicity induced at Berlin geothermal field, El Salvador. *Geothermics*, doi:10.1016/j.geothermics.  
Martinez-Garzon. P., Bohnhoff, M., Kwiatek, G., Dresen, G.: Stress tensor changes related to fluid injection at The Geysers Geothermal Field, California. *Geophys. Res. Lett.*, 40, 2596-2601.
- TF 4:  
Dobrzhinetskaya, L.F., Wirth, R., et al.: Qingsongite, IMA 2013-030. CNMNC Newsletter No. 16, August 2013, page 2708. *Mineralogical Magazine*, 77, 2695-2709, 2013.  
Kvasnitsya, V. With, R. et al: New evidence of meteoritic origin of the Tunguska cosmic body. *Planetary and Space Science*, 84, 131-140, 2013.  
Zhang J.F., Shi, F., et al.: Petrofabric and strength of SiO<sub>2</sub> near the quartz-coesite phase boundary. *Journal of Metamorphic Geology*, 31: 83-92, 2013.  
Wang, Y.F., Zhanget al.: The origin and geophysical implications of a weak C-type olivine fabric in the Xugou ultra-high pressure garnet peridotite. *Earth and Planetary Science Letters*, 376, 63-73.
- TF 5:  
Babuska V., Plomerova J.: Boundaries of mantle-lithosphere domains in the Bohemian Massif as extinct exhumation channels for high-pressure rocks. *Gondwana Res.* 23, 973-987.  
Munzarová, H., Plomerová, J. et al.: Upper-mantle fabrics beneath the Northern Apennines revealed by seismic anisotropy. *Geochem. Geophys. Geosyst. (G3)*, 14, 1156-1181.  
Karousová, H., Plomerová J., et al.: Upper mantle structure beneath the southern Bohemian Massif and its surroundings imaged by high-resolution tomography. *Geophys. J. Inter.*, 194 (2): 1203-1215.
- TF 6:  
Gauillier V., Basile C., Roure F. and Scheck-Wenderoth M., 2013: An introduction to the Tectonophysics special issue "Basin dynamics". Special Issue, Editorial, *Tectonophysics*, 591.  
Roure F., Scheck-Wenderoth M., Matenco L., Muska K. and Nazai S.: Dynamics and active processes: The Albanian natural laboratory and analogues. Special issue, Editorial, *Ital. J. Geosc.*, 132.  
Scheck-Wenderoth M., Roure F., Bunge H.P. and Glassmacher U.: Progress in understanding the South Atlantic margins. Special issue, Editorial, *Tectonophysics*, 604.

