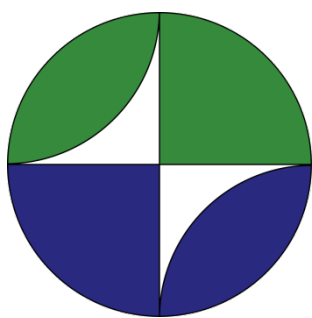


INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE

Annual Report 2022



INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE

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INTRODUCTION

Established in 1919, the International Union of Geodesy and Geophysics (IUGG) is an 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.

The IUGG is comprised of eight semi-autonomous International Associations, each responsible for a specific range of topics or themes within the overall scope of the Union activities. Each Association establishes commissions, divisions, services, working groups, or other entities. In addition, IUGG establishes Union Commissions and other activities to conduct inter-association science (see page 3).

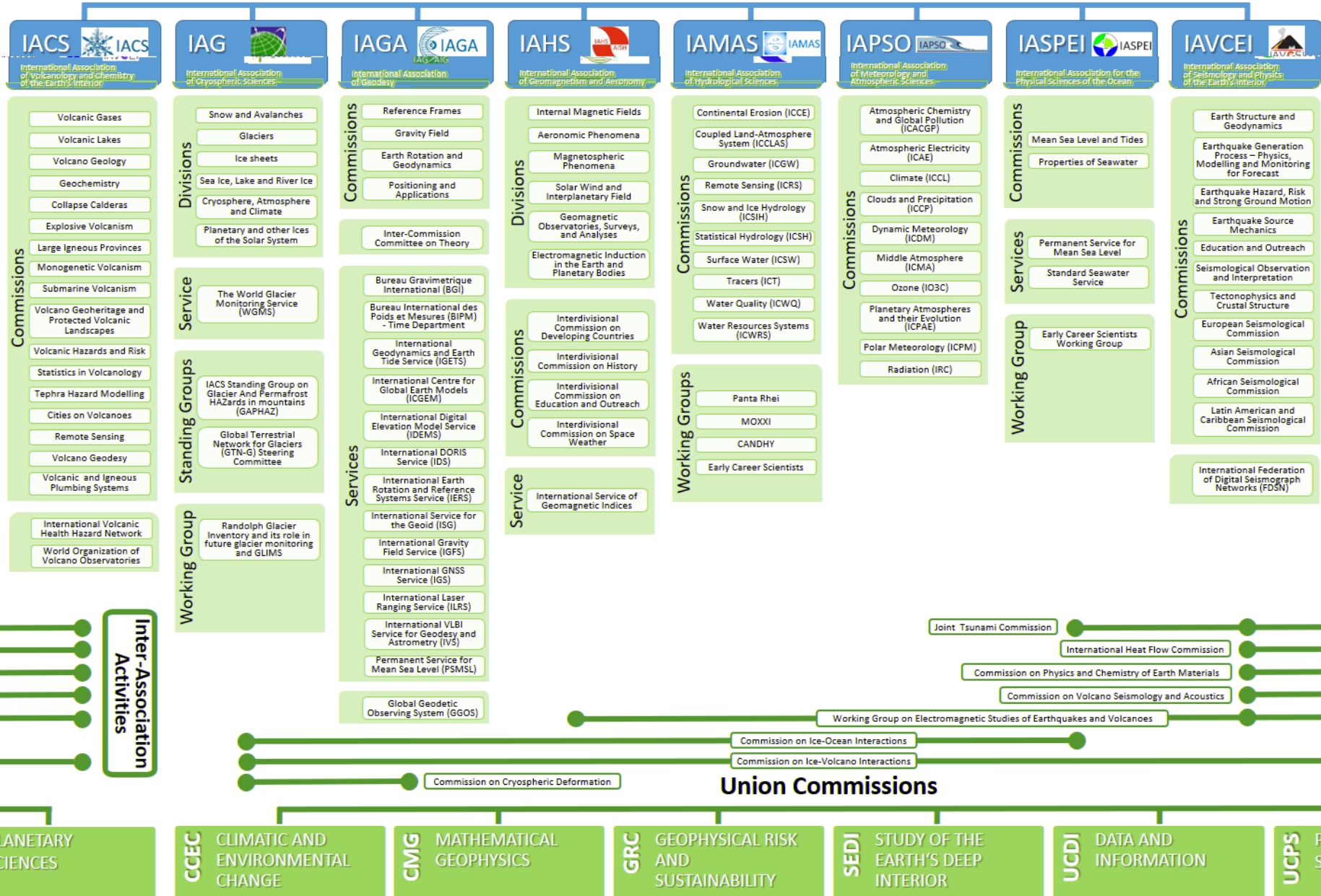
IUGG is one of over 40 scientific unions adhering to the International Science Council (ISC). ISC provides a global forum for scientists to exchange ideas and information and to develop standard methods and procedures for all fields of research. IUGG brings expertise on Earth studies from researchers in its International Associations and Commissions. As a member of ISC, 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 programs and projects. These programs have set a model for international and interdisciplinary cooperation in geosciences (see page 4).

The work of IUGG is related to that of many other scientific organizations. Some of these are inter-governmental such as those affiliated with the United Nations (UN); some are Interdisciplinary Bodies of ISC, and others are organizations of particular interest to specific Associations (see page 4).

International Union of Geodesy and Geophysics (IUGG)

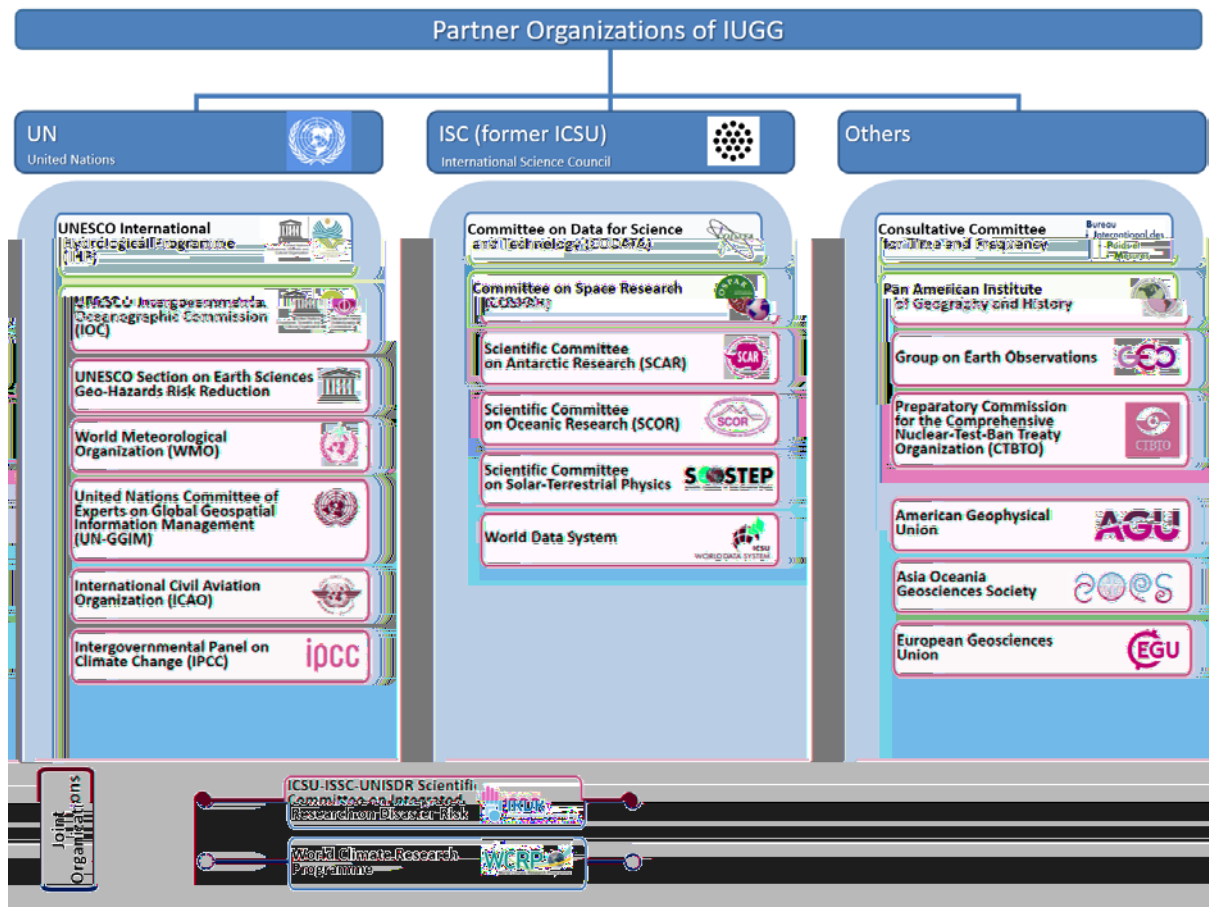
Associations



Programs and Projects initiated and/or supported by IUGG

Current	Past
<ul style="list-style-type: none"> Global Geodetic Observing System (GGOS, an IAG program) Integrated Research on Disaster Risk (IRDR) International Lithosphere Program (ILP, a joint IUGS-IUGG activity) International Year of Basic Sciences for Sustainable Development (IYBSSD) International Year of Global Understanding (IYGU) Mathematics of Planet Earth (MPE) World Climate Research Programme (WCRP) World Data System (WDS) 	<ul style="list-style-type: none"> International Geosphere-Biosphere Programme (IGBP, 1987-2015) International Year of Universe (IYU, 1958-1964) Extreme Natural Hazards and Societal Implications (ENHANS, 2010-2014) International Year of Planet Earth (IYPE, 2007-2009) Electronic Geophysical Year (eGY, 2007-2008) International Polar Year (IPY, 2007-2008) International Heliophysical Year (IHY, 2007-2009) International Decade for Natural Disaster Reduction (IDNDR, 1990-1999) Geodynamics Project (1972-1979) Global Atmospheric Research Program (1967-1972) International Hydrological Decade (1965-1974) Upper Mantle Project (1964-1970) International Geophysical Year (IGY, 1957-1958)

Programs and Projects initiated and/or supported by IUGG



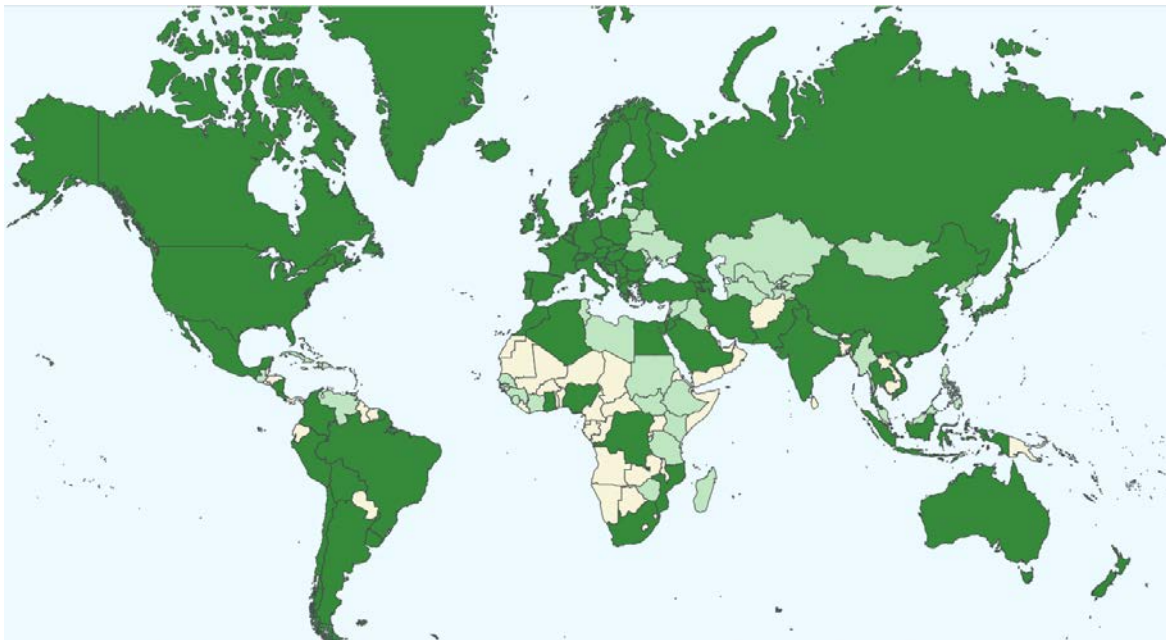
Partner Organizations of IUGG

GENERAL INFORMATION

MEMBERSHIP & FINANCE

By their very nature, geodetic and geophysical studies require a high degree of international co-operation. IUGG is critically dependent on the scientific and financial support of its member Adhering Bodies. The list of present and past IUGG Adhering Bodies is published in the IUGG Yearbook and posted on the website. Each Adhering Body establishes a National Committee for IUGG, and names Correspondents to each Association (as appropriate).

As of 31 December 2022, IUGG has 73 National Members including 59 countries in paying status. The paying members are placed in categories from 1 to 14 depending on their financial contribution to the Union (the membership dues rise with increasing category number). At present, the highest category used is category 11. The members pay dues according to a number of units assigned to their category (in category 1 the number of units is 1, and in category 11 the number is 35). According to a decision of the XXII IUGG General Assembly (Boulder, USA, 1995), the price of 1 unit is determined every year using an inflator index obtained from the Bureau of Labor Statistics, U.S. Department of Labor. In 2022, the price of 1 unit was US\$ 2,195. The 59 paying members represent a total of 277 units, which is equivalent to a total income of US\$ 608,015. The funds received as dues are the basis for IUGG's operations as a scientific union, although Union associations may have their own funds earned via book selling or donations. The funds are spent to support (i) international scientific programs, projects and services, (ii) general and scientific assemblies, symposia, workshops, and schools; (iii) travel of students, early career scientists, and scientists from developing countries to attend scientific meetings; (iv) scientific activities of Union Associations and Commissions, (v) the International Lithosphere Program, (vi) the International Science Council, and (vii) administration and management.



Regional distribution of current (dark green) and former (light green) IUGG Member Countries (as of 31.12.2022)

Several IUGG National Committees have published Annual and Quadrennial Reports on their activities over the last years. All reports are available [here](#).

IUGG National Committees are invited to [submit](#) their annual/quadrennial reports at any time.