- TF 7:  
Bedford, J., Moreno, M., et al.: A high-resolution, time-variable afterslip model for the 2010 Maule Mw=8.8, Chile megathrust earthquake. *Earth and Planet. Sc. Lett.*, Vol. 383, 26-36.  
Martínez-Garzón, P., Bohnhoff, et al.: Stress tensor changes relate to fluid injection at The Geysers geothermal field, California. *Geophys. Res. Lett.*, 118(1-6).  
Zang, A., Yoon, J.-S. et al.: Fatigue hydraulic fracturing by cyclic reservoir treatment enhances permeability and reduces induced seismicity. *Geophys. J. Int.*, doi: 10.1093/gji/ggt1301.  
Zarif, Z., Nilfouroushan, et al.: Crustal Stress Map of Iran: Insight From Seismic and Geodetic Computations. *Pure and Appl. Geophys.*, doi: 10.1007/s00024-00013-00711-00029.
- TF 9:  
Agard P., Vitale-Brovarone A.: Thermal regime of continental subduction: the record from exhumed HP-LT terranes (New Caledonia, Oman, Corsica). *Tectonophysics*, 601, 206-215.  
Plunder A., Agard P., et al.: Geodynamics from the Tavsanlı zone, western Turkey: insights into subduction/obduction processes. *Tectonophysics*, doi:10.1016/j.tecto.2013.07.28.  
van Dinther Y, Gerya T.V., et al.: The seismic cycle at subduction thrusts: insights from seismo-thermo-mechanical models, *Journal of Geophysical Research*.
- TF 10  
Hübner, A., Horsfield, B. Kapp, I.: Fact-based communication: the Shale Gas Information Platform. *Environ Earth Sci.*, 70: 3921–3925.  
Klaver, J., Desbois, G., et al.: BIM-SEM study of the pore space morphology in early mature Posidonia Shale from the Hils area, Germany. *International Journal of Coal Geology*, 103, 12-25.  
Rexer, T.F.T., Benham, M.J., et al.: Methane adsorption on shale under simulated geological temperature and pressure conditions. *Energy & Fuels*, 27 (6), 3099–3109, DOI: 10.1021/ef400381v.  
Rippen, D., Littke, R., et al.: Organic geochemistry and petrography of Lower Cretaceous Wealden black shales of the Lower Saxony Basin: The transition from lacustrine oil shales to gas shales. *Org. Geochem.*, 63, 18-36.
- CC TOPO-EUROPE  
Cloetingh, S; Willett, S.; Torsvik, T.; Werner, S.: ‘‘TOPO-EUROPE III’’, *Tectonophysics*, 602.  
Cloetingh, S., Willett S.: Linking Deep Earth and Surface Processes, *Eos Trans. AGU*, 94(5), 53.  
Matenco, L; Andriessen, P.: From Source to Sink - Quantifying the mass transfer from mountain ranges to sedimentary basins. *Global and Planetary Change*, 103, 1-260.
- CC MEDYNA  
Hidas, K.; Garrido, et al.: Strain Localization in Pyroxenite by Reaction-Enhanced Softening in the Shallow Subcontinental Lithospheric Mantle. *Journal of Petrology*, 54, 10, 1997-2031.  
Marchesi, C.; Garrido, et al.: Platinum-group elements, S, Se and Cu in highly depleted abyssal peridotites from the Mid-Atlantic Ocean Ridge (ODP Hole 1274A): Influence of hydrothermal and magmatic processes. *Contributions to Mineralogy and Petrology*, 166, 5, 1521-1538.  
Precigout, J.; et al.: Deformation and exhumation of the Ronda peridotite (Spain). *Tectonics*, 32, 4, 1011-1025.

## FUTURE ACTIVITIES

- Publications of several Special Volumes are in preparation
- Advertising for new support by national science foundations and the industry
- Several sessions with TF and CC contributions at EGU General Assembly 2014, Vienna, Austria
- Several workshops of individual task forces and CC
- ILP Business meeting during EGU General Assembly in Vienna, Austria, April 28, 2014 - 18:00
- Organize ILP contributions to IUGG General Assembly 2015
- 35<sup>th</sup> anniversary of ILP should be honored with a general ILP meeting in 2015

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 2013, the 2nd year of the IUGG quadrennium 2012-15. A final version of the report with more in depth analyses will be sent to the Finance Committee and the Bureau. It will be included as background material for the Bureau meeting in Baku, June 2014.

The 2013 budget was approved at the Council meeting in Melbourne, July, 2011. The price of 1 unit in 2013 increased to \$1,850 as compared to \$1,815 in 2012.

By the end of 2013 IUGG has 68 members representing 281 units. 7 members are associate members. Bosnia-Herzegovina and Monaco have left the union in 2013. On page 7 one can see more details about memberships.

The membership dues are the economical basis for the activities of IUGG. The situation is right now stable (a relative large sum of money has accumulated over a longer period of time). At the Melbourne GA in 2011 the Council approved a budget spending a significant part of this surplus during 2012 – 2015.

However, there is an ongoing 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.

## Content:

1. The summary of the IUGG accounts in US dollars for 2013 page 119
2. An overview of IUGG grants and allocations page 122
3. Membership information and statistics page 123

# 1) THE SUMMARY OF THE IUGG ACCOUNTS IN US DOLLARS FOR 2013

The balance of the IUGG accounting is now of the same size or bigger than one year's turnover.



## SUMMARY OF IUGG ACCOUNTS 2013

US dollars	Accounts	Budget	Check of transfers
<b>RECEIPTS</b>			
1. Membership Subscription	499.163,02	504.600,00	
2. ICSU Grants	0,00	0,00	
3. Assembly Surcharge	0,00	0,00	
4. Sales of Publications	0,00	200,00	
5. Miscellaneous			
a. Interest	0,00	12.500,00	
b. Gain on exchange	1.985,48		
c. Other	0,00		
d. Associations, surcharge	0,00		
6. Total Receipts	501.148,48	517.300,00	
7. Balance on 1/1 2013	831.028,82	708.700,00	
8. Check Sum	1.332.177,30	1.226.000,00	
<b>EXPENDITURES</b>			
11. Administration			
11.1 Personnel	14.631,52	20.000,00	
11.2 Equipment	2.908,13	5.000,00	
11.3 Supplies	0,00	5.000,00	
11.4 Communications	11.212,48	8.000,00	
11.5 Travel, Administration only	93.993,59	65.000,00	
11.6 Miscellaneous	2.433,71	1.000,00	
11.6a ENHANS	0,00	0,00	
11.6b Associations, surcharge	0,00	0,00	
11.7 Travel, representation	12.661,52	15.000,00	
12. New initiatives			
12.1 Education and outreach	30.042,92	30.000,00	
12.2 Science	28.309,02	30.000,00	
13. General Assemblies			
13.1 Organization	0,00	0,00	
13.2 Travel	0,00	0,00	
14. Symposia	23.337,77	30.000,00	
15. Annual allocations			
15.1 Annual allocations	306.762,75	247.500,00	
16. Dues and Grants			
16.1 ICSU	26.501,33	25.000,00	
17. ICSU grants			
17.1 eGY-Africa	14.137,93	0,00	
18. Union activities			
18.1 GRC, SEDI, CMG, UCDI	12.000,00	18.000,00	
18.2 Inter-Union Science (ILP)	15.000,00	15.000,00	
18.3 Liaison Officers	0,00	30.000,00	
18.4 International Scientific Programs	3.000,00	25.000,00	
18.5 New commissions	0,00	5.000,00	
19. Countries in need			
19.1 Travel Grants, General Assemblies	0,00	0,00	
20. Fees			
20.1 Professional services	0,00	5.000,00	
20.2 Bank fees	2.156,32	3.000,00	
21. Contingencies	0,00	5.000,00	
22. Loss on exchange			
23. Total Expenditures	599.088,99	587.500,00	
24. Balance on 31/12 2013	733.088,32	636.500,00	
25. Check sum	1.332.177,30	1.226.000,00	
Check sum balance	0,00		

March 31, 2014

Aksel Walloe Hansen

USD/DKK	
Exchange rates: Line 8	5,62 =DEC 31, 2012
Line 22	5,41 =DEC 31, 2013
Other:	5,62
USD/EUR	
Line 8	0,75 =DEC 31, 2012
Line 22	0,73 =DEC 31, 2013
Other:	0,75



The summary of the IUGG accounts is in USD. It is the sum of three different accounts in USD, EUR and DKK with Danske Bank. In addition IUGG also has a Mastercard account which is used mostly in connection with traveling. 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 (March 31, 2014) IUGG has received payments equivalent to a total of 256 units for 2013. The total number of units was 281 for the year 2013. The amount paid in 2013 is close to the budget.

##### **5.a, Interest**

No interest was paid in 2013.

##### **5.b, Gain on exchange**

This line together with the corresponding line 22 is used to balance the accounts. In 2013 there was small gain on exchange. In 2011 there was a loss on exchange while there was a significant gain in 2012. The reason for these fluctuations is of course the large fluctuations in the exchange rates during a year.

#### Expenditures

##### **11.1, Personnel**

In 2013 IUGG paid a web master, based in Moscow, for doing the maintenance work on [www.iugg.org](http://www.iugg.org) and a student assistant in Copenhagen.

##### **11.6a, ENHANS**

This line is now closed but kept here for continuity reasons.

##### **12.2, Science**

Two grants approved for 2012 are not paid in full by the end of the year. The money will be paid out in 2013.

##### **15.1, Annual allocations to associations**

The annual IUGG allocation to the associations is installed when the financial report for the previous year is received.

The distribution percentages and the allocations used in 2012-2015 are shown here:

	%	2013 amount	according to the applied
IACS	9,55	\$20,493	
IAG	12,02	\$25,793	
IAGA	16,46	\$35,321	
IAHS	11,86	\$25,450	
IAMAS	16,20	\$34,763	
IAPSO	10,75	\$23,068	
IASPEI	13,61	\$29,205	
IAVCEI	9,55	<u>\$20,493</u>	
		<b>\$214,586</b>	

The actual payment in 2013 was higher because pending allocations from 2012 were paid in 2013.