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. The Council is convened at each quadrennial General Assembly but can make decisions by electronic voting in between General Assemblies. 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. The IUGG Secretariat is located at the German Research Centre for Geosciences (GFZ) in Potsdam, Germany, and assists in the implementation of the decisions of the Bureau, Executive Committee and the Council.

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 activities, assemblies, workshops, and symposia, although only scientists from member countries with dues paid may serve as Association Presidents.

The eight International Associations are listed below, and short reports on their 2022 activities are included here. Additional information about each Association is given on their websites, 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 2022, the following bodies were active:

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

Inter-Unions Commission

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

GENERAL ASSEMBLIES OF THE UNION

General Assemblies have been held since 1922 and, since 1963, at 4-year intervals. These assemblies provide an extraordinary opportunity for Earth scientists from around the world to gather and share expertise, research data, and results. Past IUGG General Assemblies are listed in the IUGG Yearbook and on the website. The most recent General Assembly was held in Montreal, Canada, 8-18 July 2019. The next IUGG General Assembly will take place in Berlin, Germany, 11-20 July 2023.

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.

IUGG OFFICERS FOR 2019-2023

IUGG Bureau

President:	Kathryn Whaler	UK
President-Elect:	Chris Rizos	AUSTRALIA
Secretary General:	Alexander Rudloff	GERMANY
Treasurer:	Niels Andersen	DENMARK
Members:	Stephen McNutt	USA
	Eduard Petrovsky	CZECH REPUBLIC
	Yun Xia	CHINA
Executive Secretary: (a non-voting member of the Bureau)	Franz G. Kuglitsch	GERMANY

IUGG Executive Committee

IUGG Bureau Members

Immediate Past President:	Michael G. Sideris	CANADA
IACS President:	Regine Hock (2019-2021)	USA
	Liss M. Andreassen (2021-2023)	NORWAY
IAG President:	Zuheir Altamimi	FRANCE
IAGA President:	Mioara Manda	FRANCE
IAGS President:	Günter Blöschl (2019-2021)	AUSTRIA
	Berit Arheimer (2021-2023)	SWEDEN
IAMAS President:	Joyce Penner	USA
IAPSO President:	Trevor McDougall	AUSTRALIA
IASPEI President:	Kenji Satake	JAPAN
IAVCEI President:	Patrick Allard	FRANCE

IUGG Finance Committee

Chair:	Corina Risso	ARGENTINA
Members:	Jozsef Adam	HUNGARY
	Priscilla Grew	USA

Association Secretaries General

IACS Secretary General:	Richard Essery	UK
IAG Secretary General:	Markku Poutanen	FINLAND
IAGA Secretary General:	Monika Korte	GERMANY
IAGS Secretary General:	Christophe Cudennec	FRANCE
IAMAS Secretary General:	Steven Ackerman	USA
IAPSO Secretary General:	Stefania Sparnocchia	ITALY
IASPEI Secretary General:	Johannes Schweitzer	NORWAY
IAVCEI Secretary General:	Roberto Sulpizio	ITALY

Union Commission Officers

Union Commission on Climatic and Environmental Changes (CCEC)

Chair:	Jianping Li	CHINA
Secretary:	Tonie van Dam	LUXEMBOURG

Union Commission on Mathematical Geophysics (CMG)

Chair:	Alik Ismail-Zadeh	GERMANY/RUSSIA
Secretary:	Ilya Zaliapin	USA

Union Commission on Geophysical Risk and Sustainability (GRC)

Chair:	John LaBrecque	USA
Secretary:	Katia Kontar	USA

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

Chair:	Christine Thomas	GERMANY
Secretary:	Michael Bergman	USA

Union Commission for Data and Information (UCDI)

Chair:	Sateesh Shenoi	INDIA
Vice Chair:	Anatoly Soloviev	RUSSIA

Union Commission on Planetary Sciences (UCPS)

Chair:	Shuanggen Jin	CHINA
Secretary:	Scot Rafkin	USA

Inter-Unions Commission: International Lithosphere Program (ILP)

President:	Hans Thybo	TURKEY/NORWAY
Secretary General:	Mian Liu	USA

IUGG SECRETARIAT

The IUGG Secretariat is the informational centre of IUGG. It implements the organization plans, organizes the daily management of the Union, prepares business meetings, represents the Union at conferences, publishes documents (e.g., Newsletters, Yearbooks, Annual Reports) and helps National Members to be engaged in the Union's and its Associations activities.

Since the year 2013, the IUGG Secretariat is located at

Helmholtz Centre Potsdam
GFZ German Research Centre for Geosciences
Telegrafenberg, A17
14473 Potsdam
GERMANY

<i>Executive Secretary:</i>	Franz G. Kuglitsch	GERMANY
<i>Assistant:</i>	Katrin Gundrum	GERMANY
<i>Webmaster:</i>	Jan Schubert	GERMANY

MESSAGE FROM THE PRESIDENT

Another year, another set of challenges! Just as the worst of the pandemic started to ease, Russia invaded Ukraine. Besides death, destruction and displacement affecting the two nations and their near neighbours, this has global ramifications for food and energy security. Many countries have experienced extreme weather events (and consequences thereof such as landslides), almost certainly linked to anthropogenic climate change. The latest assessment shows that we are not on target to reduce emissions sufficiently to limit the temperature rise to 1.5 °C. On this not-so-cheery note, let me outline what has been happening within IUGG during 2022, and the beginning of 2023.



IUGG supported the statement by the International Science Council ([ISC](#)) condemning the invasion of Ukraine, and many Associations reiterated this support. IUGG follows International Science Council (ISC) guidelines and therefore does not discriminate against individual scientists on the basis of nationality. This means Russian scientists can continue to play a part in IUGG activities and, in principle, can attend its meetings. However, financial sanctions prevent IUGG from accepting the annual subscription from the Russian Academy of Sciences, and therefore Russia is currently in observer status and unable to vote at Council. Shortly after the invasion of Ukraine began, IUGG provided a grant to the Polish Academy of Sciences to support displaced Ukrainian scientists.

I have been participating in online meetings for Members with the ISC President, Peter Gluckmann, where he has been summarising the main activities of the ISC and holding Q&A sessions; these are now held quarterly. The President will be giving a welcome address at the forthcoming General Assembly in Berlin. I attended the annual meeting of the European Members of the ISC in London in October, where there were speakers and panel discussions on ‘Science advice and sustainability’ and ‘Crisis preparedness and the challenges of scientific advice’. I shall attend an Extraordinary General Assembly in April 2023 to vote upon small further changes to the Statutes and Rules of Procedure to bring them into line with French law on non-profit organizations. I shall also attend the mid-term meeting of ISC members in May 2023, in Paris. The Agenda is still being developed, but the theme is ‘Capitalizing on Synergies in Science’. IUGG nominated IAHS Secretary-General Christophe Cudennec to join an ISC delegation to UNESCO where a recommendation to member states on Open Science was developed. We also successfully nominated him as an expert for the ISC delegation to the [United Nations Water Conference 2023](#), and he contributed to a Policy Brief issued by ISC in advance of the conference. He is also under consideration as an IUGG nominee for the ISC-UNEP Foresight Expert Panel. Past President Harsh Gupta was successfully nominated for ISC Fellowship by IUGG, supported by the International Union of Geological Sciences.

Following the proclamation of the International Year of Basic Sciences for Sustainable Development ([IYBSSD](#)), the Opening Ceremony was held at UNESCO in Paris in July 2022, attended by myself and the Executive Secretary. Interviews filmed at the Ceremony, including with myself, are available on the IYBSSD website and YouTube channel. I have continued to attend Steering Committee meetings, held online. As part of IYBSSD, IUGG ran a special grants round, and awarded a total of \$65,000 to 8 projects. Each had to be cosponsored by at least two Associations or Commissions. Although some are part of a regular series of events, the stipulations of this grants round meant that the activities and intended outputs are focussed around the IYBSSD. The [ISC GeoUnions](#) successfully proposed an ISC Distinguished Lecture Series webinar relevant to the IYBSSD, and the first two have been held in early 2023, with the next scheduled for April. The intention is that each of the 9 GeoUnions will nominate a

speaker. Also as part of the IYBSSD, the Commission on Mathematical Geophysics (CMG) held a Conference in hybrid mode in Republic of South Korea during which I participated online in a discussion panel on 'Basic Science and Mathematics for Sustainable Development'. The Federation of Indian Indian Geosciences Associations (FIGA) Congress was held in Dehradun, India in November, on 'Geosciences of Himalaya for Sustainable Development', where I gave a talk on 'Basic Geoscience for Sustainable Development' as part of an International Development session. The Closing Ceremony will be at CERN in September/October 2023. As the International Year draws to its end, there are plans to turn it into a Decade.

The Bureau met in person in Berlin/Potsdam, Germany, in October. The Messe CityCube in Berlin, location of the [28th General Assembly \(GA\)](#) in July 2023, hosted our first day, and we had a tour of the facilities. Our second day was at GFZ, Potsdam, where the Secretary General, Executive Secretary and Assistant are based, as are the Chair and Vice-Chair of the GA Local Organizing Committee. The International Centre for Theoretical Physics ([ICTP](#)) liaison to IUGG, Abdelkrim Aoudia, joined online to present and discuss plans for continuation of cooperation between IUGG and ICTP. This cooperation began in 2011 and ICTP is an important capacity building and education partner for IUGG. We have agreed a new programme and our new Memorandum of Understanding will be signed later in 2023, probably during the IUGG-sponsored Summer School on Earthquake Mechanics.

Our participation in the [AGU](#)-led Global Geoscience Societies (GGS) Task Teams (TTs) has continued, with myself and/or the Secretary General attending most online meetings. The TT on Public Engagement and Outreach to Raise Awareness of Earth and Space Sciences (ESS) issued a statement on Earth Day, supported by 15 societies or unions, which was viewed over 3000 times on IUGG social media platforms. The Advocate for the ESS in Global and Domestic Policies progressed plans for a webinar on food security, in which a former IUGG Union Lecturer has been invited to participate. The Support Early Career and Student Communities TT, with input from the Inclusion and Representation TT, is about to launch a survey which aims to understand the factors influencing decisions to stay in or leave academia, and how the GGS can help support early career scientists in their preferred career path. Progress and activities of all four TTs were reported at a hybrid meeting of the GGS during the Fall AGU meeting; I attended online and the Secretary General was there in person.

In October I attended a multi-disciplinary colloquium in Monaco to commemorate the centenary of the death of His Serene Highness Prince Albert I in 1922. His Serene Highness Prince Albert II gave a short talk in the Opening Session, and attended the Closing session. It was intended to be a longer event in 2022, but the pandemic forced the postponement and the shortened format. Prince Albert I was important in the early history of IUGG, having been one of the four first Vice-Presidents, and President of what became IAPSO. During the meeting, I met with several staff from the Musée Océanographique, which holds archive material related to this. I presented them and the Centenary Committee with a laminated message from IUGG commemorating the event.

Besides participating in the discussion panel in the CMG Conference, I also recorded a greeting for the Opening Ceremony. I also provided one for the China Earthquake Administration Conference on Earthquake Science and Technology in Beijing. These conferences take place every 5 years to review the progress of earthquake science and technology in China and worldwide, as well as to release guidelines for the next 5 years. IUGG supports the Kyoto Landslide Commitment 2020, and I wrote a Foreword to Volume 1, Issue 1 of the open access journal '[Progress in Landslide Research and Technology](#)'. Issues 1 and 2 make up the two founding issues published with IUGG support. I gave a keynote presentation on 'AI for Natural Disaster Management' in a Workshop organized by the [ITU/WMO/\(UNEP\) Focus Group](#), where I highlighted the role artificial intelligence is playing in the work of our Associations and Commissions, and mentioned the 28th GA. Thanks to those Associations who provided material. I wrote to European Space Agency in support of a proposed joint ESA-NASA satellite gravity mission, quoting the Resolution passed at the GA in 2015 that urges "... international and national institutions, agencies and governmental bodies in charge of supporting Earth science research

to make all efforts to implement long-term satellite gravity and magnetic observation constellations with high accuracy that respond to the aforementioned need for sustained observation.'

This is my last report as President. It has been my privilege to serve in this role for the last 4 years. It hasn't been quite the Presidency any of us could have imagined, but nevertheless the Union has maintained considerable activity, much of it online, and influence. The abstracts submitted to the GA suggest an appetite for in-person meeting; I hope we can make the most of the opportunity to get together.

Kathryn Whaler

MESSAGE FROM THE SECRETARY GENERAL



Another, meanwhile third year under COVID-19 conditions! At least 2022 brought first signs of easing and in-presence meetings.

A number of selected, individual highlights are reported on here:

On the occasion of the annual Earth Day on 22 April 2022 the Task Team "Public Engagement and Outreach to increase Earth and Space Science Awareness" of the **Global Geoscience Societies**, presented a [shared statement](#) (see graphic). The thematic focus was the vulnerability of planet Earth and its protection. The declaration was signed by a total of 15 societies and unions and enjoyed high visibility and a corresponding

echo in the social networks.

Another milestone was the **relocation and relaunch of our website!** This measure was already based on a discussion in the IUGG Bureau in 2021, but was mandatory since 24 February 2022. In July, the time finally arrived: the [new IUGG website](#) shone in a fresh, contemporary design and now runs under the European Data Protection Directives. Many thanks to our previous webmaster Dima, to the new webmaster Jan and, of course, to Franz for taking care of the migration. We have taken leave from many older pages and created new links. Should there still be one or the other broken link, please let us know.

As international geoscience organizations, on today's Earth Day we celebrate Earth's abundant natural resources; its diverse but threatened natural environments; and all the beautiful but fragile life with which we share this planet.

We recognize that we have an important role to play in conserving, managing, and caring for our shared home, and that science can guide us on our path to a healthy, safe, and sustainable future for this Earth. Please join us in calling attention to and acting on this urgent task.



A temporal focus has been preparation work for the **IUGG General Assembly 2023**, taking place in Berlin in July. I participated in numerous video conferences of the SPC (=Science Programme Committee) as a member and was present as a guest at several meetings of the LOC (=Local Organising Committee). It was also impressive to experience Messe Berlin and its City Cube (our conference venue) under full load again in September. I look forward to welcoming many participants to this event!

With regard to business travel, let me mention the following three events: At the beginning of September, I participated in the [3ECEES: The Third European Conference on Earthquake Engineering and Seismology](#), together with the **ESC (European Seismological Commission)** in the Palace of Parliament in Bucharest/Romania. With this meeting I also refreshed my **IASPEI affiliation** and, of course, met many colleagues and friends. Unfortunately, my presence on site was limited in time.

The duties of a Secretary General also include farewells. At the beginning of November, I attended the **funeral service and burial of the late Helmut Moritz (1933-2022)** in Graz. An impressive tribute to the

life's work of our former IUGG President (1991-95) is published in the [November eJournal \(Vol. 22, Issue 11\)](#).

At the end of the year, I took part in the **AGU Fall Meeting**, this time in Chicago. In the McCormick Place Convention Centre, supposedly the largest congress centre on the American continent, around 20,000 participants finally met again in presence. Together with the Executive Secretary and the PCO (= Professional Congress Organiser) C:IN appointed by the Berlin organiser, we enthusiastically promoted the IUGG General Assembly in Berlin at our booth in the exhibition area. Furthermore, I had the pleasure of representing the IUGG in several leadership meetings with the other Global Geosciences Societies.

Finally, I thank my team in the Secretariat: Katrin and Franz! We are committed to providing excellent service to the Union and its associations. I also thank the GFZ — my employer — for hosting and supporting the IUGG Secretariat, as well as the German Research Foundation DFG.

Alexander Rudloff

IUGG ACTIVITIES

IUGG SECRETARIAT

The [IUGG Secretariat](#) is located at the German Research Centre for Geosciences in Potsdam (GFZ). The Secretariat is managed by the IUGG Secretary General Alexander Rudloff and the IUGG Executive Secretary Franz Kuglitsch, and supported by Katrin Gundrum. The Secretariat is responsible for implementing the day-to-day operations of IUGG; this includes (i) maintenance of daily correspondence and communication with IUGG National Committees, Adhering Organizations, Union Associations, Executive and Financial Committees, Union Commissions, Committees, Partner Organizations, and others; (ii) maintenance of IUGG electronic databases and technical documents; (iii) supervision of the IUGG web-master and preparation of updates for the IUGG website and social media in timely fashion; (iv) development of IUGG Yearbooks and Annual Reports; (v) negotiations with companies for production of IUGG-related publications, medals, pins etc.; (vi) publication of the IUGG E-Journal (monthly issues); (vii) assistance in technical screening of IUGG grant applications, medal and awards nominations; (viii) preparation work for IUGG General Assemblies, Council, Executive Committee, and Bureau Meetings; and some other activities.

The IUGG Secretariat is co-sponsored by the **GFZ** and the **German Research Foundation (DFG)**. IUGG thanks the GFZ and DFG for the financial support of the Secretariat.

IUGG Yearbook. The Secretariat maintains the data related to the IUGG and its Association and produce annually a Yearbook which is available [here](#). By the decision of the IUGG Bureau only the current Yearbook should be linked to the IUGG website.

IUGG website and social media. The new [IUGG website](#) went online in September 2022. It is maintained and regularly updated by the new IUGG webmaster Jan Schubert. To learn more about IUGG and to keep individuals updated on Union's activities, the IUGG Secretariat maintains social media accounts on Facebook, Flickr, Twitter, and YouTube.

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 Science Council (ISC), news and reports related to IUGG scientific programs and co-sponsored scientific meetings, and a calendar of scientific meetings.

IUGG Exhibition Booth. To promote the IUGG General Assembly 2023 ([IUGG2023](#)), IUGG had an exhibition booth at the EGU General Assembly 2022 in Vienna, Austria, and at the AGU Fall Meeting 2022 in Chicago, USA.

IUGG BUSINESS MEETINGS 2022

After more than three years, the IUGG Bureau Members and the Chair of the Finance Committee met again in person on 20 and 21 September 2022 in Berlin and Potsdam, Germany, to discuss the administration and finance of IUGG, to visit the venue of the IUGG General Assembly 2023 ([IUGG2023](#)), and to meet with representatives of the Local Organising Committee ([LOC](#)), the Scientific Program Committee ([SPC](#)), and the German Research Centre for Geosciences ([GFZ](#); the host of IUGG2023) to discuss the preparations for IUGG2023. In addition, the Memorandum of Understanding between IUGG and GFZ was signed.



Left picture: participants of the IUGG Bureau Meeting 2022, Kathy Whaler (President), Chris Rizos (President-elect), Alex Rudloff (Secretary General), Steve McNutt (Bureau Member), Aksel Hansen (Treasurer 1999-2019), Corina Risso (Chair of the Finance Committee), Franz Kuglitsch (Executive Secretary), and Eduard Petrovsky (Bureau Member) (fLTR). Niels Andersen (Treasurer; top left corner)

IUGG SECRETARIAT 2012-2022

The IUGG Bureau, on behalf of the IUGG community, congratulates and thanks Franz Kuglitsch, IUGG Executive Secretary, for his tireless efforts and extremely effective performance over the last decade. Franz joined the IUGG as Executive Secretary in November 2012 when the IUGG Secretariat was established at the German Research Centre (GFZ) in Potsdam, Germany. The IUGG Secretariat is the information centre of IUGG, it implements the organisation plans, oversees the daily management of the Union, prepares business meetings, represents the Union at conferences, publishes documents, and supports the engagement of National Members in the Union's and Associations' activities.

More information about Franz can be found [here](#) (pages 3-4).

On this occasion, the IUGG thanks GFZ and the German Research Foundation (DFG) for their generous and continuous support.



Franz Kuglitsch, IUGG Executive Secretary (left), receives the certificate of honour from Alexander Rudloff, IUGG Secretary General (right) at the GFZ

PREPARATIONS FOR THE IUGG GENERAL ASSEMBLY 2023

Welcome to Berlin!



Progress Report

The XXVIII IUGG General Assembly ([IUGG2023](#)) will be held from 11 to 20 July 2023 in Berlin, Germany. This is a special opportunity for participants from Europe and from around the world to meet in-person under the theme *Together Again for Geosciences*.

The IUGG2023 will be hosted by the German National Committee for Geodesy and Geophysics (NKG) and organised by the German Research Center for Geosciences ([GFZ](#)). It will be supported by the German Research Foundation ([DFG](#)), the Federal Institute for Geosciences and Natural Resources ([BGR](#)), the German Adhering Body to IUGG) and several other German organisations and research centres. We look forward to welcoming over 5,000 delegates at the Assembly.

The Local Organising Committee ([LOC](#)) was assembled from researchers across Germany, meets regularly online, and appointed [C-IN](#) as the professional conference organiser. A number of important activities have taken place so far, including the setup of the conference website, the production of advertising material, and the active promotion of IUGG2023 at major international conferences.

The Scientific Program Committee ([SPC](#)) consists of the Secretaries General of the Associations and the Union, meets regularly online, and decided to reduce the scientific program of IUGG2023 to 8 days (12 to 19 July 2023). Currently, 6 Union Symposia, 9 Union Lectures, and over 50 Inter-Association symposia proposals have been accepted and are in the final stages of preparation. At the Association level, over 150 symposia proposals are under consideration. The next and final stage includes their refinement by the lead conveners and the approval by the lead Associations with the planned date of posting at the end of September 2022.

Together, the two committees have agreed on the following [deadlines](#):

IMPORTANT DATES

30 September 2022

- Online registration and abstract submission opens
- Online accommodation reservations open
- Travel grant applications open

14 February 2023

- Closing of abstract submission
- Closing of grant application submission

17 March 2023

- Abstract/grant acceptance sent to participants

28 April 2023

- Early-bird registration closes

02 May 2023

- Newsletter on field trips and accommodation reservations
- Final Adjustment of program

12 May 2023

- Complete scientific program and guidelines for presenters published

If you need a visa to travel to the European Union, please find more information [here](#).

Harald Schuh (LOC Chair) and Jürgen Müller (SPC Chair)

ASSOCIATION SCIENTIFIC ASSEMBLIES 2022

IAHS Scientific Assembly 2022

The XIth IAHS Scientific Assembly (IAHS2022) was held in Montpellier, France from 29 May to 3 June 2022 with a very rich [scientific programme](#).

The Scientific Assembly was the opportunity to celebrate the 100-year anniversary of the association, to look forward to the end of the [Panta Rhei](#) decade which will close in 2023, to envisage progress on the 23 UPHs - [Unsolved Problems in Hydrology](#), and to screen developments of [Open Science](#) and support to [Agenda 2030](#) in water-related fields.

There were 600 attendees from 65 countries at this in-person meeting locally organised by a team of scientists from diverse institutions federated by the UNESCO Cat2 Centre ICIREWARD. COVID-19 travel restrictions continued to cause problems for some attendees with about 80 cancellations.

In 2021, the local organising committee decided not to hold the meeting in hybrid mode so as to encourage attendance and better collaboration. This was generally thought to be a good decision especially for the networking opportunity availed to younger members. Members were delighted to meet again and have the opportunity for discussion and interaction.

Left to right: Christophe Cudennec (Secretary General IAHS), Abou Amani (Director, Division of Water Sciences UNESCO), Hubert Savenije (2020 Dooge medallist), Francis Chiew (2022 Volker medallist), Eleni Maria Michailidi (2020 Tison awardee), Taikan Oki (2021 Dooge medallist), María José Polo Gómez (2022 Dooge medallist), Berit Arheimer (President IAHS), Günter Blöschl (Past President IAHS), Svenja Fischer (2021 Tison awardee), Johannes Cullmann (Director, Climate and Water Department, WMO – receiving award for Harry Lins 2021 Volker medallist), Alexander Ross (2022 Tison awardee), Attilio Castellarin (Editor in Chief HSJ), Salvatore Grimaldi (Vice President IAHS), Bruno Merz (2020 Volker medallist)

IAHS2022 was the first in-person assembly since the IUGG General Assembly in Montréal, Canada in July 2019. The plenary therefore provided an opportunity to celebrate [IHP IAHS-UNESCO-WMO medallists and Tison award](#) winners for three years (2020-2022). Our congratulations go to them all.

Of the [33 SYSTA awards](#) granted to attend the assembly 25 were able to participate. Seven were unable to attend due to visa issues and one withdrew. IAHS organised their flights, accommodation and registrations as well as refunding local expenses up to a maximum total of EUR 2,500. They all spoke highly of the opportunity afforded to them to meet and interact with their peers.

The [Early Career Committee](#) representatives took up their roles during the assembly. IAHS international commissions and working groups, the Editorial Board of Hydrological Sciences Journal and the IAHS Bureau had strategic and operational meetings. WMO and UNESCO took the opportunity to reach out to the scientific community on their latest developments and on science-operational-policy interactions.

Participants of IAHS2022 in Montpellier, France

Christophe Cudennec, IAHS Secretary General

UNION COMMISSION CONFERENCES 2022

CMG – 33rd IUGG Conference on Mathematical Geophysics

The 33rd IUGG Conference on Mathematical Geophysics ([CMG2022](#)) was held in Seoul, Republic of Korea, from 20 to 24 June 2022 in a hybrid format. The conference was organised by the Union Commission on Mathematical Geophysics (CMG) and hosted by the Seoul National University. The theme of the conference was “Geophysics in the World of Modern Mathematics and Artificial Intelligence”. The CMG2022 [Program](#) covered several important topics related to data sciences, AI, machine learning, geophysical fluid dynamics, mathematics for natural hazards and climate science, and geophysical inversions. More than 140 people from 33 countries attended the conference.



The crystal Vladimir Keilis-Borok Medal 2022

Two keynote lectures were delivered by Frederik J. Simons of Princeton University, who received the 2022 Keilis-Borok Medal for his outstanding contributions to mathematical geophysics and development of cutting-edge mathematical methods in geoscience data analysis, and Kwang-Yul Kim of Seoul National University. A [panel](#) of eminent experts in geosciences, physics, and mathematics discussed how basic science, mathematics, science education and policymaking should be integrated so as to contribute to solving fundamental problems of nature and society as well as challenging issues of sustainability. The panel raised awareness about *the 2022 United Nations International Year of Basic Science for Sustainable Development* in promoting the basic sciences.



Conference group photo

Over five days 14 invited speakers from Czech Republic, France, Hungary, Oman, Russia, Rwanda, Saudi Arabia, Switzerland, UK, and USA presented cutting-edge mathematical applications to geosciences. In addition, participants enjoyed more than 40 contributed presentations and discussed challenging issues in mathematical geophysics. The conference was preceded by a two-day workshop “Geodynamic Modeling with the Advanced Solver for Problems in Earth ConvecTion (ASPECT)”. The conference was highlighted in [local media](#). More information on the conference can be found [here](#).

Alik Ismail-Zadeh, Sang-Mook Lee and Ilya Zaliapin, CMG2022 organisers

SEDI – 17th Symposium of the Study of the Earth's Deep Interior

In 2022, the SEDI meeting was supposed to be held in Taipei, at the National Taiwan University at the Institute of Earth Sciences (Academia Sinica) after cancellation of the 2020 meeting in Taipei. The local organizing committee included Frederic Deschamps and Ban-Yuan Kuo (co-leads) along with Wen-Che Yu, Wen-Pin Hsieh, Kenny Vilella and Hsing-Wen (Samantha) Hsieh. However, due to the continuation of the Covid pandemic and the travel restrictions and quarantine requirements that were in place for Taiwan, we held the 2022 SEDI meeting at ETH Zürich with a very short preparation time. The organizing committee was the same as for Taipei and in addition included Jerome Noir and Karin Emmenegger of the ETH. The speakers and chairs were similar to those planned in 2020 but there were restrictions for flights from Japan and other Asian Countries (due to the war in Ukraine AND the pandemic), which reduced the presence of those scientists. The scientific program of the meeting is available at the web site <https://sedi2022.earth.sinica.edu.tw/>

The atmosphere during SEDI was marked by a happiness to meet with colleagues again after a long time of virtual conferences and many young scientists were present and benefitting from talking with each other and colleagues from different institutions. The organization, even though the ETH and Taipei team had only 4 months for preparation, was excellent and we believe people enjoyed the conference and the presentations. While many participants were present at ETH, there was also the possibility to follow talks online on the ETH platform or on Zoom.

We feel that as a small conference SEDI fosters strong collaborations/interactions and is a good way for early career scientists to present their work, and a physical meeting is therefore the best form for SEDI meetings also in the future.