### **16.1, ICSU**

In 2012 ICSU introduced a new financial system. IUGG is now paying dues to ICSU in band A category (the highest category).

### **17.1, eGY Africa**

This project has been delayed and a major part of the grant money from ICSU was spent in 2013, but a small left over is to be disposed in 2014.

### **18.3, Liaison Officers**

No travel support was paid to Liaison officers in 2013.

### **18.4, International Scientific Programs**

IUGG used to support two international programmes: FAGS and WCRP. There is still some uncertainty to which organization the FAGS money should be paid to. The annual contribution to WCRP has been terminated.

### **18.5, New Commissions**

The new CCEC commission is supported financially, 5k/yr. A new account is opened in 2014 to handle the money.

## 2) AN OVERVIEW OF IUGG GRANTS AND ALLOCATIONS

IUGG is supporting science in different ways:

- i) Annual allocation to Associations, line 15 (see comments on page 120)
- ii) New initiatives, line 12
- iii) Smaller scientific meetings, line 14
- iv) Union activities, line 18

Here follow some main figures for the amounts allocated in 2013:

**i) Line 15.1 (2013 figures) \$ 214,586**

**ii) Line 12 (new initiatives)**

5 grants were awarded for 2012-2013. Part of it was paid in 2013.

This line is also used to pay ICTP training course activities +

Cambridge University Press for Publication of an IUGG book \$ 30,042

2 IUGG grants + special grant to the Mathematical Union \$ 28,309

Total **\$ 58,351**

**iii) Line 14 (Symposia grants)**

7 grants were paid to association meetings \$ 23,338

5 grants to Scientific Assemblies were paid to the Associations

directly, together with the annual allocations \$ 6,662

Total **\$ 30,000**

**iv) Lines 18.1, 18.2 (Union Activities)**

18.1 GRC, SEDI, CMG \$ 12,000

18.2 ILP \$ 15,000

18.4 special grant to WMO meeting about volcanic ash \$ 3,000

Total **\$ 30,000**

### 3) MEMBERSHIP INFORMATION AND STATISTICS

At the time of writing (March 31, 2014) IUGG has 68 members representing 278 units. In 2013 two countries decided to withdraw their membership. Early 2014 Nicaragua is in process of being admitted as a new member. Some members have been moved to associate membership.

10 members are in associate status and 11 paying members are in observer status. The 11 members in observer status are:

#### **In category 1**

Bulgaria (3. year as observer)  
Iran (3. year as observer)  
Indonesia (2. year as observer)  
Macedonia (2. year as observer)  
Vietnam (2. year as observer)

#### **In category 2**

Pakistan (2. year as observer)  
Egypt (1. year as observer)  
Nigeria (1. year as observer)  
Portugal (1. year as observer)

#### **In category 3**

Greece (4. year as observer)  
Philippines (4. year as observer)

In addition, another member started 2014 as observer, but the dues in arrears have been paid by now.

The 11 observer countries together represent 19 units.

Both Albania and Armenia are moved to A-membership with effect in 2013. Morocco, DR Congo and Ghana have been moved to Category A as of 1 January 2014.

Bosnia-Herzegovina and Monaco have informed IUGG that they want to terminate their membership of the union.

In summary, the membership overview

Cat	No. of members	No. of units	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	7	3	21
2	14	2	28
1	18	1	18
A	10	0	0