Participants of the 2022 SEDI meeting at ETH Zurich

INTER ASSOCIATION MEETINGS 2022

EMSEV22

The 2022 symposium ElectroMagnetic Studies of Earthquakes and Volcanoes ([EMSEV2022](#)) was held in a hybrid format from 22 to 24 August 2022 at the National Central University (NCU), Taoyuan, Rep. of China. The symposium was mainly planned by Prof. J.Y. Liu from NCU and the EMSEV Bureau.



The [scientific programme](#) of EMSEV2022 included six sessions:

- Electromagnetic methods for seismicity and volcano monitoring.
- Theoretical and laboratory studies for understanding seismic and volcanic phenomena.
- Satellite observations for volcanic and seismic hazard assessment and monitoring.

- Earthquake and volcano related phenomena investigation by multidisciplinary and multi-parametric approaches.
 - Magnetospheric, ionospheric, atmospheric, and lithospheric coupling.
 - Electromagnetic signals associated with earthquakes and volcanic eruptions.
- and a special session on "Hunga Tonga Hunga Ha'apai volcano eruption, 15 January 2022".

EMSEV2022 was attended by more than 80 participants from ten countries incl. Rep. of and P.R. China, USA, Japan, France, Italy, Russia, Greece, India, and Fiji.

At the EMSEV Bureau Meeting on 9 September 2022, Prof. S. Kumar of The University of the South Pacific in Fiji and Prof. F. Vallianatos of the National and Kapodistrian University of Athens in Greece presented their bids to host EMSEV2024. It was decided to organise EMSEV2024 in Crete, Greece, in September 2024.

Our thanks go to all the participants, NCU as the host, and the co-sponsors incl. Academia Sinica, NCU Space Physics and Engineering Center, and IUGG for making EMSEV2022 a great success.

Toshiyasu Nagao, EMSEV Chair

ASSOCIATION JOURNALS

The IUGG, through some of its Associations, regularly publishes a number of peer-reviewed journals covering various topics of Earth and space sciences. Here, we would like to introduce you to the major journals of our Associations.

International Association of Geodesy (IAG)

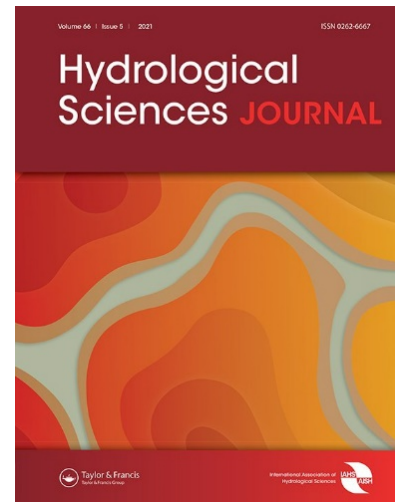
The [Journal of Geodesy](#) is the official journal of the IAG concerned with the study of scientific problems of geodesy and related interdisciplinary sciences. It presents peer-reviewed papers on theoretical or modelling studies, and on results of experiments and interpretations. In addition to original research papers, the journal includes commissioned review papers on topical subjects, occasional short notes on topics with broad significance to the readership, and special issues arising from scientific symposia or workshops. The journal covers the whole range of geodetic science and reports on theoretical and applied studies in research areas such as positioning; reference frame; geodetic networks; modelling and quality control; space geodesy; remote sensing; gravity fields, and geodynamics. The Journal of Geodesy is published by Springer. Five year impact factor: 4.9 (2022).



- An international journal examining scientific problems of geodesy and related interdisciplinary sciences.
- Covers the entire range of geodetic science.
- Presents peer-reviewed papers on theoretical or modelling studies, and on the results of experiments and interpretations.
- Reports on theoretical and applied studies in research areas such as positioning; reference frame; geodetic networks and more.
- 97% of authors who answered a survey reported that they would definitely publish or probably publish in the journal again.

International Association of Hydrological Sciences (IAHS)

The [Hydrological Sciences Journal](#) is the official Journal of the IAHS and provides a forum for original papers and for the exchange of information and views on significant developments in hydrology worldwide. The Hydrological Sciences Journal is published by Taylor & Francis. Five-year impact factor: 3.7 (2022).

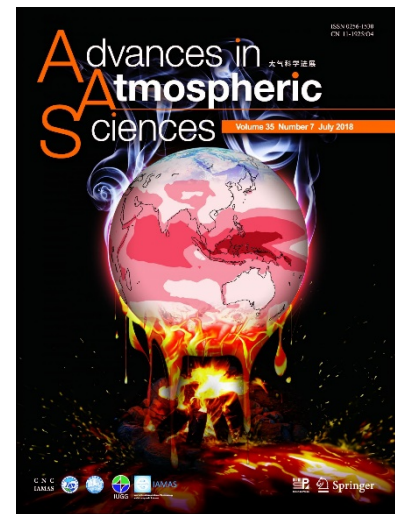


The scope of the journal includes:

- The hydrological cycle.
- Surface water, groundwater, snow and ice, in all their physical, chemical and biological processes, their interrelationships, and their relationships to geographical factors, atmospheric processes and climate, and Earth processes including erosion and sedimentation.
- Hydrological extremes and their impact.
- Measurement, mathematical representation and computational aspects of hydrological processes.
- Hydrological aspects of the use and management of water resources and their change under the influence of human activity.
- Water resources systems, including the planning, engineering, management and economic aspects of applied hydrology.

International Association of Meteorology and Atmospheric Sciences (IAMAS)

[Advances in Atmospheric Sciences](#), launched in 1984, offers rapid publication of original scientific papers on the dynamics, physics and chemistry of the atmosphere and ocean. It reports on the latest achievements and developments in the atmospheric sciences, including marine meteorology and meteorology-associated geophysics, as well as the theoretical and practical aspects of these disciplines.



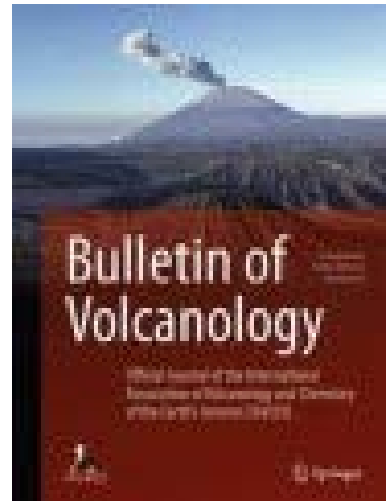
The coverage includes weather systems, numerical weather prediction, climate dynamics and variability, satellite meteorology, remote sensing, air chemistry and the boundary layer, clouds and weather modification. Papers describing the application of new mathematics or new instruments are also collected here.

Advances in Atmospheric Sciences is sponsored by the Chinese Committee for IAMAS, the Institute of Atmospheric Physics at Chinese Academy of Sciences and Chinese Meteorological Society. It is the associated journal of IAMAS and is published by Springer. Five year impact factor: 4.7 (2022).

- This journal presents original scientific papers on the dynamics, physics and chemistry of the atmosphere and ocean.
- Covers weather systems, numerical weather prediction, climate dynamics and variability, satellite meteorology, remote sensing, and more.
- Free app available on iTunes and Google Play Store.

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

The [Bulletin of Volcanology](#) was founded in 1922, as Bulletin Volcanologique, and is the official journal of the IAVCEI. The Bulletin of Volcanology publishes papers on volcanoes, their products, their eruptive behaviour, and their hazards. Papers aimed at understanding the deeper structure of volcanoes, and the evolution of magmatic systems using geochemical, petrological, and geophysical techniques are also published. Material is published in four sections: Review Articles; Research Articles; Short Scientific Communications; and a Forum that provides for discussion of controversial issues and for comment and reply on previously published Articles and Communications. The Bulletin of Volcanology is published by Springer. Five year impact factor: 2.9 (2022).



IUGG GRANTS PROGRAM 2022-2023

IUGG continues its Grants Program for 2022-2023, which will complement the Union program of funding symposia and workshops organised or co-sponsored by Union Associations and Union Commissions. Key priority areas are defined for the Grants Program in line with IUGG overall scientific strategies:

- Creation of new knowledge in Earth and space sciences
- Dissemination of knowledge, data and information on geophysics and geodesy
- Geoscience for sustainable development
- Geoscience and policy interface
- Geoscience education and outreach in developing countries

For 2022-2023, IUGG awarded grants to the following projects:

- ***Implementing IUGG 2015 Resolution #4: Organization of the GNSS Tsunami Early Warning (GTEWS) Consortium*** (a joint project between GRC, IAG, IAGA, IAPSO, IASPEI, and IAVCEI);
- ***Kyoto Landslide Commitment 2020*** (a joint project between GRC, IAGA, IASPEI, and IAVCEI);
- ***2nd IAG Commission 4 Symposium "Positioning and Applications"*** (a joint project between IAG and IAGA); and
- ***Discovering Patascoy, an unknown Holocene volcano*** (a joint project between IAVCEI and IASPEI).

In July 2022, the IUGG decided to issue the IUGG Grants Program 2022-2023 (Special Call) which is dedicated to the International Year of Basic Sciences for Sustainable Development (IYBSSD2022). The program aims to support projects which address international cooperation in Earth and Space Sciences and that highlight the importance of basic science for sustainable development.

The IUGG awarded grants to the following projects:

- ***Geosciences for Sustainable Development*** (a joint project between CCEC and IAPSO)
- ***2023 Glacial Isostatic Adjustment (GIA) Training School*** (a joint project between IACS and IASPEI)
- ***Workshop in Geodesy and SAR*** (a joint project between IAG and IASPEI)

- **Sixth Meeting of ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management** (a joint project between IAMAS and IAG)
- **Heat Flow Summer School & Workshop** (a joint project between IAPSO, IASPEI, and IAVCEI)
- **Towards creating and launching the Network for African Volcanologists (NAV)** (a joint project between IASPEI and IAVCEI)
- **Celebrating the 80th anniversary of Parícutin volcano (Michoacán, Mexico): Preserving our heritage and preparing for future eruptions; February 19-24, 2023** (a joint project between IAVCEI and IASPEI)
- **Improving earthquake preparedness through geoscience education in the Himalaya** (a joint project between SEDI, IASPEI, and ILP)

The total funding is USD 65,000.

GEOSCIENCE EDUCATION

The collaboration between IUGG and ICTP

Since 2011, the Abdus Salam International Centre for Theoretical Physics ([ICTP](#), Trieste, Italy) and IUGG have been working together to enhance geophysical and geodetic education and science collaboration. IUGG annually awards grants (48 awards between 2011 and 2019) to support science education events, such as workshops and training schools, organized by ICTP.

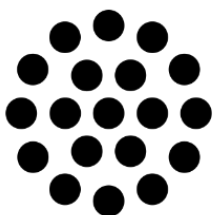
Founded in 1964, by the late Nobel Laureate Abdus Salam, ICTP seeks to accomplish its mandate by providing scientists from developing countries with the continuing education and skills that they need to enjoy long and productive careers. ICTP has been a major force in stemming the scientific brain drain from the developing world. The impact of ICTP extends well beyond the Centre's facilities to virtually every corner of the Earth.

IUGG grants to support geoscience education events from 2020 to 2022

Due to the COVID-19 pandemic, most of the ICTP scientific meetings planned for 2020-2022 were cancelled or postponed. The 2020-2022 IUGG contributions will be used to support future ICTP/IUGG projects.

COOPERATION WITH THE INTERNATIONAL SCIENCE COUNCIL (ISC)

ISC Statement on Ukraine



**International
Science Council**



The IUGG echoes the [Statement on Ukraine](#) published by the International Science Council ([ISC](#)) on 28 February 2022 (see below) and expresses its deep dismay and concerns regarding the military offensives being carried out in Ukraine and warns against the severe outcomes that conflict will have on the research and academic community. IUGG opposes any discrimination or harassment of

individuals based on factors such as age, citizenship, disability, ethnic origin, gender identity, language, political or other opinion, religion, or sexual orientation. It is the IUGG policy to follow the regulations of the ISC on non-discrimination and universality of science.

»The ISC expresses its deep dismay and concerns regarding the military offensives being carried out in Ukraine. This conflict has already generated a grave humanitarian crisis.

Science has proven to act as a platform for dialogue even in times of war, and therefore is a resource on which to capitalize to avoid further loss of life and disruption including that to scientific research and infrastructures. The ISC counts members in all countries involved in this conflict.

At a time when the demand and the potential for science to provide actionable knowledge to our global challenges on multiple fronts – climate change, the COVID-19 pandemic, and growing inequalities – are greater than ever, the current conflict in Ukraine and its consequences will hamper the power of science to solve problems when we should be harnessing it.

The ISC also warns against the severe outcomes that conflict will have on the research and academic community. Our capacity to work collaboratively on global challenges, and on cutting edge research such as Arctic and space research, is only equal to our capacity to maintain strong collaboration amidst geopolitical turmoil. Ultimately the isolation and exclusion of important scientific communities is detrimental to all.

The ISC and its [partners](#) are committed to assisting the global scientific community in welcoming and protecting scientists who have been placed at-risk or become displaced by this conflict by providing them opportunities to continue their work.

The ISC is committed to continue advancing the equal participation and collaboration between scientists in all countries in its activities and the principle of the free and responsible practice of science which is enshrined in its [statutes](#).«

ISC Annual Report 2021



The International Science Council's (ISC) 2021 Annual Report is now available [here](#). 2021 was a pivotal year for the ISC, with the launch of major new activities, a well-attended General Assembly, and the election of the Council's second Governing Board.

COOPERATION WITH INTERNATIONAL AND INTERGOVERNMENTAL ORGANIZATIONS

IUGG and Partners – Joint Earth Day Statement

IUGG celebrates Earth Day on 22 April 2022 together with its partners and published the following statement.

As international geoscience organizations, on today's Earth Day we celebrate Earth's abundant natural resources; its diverse but threatened natural environments; and all the beautiful but fragile life with which we share this planet.

We recognize that we have an important role to play in conserving, managing, and caring for our shared home, and that science can guide us on our path to a healthy, safe, and sustainable future for this Earth. Please join us in calling attention to and acting on this urgent task.