## IUGG Members, 1 January 2014. Observer status as of 1 April 2014

Member Country	Cat	Units	Member Country	Cat	Units
<b>10 adhering bodies in</b>	<b>A</b>		<b>14 adhering bodies in</b>	<b>2</b>	<b>28 units</b>
Albania			Chile		
Armenia			Czech Republic		
Bolivia			Egypt		
Costa Rica			Hungary	observer, 2014	
D.R. Congo			Ireland		
Georgia			Korea, South		
Ghana			Mexico		
Mauritius			Nigeria	observer, 2014	
Morocco			Pakistan	observer, 2013	
Peru			Poland		
			Portugal	observer, 2014	
<b>1 adhering body in</b>	<b>11</b>	<b>35 units</b>	Saudi Arabia		
USA			Thailand		
			Turkey		
<b>3 adhering bodies in</b>	<b>8</b>	<b>60 units</b>	<b>18 adhering bodies in</b>	<b>1</b>	<b>18 units</b>
German			Azerbaijan		
Great Britain			Bulgaria	observer, 2012	
Japan			Colombia		
			Croatia		
<b>1 adhering body in</b>	<b>7</b>	<b>15 units</b>	Estonia		
France			Iceland		
			Indonesia	observer, 2013	
<b>5 adhering bodies in</b>	<b>6</b>	<b>50 units</b>	Iran	observer, 2012	
Canada			Israel		
China			Jordan		
India			Luxembourg		
Italy			Macedonia	observer, 2013	
Russia			Mozambique		
			New Zealand		
<b>3 adhering bodies in</b>	<b>5</b>	<b>21 units</b>	Romania		
Australia			Slovak Republic		
Spain			Slovenia		
Switzerland			Vietnam	observer, 2013	
<b>6 adhering bodies in</b>	<b>4</b>	<b>30 units</b>			
China, Taipei					
Belgium					
Denmark					
Netherlands					
Norway					
Sweden					
<b>7 adhering bodies in</b>	<b>3</b>	<b>21 units</b>			
Argentina					
Austria					
Brazil					
Finland					
Greece	observer, 2011				
Philippines (back again)	observer, 2011				
South Africa					

# ADDITIONAL UNION MATTERS

## Awards and Honors

**Robin Adams**, past IASPEI Secretary General (1979-1991), received the inaugural 2013 IASPEI Medal for sustaining IASPEI goals and activities and for scientific merits in the field of seismology and physics of the earth's interior.

**Günter Blöschl**, President of the IAHS International Commission on Water Resources Systems, received the 2013 International Hydrological Prize of the IAHS, World Meteorological Organization (WMO), and the International Hydrological Program of UNESCO for his outstanding contribution to hydrology.

**Tamaz Chelidze**, President of the Georgian National Committee for Geodesy and Geophysics, was elected a Full Member (academician) of the Georgian National Academy of Sciences at the annual meeting of the academy.

**Yun-tai Chen**, IUGG Bureau Member (2003-2011), was awarded the 2013 Axford Medal of the Asia and Oceania Geosciences Society (AOGS) for his significant contributions to the study of seismic source, both in theoretical and practical aspects in seismology, invaluable service in the international and Asian communities, and efforts to start up the AOGS activities. Also *Yun-tai Chen* was elected AOGS President (2014-2016).

**Jaime Urrutia Fucugauchi** (UNAM, Mexico), IUGG Liaison Officer to the ICSU ROLAC, was awarded the 2013 AGU International Award. Jaime has been elected to El Colegio Nacional, a Mexican honorary academy, for his contributions to the Earth and planetary sciences, education and outreach activities.

**Arnold L. Gordon** (Columbia University, USA) was awarded the 2013 Prince Albert I Medal for his outstanding contribution in observational oceanography and in particular for his work in defining the physical processes in the Southern Ocean and Indonesian Throughflow.

**Ibrahim Guliev**, President of the Azerbaijan National Committee for Geodesy and Geophysics, was elected a Vice President of the Azerbaijan National Academy of Sciences at the annual meeting of the academy.

**Harsh Gupta** (IUGG President, Member of the National Disaster Management Authority, India) and **Kalachand Sain** (IUGG representative at the Bureau of the International Lithosphere Program, CSIR-National Geophysical Research Institute, India) received the 2012 Gondwana Research Best Paper Award of the International Association of Gondwana Research for their article "Gas hydrates in India: Potential and development".

**John Labrecque** (NASA Science Mission, USA), Vice Chair of the IUGG Union Commission on Geophysical Risk and Sustainability, was awarded the 2013 Flinn Award of the American Geophysical Union (AGU).

**Federico Lombardo** and **Elena Volpi** (University Roma Tre, Italy) were awarded the IAHS Tison award for young scientists.