IUGG attending the DGG100 Celebrations in Berlin

President Kathy Whaler attended in person the celebration of the German Geophysical Society's Centennial event (DGG100) on 19 September 2022, in Berlin, Germany. The event took place in the



Kathy Whaler, promoting the IUGG General Assembly 2023 (left) and framed by the IUGG Secretary General and DGG President Thomas Bohlen, from the Karlsruhe Institute of Technology (KIT), pictures: DGG (photothek/Liesja Johannsen), 2022

premises of the State Representation of the Free State of Saxony, as a reference to the fact that the DGG was founded in Leipzig in 1922. About 50 people attended the exclusive event, which included a programme of greetings, birthday greetings, impulses, messages from IUGG, AGU and EGU, and a historical review of 100 years of DGG.

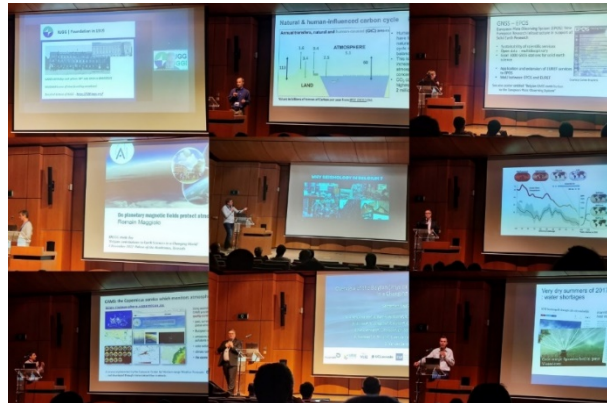
IUGG Belgium – Study Day on Belgian Contributions to Earth Sciences in a Changing World

The Belgian National Committee for Geodesy and Geophysics ([BNCGG](#)), the Belgian adhering body to IUGG, organised a study day on 4 November 2022 in Brussels aiming at bringing together the Belgian Earth sciences community, and to showcase ongoing contributions to international programmes in each of the eight associations of the IUGG. The venue of the symposium was the Palace of the Academies, the same building where the IUGG was founded on 28 July 1919 when Belgium was one of the nine founding members. The [study day](#) was conceived as a mixture of plenary presentations for each of the eight associations and lengthy poster sessions aimed in particular at PhD students and postdocs.

The welcome address was given by Alexander Rudloff, IUGG Secretary General, who reminded the audience about the historical role of Belgium in the Union and gave a good overview of the mission and structure of IUGG. The keynote lecture was delivered by Richard Allan from the University of Reading, UK, and focused on the global water cycle by means of Earth Observation Data and climate prediction models. This was followed by talks focusing on all of the associations, which gave an excellent overview of Belgian scientific highlights in each of the respective research fields.

The symposium was attended by 80 scientists and 50 posters were presented.

Philippe Huybrechts, President of BNCGG, on behalf of the Organising Committee



Composite picture of the plenary presentations. From left to right, and from top to bottom: Alexander Rudloff (IUGG), Richard Allan (keynote), Véronique Dehant (IAG), Romain Maggiolo (IAGA), Thomas Lecocq (IASPEI), Frank Pattyn (IACS), Simon Chabrilat (IAMAS), Sébastien Legrand (IAPSO), and Patrick Willems (IAHS)

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 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)

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)



IACS

International Association
of Cryospheric Sciences

IACS website: www.cryosphericosciences.org

INTRODUCTION

The International Association for Cryospheric Sciences (IACS) is the Association of the International Union of Geodesy and Geophysics (IUGG) concerned with snow and ice science and 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 coordination;
- 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;
- promote and support diversity, inclusion and equality within the field of cryospheric science, including but not limited to career stage, gender, racial and ethnic identities, and geographic origin.

ADMINISTRATION

In the absence of an in-person assembly in 2022, the IACS Annual Bureau Meeting was held online on 20 October 2022. Annual meetings include reports from all of the IACS Divisions, Working Groups, Standing Groups, Joint Bodies and Joint Commissions. We have found that splitting these online meetings into two sessions at different times of day to suit different time zones is an efficient and inclusive way to conduct IACS business while reducing carbon footprint.

To run the day-to-day business of IACS, an Executive Committee consisting of the President, Secretary General and President-Elect or Immediate Past-President holds regular teleconferences, in which all Bureau members are welcome to join.

ACTIVITIES

IACS communications

The IACS homepage (<https://cryosphericsscience.org/>) is hosted at the World Glacier Monitoring Service in Zurich and is linked to twitter account @iacscryo (<https://twitter.com/iacscryo>). IACS newsletters feature announcements and reports of IACS activities (<https://cryosphericsscience.org/newsletter/>). Four newsletters were published in 2022.

IACS Working and Standing Groups

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 IACS Working Groups are:

- Randolph Glacier Inventory and its role in future glacier monitoring and GLIMS (2020-2023) has the objective of automating the process of generating digital glacier outlines to support research in glacier mass balance and contributions to sea level rise. RGI version 7 was pre-released for international review in 2022.
- Regional Assessments of Glacier Mass Change (RAGMAC, 2019-2023) brings together the research community that is assessing regional glacier mass changes from various observation technologies to come up with a new consensus estimate of global glacier mass changes and related uncertainties. The Glacier Mass Balance Intercomparison Exercise (<https://glambie.org>) was launched in 2022.
- Debris Covered Glaciers (2018-2022) aims to advance our ability to map debris thickness, to identify the level of model complexity required to estimate sub-debris melt, and to coordinate knowledge exchange. A one-year extension has been requested and approved to allow completion of WG publications following pandemic delays.

“Glacier mice” are moss balls found on the surface of some glaciers. This one is circa 7 cm in diameter and was found on the surface of Austerdalsbreen, an outlet of Jostedalbreen, Norway (photo: Liss M. Andreassen, September 2021)

Two new WG suggestions on Antarctic Marginal Ice Zone Processes and Glacier - Ice Sheet Delineation were announced on Cryolist and in the November 2022 IACS Newsletter. The aim is to develop these plans into full proposals.

The IACS/IPA Standing Group on Glacier and Permafrost Hazards in High Mountains (GAPHAZ) aims to:

- improve international scientific communication on glacier and permafrost hazards;
- compile knowledge related to glacier and permafrost hazards in high mountains;
- work towards greater transfer of information and improved communication between the scientific and governmental communities;
- signpost sources of advice to international and national agencies, responsible authorities and private companies;
- act as a focal point for information for international media during relevant crises.

IACS is part of the Global Terrestrial Network for Glaciers (GTN-G) Steering Committee. GTN-G is a framework for internationally coordinated monitoring of glaciers jointly run by the US National Snow and Ice Data Center, the Global Land Ice Measurements from Space initiative, and the World Glacier Monitoring Service.

IACS Joint Commissions

Joint Commissions with other IUGG Associations aim to foster collaboration and coordination on topics of overlapping interests. IACS currently has three Joint Commissions:

- IACS-IAG Joint Commission on Cryospheric Deformation. IACS secured an IUGG grant in the 2022 special call to support the Glacial Isostatic Adjustment Training School.
- IACS-IAPSO Joint Commission on Ice-Ocean Interactions. An online workshop on ice-ocean interactions was held 17-19 October 2022. JCIOI Terms of Reference were approved by the IACS and IAPSO Bureaus.
- IACS-IAVCEI Joint Commission on Volcano-Ice Interactions. An EGU 2022 session was co-sponsored.

Joint bodies

IACS approved the creation of a Joint Body with the Mountain Research Initiative and the WMO Global Cryosphere Watch on “the status of the mountain snow cover” in 2022. The objectives of the Joint Body are to:

- provide robust information on mountain snow cover changes at a global scale;
- better understand processes of snow accumulation and ablation based on existing modelling and observational studies;
- open access to snow data for the research community and operational capacity building for understanding mountain snow cover changes and impacts.

A session on mountain snow cover was organized at the International Mountain Conference 2022 and a side event was contributed through the Cryosphere Pavilion at COP27.

Co-sponsored events and activities

IACS supports events that are of interest to the cryospheric community. Our contributions typically cover part of the travel costs for early career scientists and scientists from developing countries attending cryosphere related events, or IACS awards for scientists in these categories. Funding

requests must be submitted for deadlines on 1 February, 1 June and 1 October and at least two months prior to the event that is to be supported. Proposers are informed of decisions approximately two weeks after the deadline. After a decrease in applications in 2020 and 2021, IACS provided support for the International Mountain Conference and approved support for the Snow Science Winter School in 2022.

Awards

The Graham Cogley Awards for 2022 were awarded to Gavin Piccione (University of California Santa Cruz, USA), Devon Dunmire (University of Colorado, USA) and Jonathon Preece (University of Georgia, USA) for student presentations at the Cryosphere 2022 conference in Reykjavik. This award, established in memory of Graham Cogley and generously sponsored by the Cogley family, recognizes excellence in glaciological research by early career scientists. It is awarded in alternate years by IACS and the International Glaciological Society.

IACS successfully nominated Valerie Masson-Delmotte (LSCE, France) for the IUGG Gold Medal and Mohd Farooq Azam (Indian Institute of Technology Indore), Natalya Gomez (McGill University, Canada) and Johan Gaume (WSL Institute for Snow and Avalanche Research SLF, Switzerland) for IUGG Early Career Scientist Awards.

FUTURE ACTIVITIES

IACS has proposed 15 symposia and 6 joint symposia and is contributing to 9 other joint symposia at the IUGG 2023 General Assembly.

Nominations have been received by an independent panel for election of a new IACS Bureau, including a President-Elect, during the IACS Plenary Meeting on 15 July 2023. The only Bureau position that is not up for election at this time is President; following the IACS Statutes, Liss M. Andreassen will serve for another two years as President, and then a further two years as Immediate Past-President.

The Secretary General is representing IACS on the steering committee for the fourth International Conference on Arctic Research Planning (Boulder, USA, 2025).

Richard Essery, IACS Secretary General

International Association of Geodesy (IAG)



IAG website: www.iag-aig.org

INTRODUCTION

The structure of IAG comprises several components: four Commissions (1. Reference Frames, 2. Gravity Field, 3. Earth Rotation and Geodynamics, and 4. Positioning and Applications), the Inter-Commission Committees on Theory (ICCT), Climate Research (ICCC), and Marine Geodesy (ICCM), IAG Project Novel Sensors and Quantum Technology for Geodesy (QuGe), twelve International Scientific Services, the Global Geodetic Observing System (GGOS), and the Communication and Outreach Branch (COB).

The Commissions are divided into Sub-commissions, Study Groups and Working Groups. The Inter Commission Committees (ICCs) and the Project investigate scientific geodetic-related problems in close cooperation with the Commissions. The Services generate scientific products utilizing Operation, Data and Analysis Centres.

The Global Geodetic Observing System GGOS is a component of IAG that works with the IAG Services to provide the geodetic infrastructure necessary for monitoring the Earth system and global change research. GGOS ensures the basis to maintain a stable, accurate and global reference frame, which is crucial for all Earth observation.

The COB provides communication, public information and outreach links, in particular via the IAG Website and the monthly Newsletters.

The IAG General Assembly, the Council, the Executive Committee, Bureau, and the Office carry out the administration of IAG. The Council is composed of the delegates appointed by the national adhering bodies; the Bureau comprises the IAG President, Vice-President and Secretary General; the Executive Committee consists of 17 elected members; the Office assists the Secretary General in fulfilling his duties. The COB is responsible for the promotional activities of the IAG and the communication with its members.

ADMINISTRATION

IAG Council

The IAG Council meetings are at the General Assembly, next time in July 2023 in IUGG GA in Berlin. In the interim, online meetings or electronic votes can be organized as needed. In 2022 there were no online meetings or voting. A few information emails were sent to the national correspondents.

IAG Executive Committee (EC)

The EC 2019-2023 held one online and one hybrid meeting in 2022. The online meeting was in two parts, on April 12 and 27 and the hybrid meeting in Paris on December 5. Additionally, there were several information e-mails to the EC members. There was one change in the EC, President of the Intercommission Committee for Marine Research (ICCM), Yangxi Yang stepped down, and EC the new president Valérie Ballu was approved unanimously by the EC.

IAG Bureau

The IAG Bureau (President, Vice President, and Secretary General) discussed day-to-day decisions through e-mail exchanges and regular monthly Zoom meetings.

IAG Office

The IAG Office (Secretary General, with the Treasurer and the “IAG Secretariat”, a registered Society concerning financial matters) managed the Association's finances, membership matters, daily contacts to IAG, IUGG and other external contacts, correspondence to Council and preparing meetings, minutes and notes of Council, Executive Committee and Bureau meetings.

ACTIVITIES

Due to the COVID-19 pandemic, all meeting-related activities were still lower than normal but quickly recovering. Towards the end of the year, several meetings were organised also in-person or hybrid, some of them delayed from the previous year.

Several IAG or IAG-sponsored meetings were organised in 2022. In parenthesis at the end is the IAG entity responsible or participating to organize the event.

- IVS Training School March 22-25, 2022, Helsinki, Finland. Online only; 120 participants, 20 teachers
- 12th IVS General Meeting March 28-April 1, 2022, Helsinki Finland. Online only, 175 participants (a new record of IVS), 98 contributions
- IGRF Workshop 2022, April 11-13, 2022 Leipzig, Germany (25 in-person, >60 online) (Commission 2, SC2.1)
- EUREF 2022 Symposium, June 1-4, 2022, Zagreb, Croatia (only online ~100 participants) (Commission 1 SC 1.3a)
- X. Hotine-Marussi Symposium on Mathematical Geodesy, Milan, Italy, 13-17 June 2022 (60 participants who contributed 80 papers, Proceedings to be published in the IAG Symposia series) (ICCT)
- IGS Workshop "IGS 2022: Science from Earth to Space", June 27-July 1, 2022, Boulder CO, USA (virtual)
- 2nd International Symposium: Positioning and Applications, September 5-9, 2022, Potsdam, Germany (75 participants, of which 45 in-person; Proceedings to be published in the IAG Symposia series) (Commission 4)
- Gravity, Geoid, and Height Systems 2022 (GGHS2022), September 12-16, 2022, Austin TX, USA (87 participants, 59 in-person, proceedings to be published in IAG Symposia series) (Commission 2)
- REFAG 2022, October 17-21, 2022, Thessaloniki, Greece (100 participants from 22 countries; proceedings to be published in the IAG Symposia Series in 2023) (Commission 1)
- Unified Analysis Workshop (UAW) October 22-25, 2022, Thessaloniki, Greece (62 participants, 49 on-site) (IERS)

- IDS Workshop 2022, October 31-November 2, 2022, Venice, Italy, In-person meeting with 23 presentations.
- 22nd International Workshop on Laser Ranging, Guadalajara, Spain, November 7-11, 2022 (109 in-person participants and 63 online; from 20 countries) (ILRS)
- SIRGAS Symposium, Santiago de Chile, November 7-9, 2022 (90 participants in-person and 130 online) (Commission 1 SC1.3b)
- GGOS Days 2022, November 14-16, 2022, Munich Germany (33 in-person and 78 online)



Participants of IAG International Symposium on Reference Frames for Applications in Geosciences (REFAG 2022), Thessaloniki, Greece on October 17-20, 2022. The Symposium was organized by the Aristotle University of Thessaloniki, under the scientific coordination of Commission 1 of IAG

Activities of Commissions, Inter-Commission Committees, and Services

The four IAG Commissions, Sub-Commissions, three Inter-Commission Committees, IAG Project, GGOS, and the twelve Services are gradually returning to their normal activities. Several online or hybrid symposia, webinars or seminars were organized during 2022. The pandemic still restricted activities, especially during the first half of 2022. On the other hand, many online or hybrid events were organized using the experiences learned during the pandemic. This implicates a permanent change in the ways to organise such events.

The IAG entities maintain their Webpages (accessible also via the IAG Homepage) where more details can be found, as well on the IAG Newsletter. Major IAG-sponsored meetings and symposia are listed above with the names of the responsible IAG entity.

IAG Services continued their activities almost normally. Data repositories, analysis centres and products of Services have been continued without interruptions. Meetings, workshops and other activities were organized online. New realisation of the global reference frame ITRF2020 published by the IERS product centre and transition to the new reference frame is going on at all relevant services and their products, including the precise GNSS Satellite orbits of IGS.

Communication and Outreach Branch (COB)

The main activities of the COB included the publication of the monthly Newsletter, GIM International and the maintenance of the IAG Homepage (www.iag-aig.org). The IAG Newsletter is published monthly and a part of it is also in the Journal of Geodesy as an open-access paper.

Cooperation with other Organisations

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

Publications

The IAG Newsletter was published monthly online and accessible via the IAG website.

Based on the agreement with Springer Verlag, IAG Symposia Series will be open access, and free of charge to the Symposia participants. Two books were published in 2022 in the IAG Symposia Series:

- Beyond 100: The Next Century in Geodesy: Proceedings of the IAG General Assembly, Montreal, Canada
- Advances in Terrestrial Gravimetry: IAG Symposium on Terrestrial Gravimetry: Static and Mobile Measurements

The number of submissions to the Journal of Geodesy remained well above 300, with about a 30% acceptance rate. The impact factor of the Journal is 4.8 (2021). The JoG is within the top ten geosciences-related journals.

IAG membership

By the end of 2022, there were a total of 186 members, of which 24 were students and 43 were retired members. Students and retired members are free of the annual fee.

Awards

Eleven early career scientists' Travel Awards were granted to participate in the meetings (none in 2020-2021).

Obituaries

The following obituaries were published in the IAG Newsletter:

- József Ádám (1950-2022)
- Gerd Boedecker (1944-2022)
- Bjørn Engen (1941-2022)
- Juhani Kakkuri (1933-2022)
- Steve Kenyon (1957-2021)
- Helmut Moritz (1933-2022)
- George Veis (1929-2022)

FUTURE ACTIVITIES

The situation is returning to normal after more than two years of pandemic restrictions. IAG entities will have smaller working group meetings or seminars, but most of the 2023 activities will be connected to the IUGG General Assembly in Berlin, July 11-20. All administrative meetings will be organised during the GA, as well as the meeting of the IAG Council.

There will be 6 IAG Symposia and 7 joint IAG-lead Symposia (the convener is IAG-related).

- G01 symposium Reference Systems and Frames
- G02 Static Gravity Field and Height Systems
- G03 Time-variable Gravity Field
- G04 Earth Rotation and Geodynamics
- G05 Multi-signal positioning, Remote Sensing and Applications
- G06 Monitoring and Understanding the Dynamic Earth with Geodetic Observations
- JG01 Interactions of the solid Earth with ice sheets and sea level
- JG02 Theory and Methods of Potential Fields
- JG03 Remote Sensing and Modelling of the Atmosphere
- JG04 Satellite Gravimetry for Groundwater Monitoring
- JG05 Geodesy for Climate Research
- JG06 Monitoring Sea Level Changes by Satellite and In-Situ Measurements
- JG07 Modern Gravimetric Techniques for Geosciences

Markku Poutanen, IAG Secretary General

International Association of Geomagnetism and Aeronomy (IAGA)



International Association
of Geomagnetism and Aeronomy

IAGA website: www.iaga-aiga.org

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 can trace its origins to the Commission for Terrestrial Magnetism and Atmospheric Electricity, part of the International Meteorological Organisation, which was established in 1873.

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

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

As a basis for these studies the IAGA community is also strongly involved in present and past magnetic field observations from ground observatories, magnetic surveys, space missions and paleomagnetic data measured in laboratories.

More information on IAGA is provided on its websites: <http://www.iaga-aiga.org>.

ADMINISTRATION

Since 2015, IAGA is organised in six Divisions and four Inter-divisional Commissions. Each Division may form Working Groups in specialised topics and elects officers to run the business of the Working Groups. The terms of office are linked to the IUGG General Assemblies. Lists of the Division/Inter-divisional Commission leadership and the Working Group names and officers can be found on the following website: <http://www.iaga-aiga.org/about/>. There were no changes to the IAGA Divisions, Commissions and Working Groups in 2022.

IAGA is administered by an Executive Committee (EC) on behalf of IUGG Member Countries in accordance with the Association's Statutes and By-Laws. The current Executive Committee members are:

President: Mioara Manda (France)

Vice-presidents: Alan Thomson (UK), Andrew Yau (Canada)

Secretary General: Monika Korte (Germany)

Treasurer: Aude Chambodut (France)

Members: Kusumita Arora (India), Loren Chang (Early Career Representative, Rep. of China), Anna Kelbert (USA), Michael Kosch (South Africa), Huixin Liu (Japan), Klaus Spitzer (Germany), Ricardo Trindade (Brazil)

The EC had virtual meetings in February, June, August and December 2022 and communicated frequently by e-mail.

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.iaga-aiga.org/about/>.

ACTIVITIES

Sponsored topical meetings

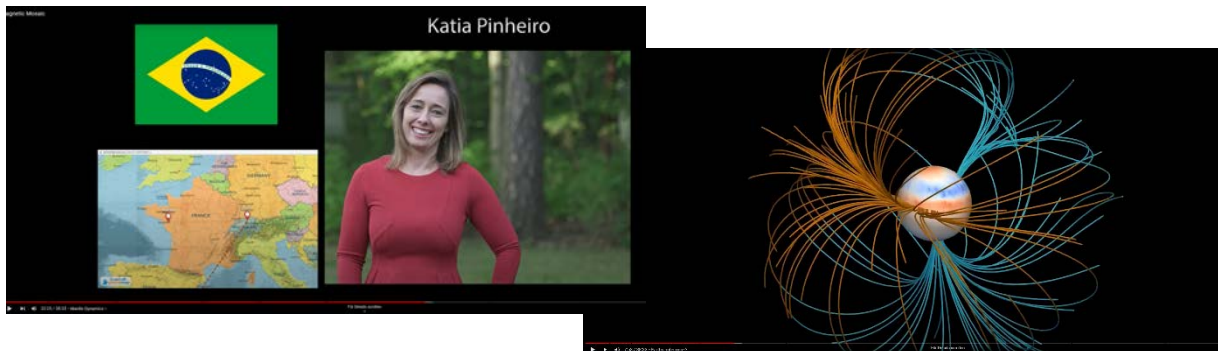
After two years when many topical workshops had to be cancelled or conducted virtually due to the pandemic, IAGA sponsored several international in-person workshops again in 2022 as listed below.

Participants of the 17th Castle Meeting on Paleo-, Rock and Environmental Magnetism in summer 2022

Workshop title	Location	Dates
Long-term Changes and Trends in the Atmosphere	Helsinki, Finland	May 30 – June 3
Vertical Coupling in the Atmosphere-Ionosphere System	Sopron, Hungary	July 11 – 15
17 th Castle Meeting on Paleo, Rock and Environmental Magnetism	Trakošćan, Croatia	August 28 – September 3
25 th Electromagnetic Induction Workshop	Çeşme, Turkey	September 11 – 17
Radiation Belt Dynamics and Remote Sensing of the Earth's Plasmasphere	L'Aquila, Italy	September 26 – 30
XIII Latin American Conference on Space Geophysics (COLAGE)	São José dos Campos, Brazil	November 27 – December 02

Outreach activities

The IAGA Social Media Working Group, founded in 2019 and consisting mainly of early career scientists, is very active in promoting IAGA and our scientific activities to a broad audience. Katia Pinheiro created an outreach film describing the “Magnetic Mosaic” of the Earth through interviews with scientists, which was shortlisted into the top 3 films in the “Women in Geoscience” category and came 5th in the People’s Choice award at the Earth Futures Festival (<https://www.earthfuturesfestival.com/the-films/v/magnetic-mosaic>). Katia Pinheiro and Shivangi Sharan won an outreach grant from IUGG in fall 2022 to continue producing outreach videos. They aim at producing a documentary and short movies connecting the science from all 8 IUGG associations through interviews mainly of early career researchers from many different countries, which should be presented at the IUGG General Assembly in Berlin in July 2023.



Two screenshots from Magnetic Mosaic, an IAGA outreach film created by Katia Pinheiro

Interaction with the International Association of Physics Students (IAPS)

Since July 2021, IAGA has established a formal collaboration with the International Association of Physics Students, IAPS. IAPS is a student-run educational association that aims to encourage students in academic and professional growth as well as build connections between physics students to break social and cultural barriers. IAGA supported the most recent edition of “PLANCKS” in 2022 in Munich (Germany), which is an international theoretical physics competition of four to five days for Bachelor and Master students. Moreover, IAGA established contacts with potential speakers with high expertise and reputation in IAGA sciences to give presentations at IAPS events, e.g. at the “IAPS4Materials” together with the Institute of Physics (IOP) in London in November 2022.

Publications and outreach

The latest issue of the annual IAGA Newsletter, nr. 59, was distributed in December 2022. It can be downloaded from the IAGA website <http://www.iaga-aiga.org/publications>. Current versions of a IAGA Flyer and Poster are also available on the website.

IAGA operates websites at <http://www.iaga-aiga.org> and is active on the following social media:

www.facebook.com/IAGAandAIGA/

www.twitter.com/IAGA_AIGA

www.instagram.com/iaga_aiga/

<https://iaga-aiga.blogspot.com/>

FUTURE ACTIVITIES

Current and future activities include the preparation of the programme for the 2023 IUGG General Assembly in Berlin and the 6th IAGA School to be held in the week before the General Assembly. IAGA will also be involved in a few topical meetings in 2023.

Monika Korte, IAGA Secretary General

International Association of Hydrological Sciences (IAHS)



IAHS website: <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 maintains strong connections with the International Hydrological Programme of UNESCO and with the Hydrology and Water Resources Programme of the World Meteorological Organisation (WMO), and is partner of the UN Water coordination mechanism.

ADMINISTRATION

Aside country membership regulated at the IUGG level, IAHS gives the opportunity to individuals to register as “Individual members” for free. During the IAHS 2022 Scientific Assembly, IAHS accepted the 10,000th member. Almost 600 new members in 72 countries were accepted in 2022 bringing the total membership to 10,425 members, of which 4,661 (44.7%) are in financially disadvantaged countries.

The following International Commissions, Working Groups and Initiatives of IAHS conduct conferences, symposia, workshops, courses, and research cooperations:

- 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 MOXXI on Measuring and Observing in the XXIst century
- Working Group CANDHY on Citizens AND Hydrology
- Working Group for Africa
- Early Career Committee (transversal across Commissions)
- Decadal Initiative Panta Rhei 2013-2022
- Unsolved Problems in Hydrology (UPH) initiative

ACTIVITIES

The main event of 2022 was the Scientific Assembly (29 May-3 June) postponed from 2021 because of the Covid pandemic. It was a successful presential Assembly in Montpellier, France, co-organized with the local UNESCO Category 2 Center IciReWard and a consortium of local research laboratories. The postponing and pandemic-related uncertainties induced a heavy workload and risk taking by the Local Organizing Committee and the IAHS governance and secretariat. The number of 592 participants materialized the wish of the community to gather again after two years of turbulences. Though delegates from some countries had to cancel their participation because of national/employer travel restrictions; and visa denials have been reported. The attendance of delegates from Southern countries was high, facilitated by the orientation and networks of many researchers in Montpellier, to the IAHS worldwide coverage, and to the IAHS granting mechanism (including 33 SYSTA grantees among whom 27 could travel).

The IAHS 100 Anniversary was celebrated during the Assembly with a strong retrospective of the IAHS development, achievements, partnerships and central role in the history of hydrological sciences across events, publications and agenda-setting initiatives. This retrospective was supported by the display of 10 milestone posters (1 per decade) and keynote talks, and served as the basis for a corporate brainstorming across the week about actual and future epistemic, operational and associative challenges and priorities. A strategic plenary with keynote talks, roundtables and a round of pop-ups allowed to discuss many issues, while specific meetings focused on the consolidation of the IAHS ED&I policy, on the community values and challenges regarding Open Science, and on the capitalisation of the Panta Rhei decade. Commissions, working groups and HSJ editorial board had coordination meetings, the Early Career Committee and French teams organized workshops, WMO launched its call for research projects, UNESCO organised meetings about IHP flagship initiatives. A PIAHS Volume is under preparation as an outcome of the Assembly.

Group photo at the IAHS2022 Scientific Assembly, Montpellier, France, 2nd June 2022

The 2022 Tison Award for Young Hydrologists has been granted to Alexander Ross (USA). The 2022 IAHS-UNESCO-WMO International Hydrology Prize medals have been bestowed to Maria José Polo Gomez (Spain, Dooge medal) and Francis Chiew (Australia, Volker medal). The Prize ceremony organized during IAHS2022 in Montpellier allowed to celebrate 2020, 2021 and 2022 Tison awardees and International Hydrology Prize medalists.