**James Screen** (Exeter University, UK) was awarded the 2013 IAMAS Early Career Scientist Medal. The Medal was presented to James Screen at the Opening Session of DACA-13 in Davos on 8 July 2013.

*Uri Shamir*, IUGG President (2003-2007), received a Life-long Achievement Award by the Israeli Water Association in the domain of water, for scientific and engineering achievements, for professional leadership, for the ability to combine research and teaching to address urgent issues facing the water sector.

## Obituaries

### **Hans-Jürgen BOLLE (1929-2013)**

Hans-Jürgen Bolle, IUGG Executive Committee Member (1983-1987), who played an important role in integrating meteorology and atmospheric sciences in Germany and Austria, and who was much engaged in international affairs coordinated by IUGG and COSPAR, died on 13 March 2013 in Munich, Germany.

Born in Northern Germany in 1929, Hans-Jürgen Bolle studied physics at the University of Hamburg and earned his PhD in 1958 by comparing measured spectra of infrared atmospheric radiation with effective black body radiation under the tutelage of Rudolf Schulze, then director of Deutscher Wetterdienst's radiation observatory. Bolle started his academic career in 1958 as an assistant professor with Fritz Möller, a pioneer in atmospheric radiation, working at the University of Mainz. In the 1960s, Bolle followed Möller to the Meteorological Institute at the University of Munich, where he headed the radiation group from 1970 to 1977. During this time, novel instruments were designed to measure radiation on balloons and satellites, e.g. the MIPAS concept which was needed to form a core instrument on the European Envisat satellite. From 1977 to 1986, Bolle worked and taught at the University of Innsbruck. From 1986 until his retirement in the 1990s he worked at the Free University Berlin.

Inspired by his mentor Fritz Möller, Hans-Jürgen Bolle was elected to the International Radiation Commission of IAMAS in 1971, served as its president from 1979-1983, and became honorary member in 1996. From 1983-1987 he took on the responsibility of the IAMAS presidency. On a wider international scene he held important positions within the World Climate Research Programme (WRCP), the International Geosphere-Biosphere Programme (IGBP) and the ICSU-Committee on Space Research (COSPAR). During five active decades of research and science management, Hans-Jürgen Bolle extended his scope from ground based, single station measurements to global observations, which are of relevance not only for the atmospheric sciences but also for the neighboring geophysical disciplines and beyond. His broad knowledge, combined with an unassuming attitude towards others, enabled him to develop an enduring network of cooperation and friendship to the benefit of many, both nationally and internationally. For this Hans-Jürgen will long be remembered with a sense of loss and warm appreciation (written by Hans Volkert).

### **Volodya KEILIS-BOROK (1921-2013)**

Vladimir Keilis-Borok, IUGG President (1987-1991), was one of the most influential mathematical geophysicists of our time. He was engrossed by the idea of earthquake prediction and spent the last few decades of his life on understanding nonlinear processes in the Earth's lithosphere leading to earthquakes. He developed a distinguished group of experts in mathematical geophysics, who contributed together with him to the theory of lithosphere dynamics, seismic hazards and risk, and earthquake prediction. Volodya Keilis-Borok (Vladimir Isaakovich - how Russians called him, Volodya - for his friends or KB - for many of his colleagues) passed away on 19 October 2013 in Los Angeles, California, at the age of 92. Born in Moscow (Russia) in 1921, he graduated from the Moscow State Geological Prospecting University in 1943 and received his PhD and DSc (Habilitation) degrees in mathematics and geophysics from the Russian Academy of Sciences in Moscow in 1948 and 1953, respectively. He worked at the Schmitt Institute of Physics of the Earth from 1948 to 1989 and chaired the Institute's Department of Computational Seismology. In 1989 he founded the Moscow Institute of Earthquake Prediction Theory and Mathematical Geophysics and became the Institute's first Director. After his retirement from the leadership of the Institute in mid 1990s, he moved to USA and became a distinguished professor of the University of California at Los Angeles (UCLA).

Trained as a geologist and a mathematician, the scientific credo of Volodya became 'mathematics for geophysics'. His early research was concentrated on seismic source modelling, surface wave



propagation in elastic layered structures, and inverse problems in seismology. He collaborated with great mathematicians Israel Gelfand, Nobel Prize winner in economy Leonid Kantorovich, Andrei Kolmogorov, and Yakov Sinai as well as with great geophysicists Keith Aki, Leon Knopoff, Frank Press, Don Turcotte, Seiji Uyeda, and many others. In mid 1960s Keilis-Borok initiated two research programs: on seismic risk analysis (with Leonid Kantorovich and George Molchan) and recognition of the regions prone to potential large earthquakes (with Israel Gelfand and Leon Knopoff). As results, a general probabilistic approach to seismic risk assessment and pattern recognition methods to predict large earthquakes and other extreme events were developed. Keilis-Borok with his colleagues applied pattern recognition methods to predict earthquakes as well as socio-economic events with notable success. For example, together with Vladimir Kossobokov (a statistical seismologist of his Moscow group) they predicted great earthquakes around the world with a success rate of over 70%, and together with Allan Lichtman (a political historian of the American University in Washington, D.C.) they predicted the popular vote winner of presidential elections in USA from 1984 to 2012 as well as 128 out of 150 U.S. mid-term Senatorial elections since 1986.

Responding to an invitation of Abdus Salam, a Nobel Prize winner in Physics, and the founding Director of the International Centre for Theoretical Physics (ICTP) at Trieste, Italy, Volodya Keilis-Borok established in the mid 1980s a research program on structure and nonlinear dynamics (SAND group) in ICTP to promote research and education in theoretical geophysics in economically less-developed countries. Alternating biennial advanced schools on nonlinear dynamics and earthquake prediction and schools on inverse problems in seismology organized by Keilis-Borok for about two decades disseminated modern knowledge in theoretical seismology and geodynamics.

Keilis-Borok was the founding Chairman of the International Committee for Geophysical Theory and Computers (1964-1979, now the IUGG Union Commission on Mathematical Geophysics). He served IUGG as a Bureau Member (1983-1987) and the International Association of Seismology and Physics of the Earth's Interior (IASPEI) as Vice President (1983-1987), and he was also Board Member and Chair of Mathematics and Natural Sciences Section of the International Council for Science (ICSU, 1988-1991). He was a member of many expert groups and scientific committees including the Committee for International Security and Disarmament of the Russian Academy of Sciences, the Scientific Committee for the U.N. Decade for Natural Disasters Reduction, and the International Working Group on the Geological Safety of Nuclear Waste Depositories.

Keilis-Borok was an elected member of the American Academy of Arts and Sciences (1969), U.S. National Academy Sciences (1971), Russian Academy of Sciences (1988), the Royal Astronomical Society (1989), Austrian Academy of Sciences (1992), Pontifical Academy of Sciences (1994), and Academia Europaea (1999). He was awarded the first Lewis F. Richardson Medal of the European Geophysical Society for exceptional contributions to nonlinear geophysics, a Doctor Honoris Causa of the Institut du Physique du Globe de Paris, France, and the 21st Century Collaborative Activity Award for Studying Complex Systems of the McDonnell Foundation.

Volodya loved his science, he could not live without it. Volodya loved people, he could not live without them. Volodya had an impressive knowledge of history, literature, music, and he knew several languages. He could recite Shakespearian sonnets in English and Russian (in the translation by B. Pasternak, Nobel Prize Winner in literature) and Goethe poems in German. Last time I met Vladimir Isaakovich was in his flat in Los Angeles in December 2012. He was already not well, but his eyes were shining when we spoke about advances in geophysics and especially in earthquake science.

“Why is it that some of us still decide to become scientists, despite the fact that businessmen, lawyers, and doctors enjoy a much higher income?” Volodya asked and answered. “A famous Russian writer Leo Tolstoy once wrote that a writer is not merely a person who writes; a writer is a person who cannot live without writing. The same, I believe, is true for a scientist. Science is an exciting adventure where major rewards come from the discovery itself. What you get instead of big money is freedom, camaraderie, and independence. The honors and promotions will depend on yourself more than in the other occupations. And you will have the overwhelming feeling of uncovering yet another one of

nature's mysteries." (Keilis-Borok, V.I., 2004. Scientific research is a token of humankind's survival. In: One Hundred Reasons to be a Scientist, ed. K. Sreenivasan. Trieste, Italy: ICTP, pp. 124-126.)