Other topical conferences and events have been organized, in particular STAHY2022 in Chia, Sardinia, Italy in September and ICCE International Symposium in Bydgoszcz, Poland in October; and supported, in particular Cryosphere 2022 in Reykjavik, Iceland in August.

The SYSTA (Sivapalan Young Scientists Travel Awards) travel award scheme has been implemented for the Assembly (33 Awards) and the two latter conferences (5 awards for physical participation at STAHY2022 and 1 award for remote attendance at ICCE Symposium). Some other financial supports could be provided to attend the Assembly, from IAHS budget and a WMO grant.

In the frame of a renewed Memorandum of Understanding, IAHS provided a financial support to Waternet, the Hydrological network for science and capacity development in Southern Africa to allocate travel grants to young scientists to attend the Waternet Annual assembly in South Africa.

The inaugural mandate of the Early Career Committee (coordinating Early Career Scientist representatives imbedded in each of the 10 International Commissions) came to an end (the term was lengthened because of the turbulences induced by the Covid pandemic). A call for candidates successfully triggered many applications out of which commissions selected their new ECC representative for 3 years.

IAHS publishes the *Hydrological Sciences Journal - HSJ* with Taylor & Francis; the online journal is made available free of charge to libraries and IAHS members in financially disadvantaged countries. Performance indicators of *HSJ* have increased. Promotion by “features articles” continues, with details disseminated in press releases and via IAHS social media. Featured articles and Tison Award papers are made free to view. All papers in volumes more than two years old automatically become open access. Any other paper can be open access, on Author’s paying principle. One running special issue *Advancing socio-hydrology: A synthesis of coupled human-water systems across disciplines*, guest edited by Pande *et al.*, accommodated numerous articles along the year, <https://www.tandfonline.com/journals/thsj20/collections/advancing-socio-hydrology>. The second batch of the Special issue on *Hydrological data: opportunities and barriers* (first batch in 2020) guest edited by Cudennec *et al.* in partnership between IAHS, UNESCO and WMO was published in December. It includes in particular an editorial on *Operational, epistemic and ethical value chaining of hydrological data to knowledge and services* by Cudennec *et al.*, <https://doi.org/10.1080/02626667.2022.2150380>; a conceptual community paper on Citizen Science: Nardi *et al.* *Citizens AND Hydrology (CANDHY): conceptualizing a transdisciplinary framework for citizen science addressing hydrological challenges*, <https://doi.org/10.1080/02626667.2020.1849707>; an article framing the WMO mechanism to support innovation in hydrometry: Dixon *et al.* *Intergovernmental cooperation for hydrometry – what, why, how?*, <https://doi.org/10.1080/02626667.2020.1764569>. *HSJ* also published an opinion paper with an ISC-IUGG-IAHS perspective following the UNESCO recommendation on Open Science: Cudennec *et al.*, *Governing Open Science*, <https://doi.org/10.1080/02626667.2022.2086462>.

The close cooperation of IAHS with UNESCO, WMO and the UN Water mechanism has been continued. We have contributed to the World Water Development Reports WWDR 2022 (*Groundwater, Making the invisible visible*); and attended online meetings of the UNESCO IHP drafting strategy and action plan, the WMO Hydrological Coordination Panel, the WMO HydroHub Innovation think tank, the WMO Capacity Development Panel, the WMO research strategy, UN Water, the UN Groundwater summit. We have also contributed to the preparation of the UN 2023 Water Conference in the frame of UN

Water, of the related ISC Policy brief <https://council.science/publications/water-policy-brief/>, and of the UNESCO-led Science-based Assessment of Global Water which was then presented at the Conference (with IAHS support expressed in the ad hoc side event).

Three bureau meetings have been held, one on 12 May (online, ahead of the Assembly), one on 4 June (presential, at the end of the Assembly), one on 12 December (online). In addition to monitoring and steering all 2022 activities, the Bureau made decisions as follows:

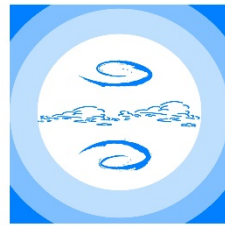
- Develop a new Decade to follow up after Panta Rhei.
- Develop a Digital Water Globe.
- Renew the iahs.info website.
- Create the Falkenmark Award for best PhD, recognising outstanding contributions to hydrological understanding of water scarcity and water supply. Malin Falkenmark received the International Hydrology Prize in 1998, <https://iahs.info/About-IAHS/Competition--Events/International-Hydrology-Prize/International-Hydrology-Prize-Winners/MFalkenmark/>
- Create the Frances Watkins Memorial Award to recognize articles whose structure, presentation and language are deemed to be exemplary. The Award commemorates the enormous contribution to the Journal made by Frances Watkins, who was its managing editor for some 27 years until her retirement and sudden death in 2022.
- Create a Working Group on Water History.
- Accept the bid (among 3) from Roorkee IIT, in partnership with NIH, to organize the 2025 IAHS Scientific Assembly in Roorkee, India, 5-10 October 2025.

FUTURE ACTIVITIES

In addition to the organisation of the IAHS part of the IUGG General Assembly, including elections, implementation of the latter decisions was initiated end of 2022 and will materialise in and beyond 2023, in particular with a hybrid process to design the 2023-2032 Science for Solutions Decade HELPING (Workshops in Cordoba, Spain in January and in Vienna, Austria in May; intermediate online consultations) to be launched in Berlin.

Christophe Cudennec, IAHS Secretary General

International Association of Meteorology and Atmospheric Sciences (IAMAS)



International Association of Meteorology and Atmospheric Sciences

IAMAS website: www.iamas.org

INTRODUCTION

IAMAS is a research association of the International Union of Geodesy and Geophysics (IUGG) that focuses on all aspects of the gaseous envelope around the Earth and other planets. The main work is conducted, coordinated, and communicated through IAMAS's 10 International Commissions (IC), which, in alphabetical order, are 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), and
- International Radiation Commission (IRC).

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

ADMINISTRATION

IAMAS Bureau Meetings

Regular administrative meetings have all been held virtually, as a result of the geographic diversity of the bureau. Planning for the IUGG meeting in Berlin 2023 has been a focus of these activities.

Improving the engagement of early career scientists in IAMAS

An IAMAS goal is to engage early career scientists in our activities. IAMAS now has an early career committee (<https://www.iamas.org/ecs/>) to advocate for and build a community among this critical group. In addition to the committee, the chair of the committee (an early-career scientist) sits on the IAMAS Bureau, with the same responsibilities as other IAMAS Bureau members (see <http://iamas.org/bureau/>). The term of appointment is two years. Dr. Jing Li of Peking University, China currently serves in this role, helping to promote the activities of IAMAS and its commissions amongst the next generation of atmospheric scientists. Dr. Sarah Perkins-Kirkpatrick, from Climate Change Research Centre at UNSW, is vice-chair and collaborates and assists Dr. Li in IAMAS early career scientist activities.

In addition, the commissions are encouraged to bring ECSs into their membership and management groups to ensure that the views and requirements of the next generation of scientists are considered.

Funding

As with last year, the pandemic led to many meetings and conferences moving to virtual formats or postponing to a later date. Funds approved for commission workshops and meetings, were approved for use next year.

We have legally incorporated IAMAS in the USA and acquired a not-for-profit status in the US. Following that designation, we set up a bank account in the USA to facilitate the distribution of IAMAS funds to our commissions in support of their approved scientific activities; the account in the USA was opened in August 2022. Funds were then moved from the IAMAS bank account in Germany to the USA. A transfer of funds from Germany to US was made in October 2022, in the amount of \$207,727.63. We express our appreciation to Hans Volkert and John Burrows for their long-term support of the IAMAS bank account in Germany.

IAMAS provided \$1000 in support of the 2022 iCACGP-IGAC Joint Conference in Manchester, UK.

IAMAS EXECUTIVE COMMITTEE 2019-2023

President:	Joyce E. Penner	USA
Vice-Presidents:	John P. Burrows	GERMANY
	Mary Scholes	SOUTH AFRICA
Past President:	John Turner	UK
Secretary General:	Steven Ackerman	USA
Early Career Scientist:	Jing Li	CHINA
Members at large:	Lisa Alexander	AUSTRALIA
	Keith Alverson	USA / JAPAN
	Iracema Cavalcanti	BRAZIL
	Mu Mu	CHINA
	Michiel R. van den Broeke	NETHERLANDS

IAMAS COMMISSIONS

Atmospheric Chemistry and Global Pollution (iCACGP). www.icacgp.org

President:	Melita Keywood	AUSTRALIA
Vice-President:	Mary Barth	USA
	Christian George	FRANCE
	Stuart Piketh	SOUTH AFRICA
	Tong Zhu	CHINA

Atmospheric Electricity (ICAE). https://www.iamas.org/icae/		
President:	Xiushu Qie	CHINA
Secretary:	Weitao Lyu	CHINA
Climate (ICCL). http://www.iccl-iamas.net/		
President:	Jianping Li	CHINA
Secretary:	Quizhen Yin	BELGIUM
Clouds and Precipitation (ICCP). https://www.iamas.org/iccp/		
President:	Greg McFarquhar	USA
Vice-President:	Heike Wex	USA
Secretary/Treasurer:	Martina Kraemer	MEXICO
Committee on Nucleation and Atmospheric Aerosols (ICNA). www.icnaa.org		
Chair:	Markku Kulmala	FINLAND
Dynamic Meteorology (ICDM). https://www.iamas.org/icdm/		
President:	Thomas Spengler	NORWAY
Secretary:	Craig Bishop	AUSTRALIA
Middle Atmosphere (ICMA). https://www.iamas.org/icma/		
President:	Bernd Funke	SPAIN
Vice-President:	Natalia Calvo	SPAIN
Ozone (IO3C). http://www.io3c.org/		
President:	Sophie Godin-Beekmann	FRANCE
Vice-President:	Paul A. Newman	USA
Secretary:	Irina Petropavlovskikh	USA
Planetary Atmospheres and their Evolution (ICPAE). https://www.iamas.org/icpae/		
President:	Ann Carine Vandaele	BELGIUM
Secretary:	Yeon Joo Lee	GERMANY
Polar Meteorology (ICPM). https://www.iamas.org/icpm/		
President:	Matthew Lazzara	USA
Secretary:	Tracy Moffat-Griffin	UK
Radiation (IRC). https://www.iamas.org/irc/		
President:	Peter Pilewskie	USA
Vice-President:	Manfred Wendisch	GERMANY
Secretary:	Hajime Okamoto	JAPAN

ACTIVITIES

Planning for the IUGG General Assembly in Berlin, Germany during 11-20 July 2023 occurred throughout this year. There are no plans for this meeting to include a virtual format.

Recent Awards

- 1) *International Science Council Fellow*: The International Science Council (ISC) appointed new Fellows in recognition of their outstanding contributions to promoting science as a global public good. Among them is Guoxiong Wu (China), who in addition to his other accomplishments also served as IAMAS President (2007-2011).

- 2) *IUGG Union Lecture*: Congratulations to Dr. Akkihebbal Ramaiah Ravishankara, University Distinguished Professor in the Departments of Chemistry and Atmospheric Science at Colorado State University, IAMAS nominee to give an IUGG Union Lecture. 2023
- 3) *IUGG Union Medal*: Congratulations to Athena Coustenis (France), IAMAS President (2011-2015), who was awarded the Jean Dominique Cassini Medal.
- 4) *IUGG Early Career Scientist*: Ten scientists have been awarded the IUGG Early Career Scientist Awards 2023 for their outstanding research in Earth and space sciences and for their international research cooperation. Thanks to Keith Alverson (Canada; IAMAS) for serving on the selection committee. The atmospheric science winners are Patrick Hupe and Christina Karamperidou. The IUGG Early Career Scientist Awards 2023 will be presented during the Award Ceremony of the IUGG General Assembly in Berlin, Germany.

Activities of the Early Career Scientist (ECS) committee

The IAMAS ECS committee was officially formed in January 2021, with 10 members representing the 10 IAMAS commissions. The main activities in 2022 included:

- Continued to hold ECS webinar series:
 - Qingxiang Li, Feb 16, 2022, Differences in persistence explain the unevenness of warming at continental scales
 - Marlene Kretschmer, Mar 25, 2022, The plausible role of Barents and Kara sea ice loss in driving future polar vortex changes
 - Carina Schumann, Apr 26, 2022, Lightning in slow motion: The Johannesburg Lightning Research Laboratory
 - David Mikolajczyk, May 20, 2022, Regional Warming Event in Winter on the Ross Ice Shelf, Antarctica as Observed by UW-Madison Automatic Weather Stations
 - Lei Bi, Jun 24, 2022, From Particle Optics to Remote Sensing, Weather and Climate Studies: Physical Models, Computational Electrodynamics, and Machine Learning
- The annual ECS event during the week of 4 July 2022;
- Continued to maintain the Twitter account and the ECS YouTube channel;
- Connected with the IUGG ECS representatives to plan for the ECS event in Berlin;
- Co-hosted the IYBSSD online conference with Chinese Academy of Sciences;
- Started a regional ECS working group in China, and hosted three webinars;

Sonja Behnke left the ECS committee due to other work commitments, with Rubin Jiang of China replacing her.

Highlights from the IAMAS International Commissions

iCACGP (<http://www.icacgp.org/>)

During 2022, the iCACGP met virtually every two months to discuss business, and as international travel started to ramp up in 2022, the iCACGP met face-to-face for the first time since 2019. This meeting took place immediately before the 15th iCACGP Quadrennial Symposium & 17th IGAC Science Conference in Manchester 2022. One of the main topics of discussion was the nomination of the 2023-2027 ICACGP members and the election of officers. Mary Barth (USA) was elected as the incoming President, with support from 4 Vice-Presidents (Christian George – France, Hiroshi Tanimoto-Japan, Judith Hoelzemann- Brazil and Hugh Coe UK). The new commission will commence in March 2023.

The 15th iCACGP Quadrennial Symposium & 17th IGAC Science Conference in Manchester was a hybrid meeting with more 400 participants from 38 countries (124 online and 278 in person) including 131 Early Career Researchers. The conference was preceded by the Early Career Short Course, a 3-day intensive training course that included topics such as communication skill development and exploring the science-policy landscape. IAMAS provided \$1000 in support of this symposium.