There are not many scientists who consider that earthquakes can be predicted, but it was not the case with Volodya. He always said that earthquake prediction is the Holy Grail of earthquake science. "Earthquakes can and should be predicted, although earthquake prediction is a challenging task". Volodya liked to quote British Prime Minister W. Churchill when he heard concerns regarding his earthquake predictions: "This is not the beginning of the end, it's the end of the beginning". Frank Press, the Science Adviser to President Jimmy Carter and former President of the U.S. National Academy of Sciences, wrote on the occasion of Volodya's 90th birthday: "Volodya, your career in science has been both creative and controversial - the same characterization that can be said of Fred Hoyle, Linus Pauling, even Albert Einstein. Knowing you, I am sure that age will be no impediment and that you will continue to put forward new concepts that will stimulate much discussion, not only in geophysics but in the social sciences as well."

Life is limited, and unfortunately, Vladimir Isaakovich Keilis-Borok cannot anymore "put forward new concepts", but his students and colleagues infected by Keilis-Borok's great enthusiasm will continue scientific research "uncovering yet another one of nature's mysteries". Volodya will be remembered by his family, friends, and colleagues around the world as a great Man, Scientist, and Teacher (written by Alik Ismail-Zadeh).

### **Duzheng YE (1916-2013)**

Duzheng Ye (also spelt as Tu-Cheng Yeh), a world-renowned meteorologist and IUGG Bureau Member from 1987 to 1995, passed away on 16 October 2013 at the age of 98. Professor Ye was a member of the Chinese Communist Party, one of the two prize winners of the National Supreme Scientific and Technological Award in 2005, winner of the 48<sup>th</sup> IMO (International Meteorological Organization) Prize in 2003, a member of the Standing Committee of the 6<sup>th</sup> and 7<sup>th</sup> National People's Congress, a Senior Academician, a former Vice President and Special Consultant of the Chinese Academy of Sciences.

Duzheng Ye devoted himself to the Earth Sciences for more than 70 years and made major contributions to developments in this discipline. He was born in Tianjin, China on 21 February 1916. He received his first degree from the Department of Meteorology, Tsinghua University in 1940, and Master's degree from Zhejiang University in 1943. During 1945-1948, he studied at the University of Chicago supervised by Carl-Gustaf Rossby and obtained his PhD degree. He returned to China in 1950 and was one of the main founders of modern meteorology in China. He instigated the now well-established research efforts devoted to Tibetan Plateau meteorology; discovered the seasonal abrupt change of atmospheric general circulation over Asia; developed the theory of atmospheric long wave energy dispersion, and therefore provided the theoretical basis for modern atmospheric long wave forecasts; proposed a theory for the scales of atmospheric motion, which has since been applied to weather forecasting; and expanded global change research by building a framework of "orderly human activities" in the context of a life-supporting environment and proposing climate change adaptation theories. He actively advised and participated in the meteorological operation systems of China and made outstanding contributions to modern meteorological operations in the country.

Duzheng Ye was elected a Foreign Member of the Finnish Academy of Sciences and Letters, Honorary Member of the American Meteorological Society, and Honorary Member of the Royal Meteorological Society of the United Kingdom. He served as President of the Chinese Meteorological Society and Chief Director and Honorary Director of the Institute of Atmospheric Physics, Chinese Academy of Sciences.

Duzheng Ye was also actively involved in international cooperation and coordination. He served as an executive member of many international organizations, including: the Joint Scientific Committee/World Climate Research Programme (JSC/WCRP), the International Association of

Meteorology and Atmospheric Physics (IAMAP) Executive Committee, and the International Geosphere-Biosphere Programme (SC-IGBP). In addition to his outstanding scientific achievements, Prof. Ye was also a great mentor and many of his students have, through his guidance, become renowned scientists in the international Earth Sciences community. He was, in every aspect, a true “master” of science and teaching and was widely remembered and respected.

Prof. Duzheng Ye fully dedicated his life to his profession and his country. He will be remembered for his leadership, innovation, generosity, and kindness. His passing is a great loss to the science community, and he will be sorely missed (written by Guoxiong Wu).

## 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
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