The Paul J. Crutzen Award for Early Career Scientists 2022 was awarded to Dr Sarah S. Petters from Aarhus University Denmark in recognition of her contribution to a better understanding of aerosol chemical composition, phase state and aerosol-water interactions. The award was presented at the 2022 iCACGP-IGAC Joint Conference in Manchester, UK.

As a follow-up to the iCACGP convened the session “The Atmosphere – the “forgotten” domain in the Sustainable Development Goals?” at the Sustainability Research & Innovation Congress 2021 where the importance of the atmosphere in the UNSDGs (United Nations Sustainability Development Group) was discussed, ICACGP published a letter in *Science* titled [Atmospheric goals for sustainable development | Science](#) that to date has been downloaded 749 times.



ICAGP Vice- President Christian George and Dr Sarah Petters receiving the Paul J. Crutzen Award for Early Career Scientists 2022

There has been slow progress on the transfer of the iCACGP website to the IAMAS hosted website.

Planning continued for the IUGG conference in Berlin 2023; iCACGP will host M27 Atmospheric Chemistry in the Anthropocene: From the Urban to Global Scales and cohost JH04 Anthropocene: Perspectives From and Within. Planning has also commenced for the ICACGP/IGAC Atmospheric Chemistry Open Science Conference to take place in Malaysia in September 2024.

ICAE (<https://www.iamas.org/icae/>)

- 1) The 17th International Conference on Atmospheric Electricity was held successfully in Tel-Aviv, Israel, between 19-24 June 2022. The venue at Tel-Aviv University's Porter School for Environmental Science hosted 120 participants from 30 countries. A total of 240 papers were initially submitted to the conference, and a 5-day scientific program of oral and poster sessions was created by the Local Organizing Committee after accepting reviews and recommendations made by the members of the ICAE Executive Committee. However, due to the evolving conditions of the COVID-19 pandemic and the difficulties it caused to international travel, as well as the restrictions caused by the Russia-Ukraine war, many papers and posters were withdrawn or cancelled. The final program contained 56 oral talks and 48 posters, arranged in 4 days. The social program included a half-day trip to the old city of Jerusalem and a Conference Dinner that included a dance competition between 4 teams of ICAE scientists and students in different music styles.
- 2) ICAE organized two Executive Committee member meetings on 19 Jun and 23 Jun during the 17th International Conference on Atmospheric Electricity, and a follow up meeting on 27 July.
 - a) The ICAE Officers, three new members and two honorary members have been elected after full discussions and voting.
 - Xiushu Qie (President) and Weitao Lyu (Secretary) will continue to serve as ICAE officers for one additional period of 4 years.
 - Yoav Yair, Amitabh Nag, and Yasuhide Hobara have been elected as ICAE new members from 9 candidates.

- Vladimir Rakov and Clive Saunders have been elected as ICAE Honorary members.
- b) Barcelona, Spain, among 3 candidate cities, has been selected as the venue of the next ICAE conference (18th conference) which will be held in 2026.
- 3) The bylaw of ICAE, which was formed in 2006, was updated during the General Assemblies of ICAE EC in 2022, as distributed at <https://www.iamas.org/icae/about/>.
- 4) Rubin Jiang has been suggested and appointed to succeed as the ICAE representative at the IAMAS ECS committee. Sonja Behnke, the first ICAE representative at IAMAS ECS (Early Career Scientist) committee, has been recently elected as president for ASE in AGU.
- 5) We completed the process of moving the ICAE website to <https://www.iamas.org/icae/>.
- 6) We published two issues of newsletters online in 2022. We collected complete issues of ICAE newsletters and all issues can now be accessed through the ICAE website.
- 7) We conducted routine maintenance of the ICAE colleague mailing list.

ICCL (<http://www.iccl-iamas.net/>)

1. Prepared 11 symposium proposals for the 28th IUGG2023 in Berlin, as listed below:
 - a. M02 Dynamics and Variability of the Warming Hole(s) in the Climate System, Conveners: Léon Chafik (Sweden), Mojib Latif (Germany)
 - b. M03 Climate Extremes in the Atmosphere-Land-Ocean System: Physical Processes, Predictability, Impacts and Adaptation, Conveners: Jules Kajtar (Australia), Nicolas Freychet (UK), Eunice Lo (UK), Vikki Thompson (UK), Mat Collins (UK), Neil Holbrook (Australia)
 - c. M04 Past Climate Changes and Their Relevance for the Future, Conveners: Qiuzhen Yin (Belgium), André Paul (Germany), Anne de Vernal (Canada), Jerry McManus (USA), Emilie Capron (Denmark), Ayako Abe-Ouchi (Japan)
 - d. M05 Atmosphere-Ocean-Ice Interactions: Physical, Biogeochemical and Biological Processes in the Ross Sea, Conveners: Zhaomin Wang (China), Walker Smith (USA), Paola Rivaro (Italy), Jisoo Park (South Korea), Mike Williams (New Zealand)
 - e. M06 Monsoon Systems in Rapid and Intensifying Climate Change and Their Role in Extreme Events, Conveners: Jianping Li (China), V. Krishnamurthy (USA), Andrew Turner (UK), Bin Wang (USA), E. Hugo Berbery (USA), Jun Matsumoto (Japan), Kyun-Ja Ha (South Korea), R. Krishnan (India), Fred Kucharski (Italy)
 - f. M07 Earth System Response to Solar Radiation Modification: Modeling, Impacts and Uncertainties, Conveners: Govindasamy Bala (India), Hauke Schmidt (Germany), Long Cao (China), Simone Tilmes (USA), John Moore (China, Finland), Michael MacCracken (USA)
 - g. M08 Variability and Near-Term Predictability of the Antarctic Climate System, Conveners: Tom Bracegirdle (UK), Zhaomin Wang (China), Irina Gorodetskaya (Portugal), Erik Behrens (New Zealand)
 - h. M09 Geosciences for Sustainable Development (Merged with Union Symposium), Conveners: Keith Alverson (Canada), Tom Beer (Australia), Jianping Li (China), Tonie van Dam (Luxenburg)
 - i. M10 El Niño/Southern Oscillation and its Regional and Global Impacts, Conveners: Fei-Fei Jin (USA), Wenju Cai (Australia), Jianping Li (China), Soon-Il An (South Korea)
 - j. JM01 Recent Advances in Regional Climate Modelling (IAMAS, IACS, IAHS), Conveners: Tomas Halenka (Czech Republic, IAMAS), Sven Kotlarski (Switzerland, IACS), Erika Coppola (Italy, IAHS)
 - k. JM05 Earth System Models: Assessing the Earth System's State and Fate From Regional to Planetary Scales (IAMAS, IAHS, IACS, IAPSO, IAVCEI?), Convener(s): François Massonnet (Belgium, IAMAS), Sophie Nowicki (USA, IACS), Richard Petrone (Canada, IAHS), Anna von der Heydt (Netherlands, IAPSO)
2. Organized two sessions for EGU 2022 (April 3-8, 2022) of two sessions: "Interglacial diversity" and "Monsoon systems in a changing climate: past, present and future".

3. Special Issues: “Global monsoonal systems during the last glacial-interglacial cycle” in Quaternary Science Reviews, “Paleoclimate modelling” in Quaternary Sciences, and “Cenozoic climate change in Asia in honor of Prof. Zhengtang Guo” in Global and Planetary Change.

ICCP (<https://www.iamas.org/iccp/>)

After holding the International Conference on Clouds and Precipitation virtually in 2021, the activities of the ICCP have not been as numerous. Nevertheless, the ICCP has had some important undertakings in 2022, including the following:

- 1) The ICCP has established a monthly journal club meeting, where cloud scientists from around the world give virtual lectures on important topics related to cloud physics. Co-organized by Martina Kraemer, Odran Sourdeval, and Greg McFarquhar, the speakers in 2022 have included Greg McFarquhar, Irene Bartolome-Garcia, Eshkol Eytan Weizmann, Jingyi Chen, Sylvia Sullivan, and Andrew Dzambo. This activity is continuing in 2023 with monthly presentations.
- 2) The ICCP has undertaken an active role in planning sessions for the 2023 IUGG/IAMAS meeting in Berlin. The following sessions are sponsored or co-sponsored by the ICCP: Cloud and Precipitation Studies; Cloud-Radiative Interactions; Dynamics and Microphysics of Moist Convection; Cloud Nucleation Studies; Weather Modification and Small Scale Geoengineering: Theory, Practice and Technology; and Weather and Climate Extremes: Understanding, Modeling, Prediction and Impacts.
- 3) With the Johannes-Gutenberg University (JGU), the ICCP will be co-sponsoring a workshop on “Clouds containing ice particles” from 23 to 26 July 2023 in Mainz. The intent of the workshop is to discuss all aspects of cirrus and mixed-phase clouds, the least understood cloud type, that contributes significantly to uncertainty in climate prediction. Topics to be covered include in-situ and remote sensing observations of clouds and their modelling on all scales.
- 4) The Cloud physics lectures conducted by the IITM in Pune have continued in 2022. Speakers in 2022 were as follows: Jiwen Fan, Alexander Khain, Heike Wex, Mary Selvam, Sanjay Sharma, Paul Field, Shin-ichiro Shima, Kirti Chandra Sahu, Vaughan Phillips, Rachel Albrecht and Odran Sourdeval.
- 5) The ICCP has been meeting virtually every 2 to 3 months during 2022 and had an in person meeting at the American Meteorological Society Conference in Cloud Physics at Madison, Wisconsin. Topics of discussion included ways to enhance international collaboration, planning for future topical meetings and the next ICCP conference, and ways to enhance diversity, equity and inclusion.
- 6) The ICCP has begun planning for the next ICCP conference that will take place 14 to 19 July 2024 in Jeju Island, South Korea. Preliminary discussions have centered around what topics should be included at the meeting, abstract review criteria, and arranging for a visit to the conference facilities that will take place in late summer 2023.

The ICCP is happy to recognize that Luis Ladino recently received the very prestigious Marcos Moshinsky award for young scientists to support a project that he proposed. This award is usually given to someone working in a more classical branch of physics so it is of special significance that Luis received this recognition.

ICDM (<https://www.iamas.org/icdm/>)

ICDM developed ten symposia jointly with another IAMAS commission and three with another association (IAPSO) for the IUGG General Assembly in Berlin in 2023.

In 2022, ICDM members organized a storm tracks workshop on Ile d’Oleron in France with partial funds from IAMAS/IUGG. The workshop attracted a total of around 50 international participants and was very well received.

ICMA (<https://www.iamas.org/icma/>)

The ICMA website was restructured and moved to IAMAS website.

Assembly symposia

- Organizing and preparing for the “Middle Atmosphere Science Symposium” at the 2023 IUGG assembly in Berlin.
- Sponsored the 11th International Workshop on Long-Term Changes and Trends in the Atmosphere, 30 May - 3 June 2022.
- Sponsored the 44th COSPAR assembly, Athens, Greece, 16 - 24 July 2022.

Business meetings / Internal affairs

The ICMA business meeting during the IUGG Assembly is planned for Thursday 13 July, 12:00-13:30h.

IO3C (<https://www.io3c.org/>)

IO3C has started preparations for hosting the Quadrennial Ozone Symposium (QOS) in 2024. It will be held in person and virtually in Boulder, CO, USA, July 14-18, 2024. The local organizing committee is being established. The venue costs are being estimated and IO3C will apply for financial support from the IAMAS and IUGG in the upcoming year. The webpage for the QOS 2024 and the announcement will be distributed in April.

The IO3C published a press statement celebrating the International Day for the Preservation of the Ozone Layer (September 16, 2022). This day was proclaimed by the United Nations General Assembly to commemorate the success of the Montreal Protocol on Substances that Deplete the Ozone Layer. The Montreal Protocol established a binding agreement to control the consumption and production of ODSs. These controls are leading to the stratospheric ozone layer’s recovery (<http://www.io3c.org/press-release-international-ozone-commission-35th-anniversary-montreal-protocol-reports-new>).

The WMO/UNEP *Scientific Assessment of Ozone Depletion: 2022* was published in January 2023 (<https://csl.noaa.gov/assessments/ozone/2022/>). This quadrennial science assessment included several results from activities sponsored by the IO3C, including the SPARC LOTUS Activity on Long-term Ozone trends and uncertainties in the lower stratosphere (<https://www.sparc-climate.org/activities/ozone-trends/>).

A joint special issue between Atmospheric Chemistry and Physics and Atmospheric Measurement Techniques journals titled *Atmospheric ozone and related species in the early 2020s: latest results and trends* (https://acp.copernicus.org/articles/special_issue1194.html) has been established for the presentations at the QOS 2021. Currently, there are 25 articles published in ACP and AMT. Several of the research papers published in this issue have contributed to the 2022 Ozone assessment. The submission deadline for the special issue was recently extended to the end of 2023.

IO3C co-sponsored a proposal to SPARC for extension of the LOTUS activity. This activity will focus on updates of the ozone trend analyses, with focus on community research papers contributing to the next Ozone assessment (2026). The proposal was accepted by the SPARC steering committee in March 2023.

IO3C also contributes to the decision making for areas of public data distribution collected by observing networks that focus on the monitoring of ozone and related species. The IO3C has advocated for timely submission and open-access data archival, reprocessing of the Dobson and Brewer ozone historic records with the IO3C approved ozone cross-sections, and ozone records homogenization (i.e. ASOPOS2). IO3C shares information about its activities in the SPARC and NDACC newsletters, in the WMO GAW Ozone and UV Bulletin, and on the IO3C Facebook page.

ICPAE (<https://www.iamas.org/icpae>)

New Bureau officers:

- President: Ann C. Vandaele (Belgian Institute for Space Aeronomy, Belgium)
- Secretary: Yeon Joo Lee (Institute for Basic Science, South Korea)

Monthly ICPAE Webinar 2022, started in Jan and concluded in Dec 2022, was successful (<https://www.iamas.org/icpae/webinar/>).

Highlights:

- The 12 Monthly webinars had 12 speakers, who were invited from 10 countries across the continents.
- There was a total of 226 participants for the 12 webinars (on average, 19 participants per webinar).
- Diverse scientific topics about the atmospheres in the solar system planets and exo-planets.
- There was a 1:1 balance between ECS speakers and Senior speakers.
- Webinar team consists of Yeon Joo Lee, Daniel Yiu Wah Lo, Tao Cai, Ann Carine Vandaele, and Maarten Roos-Serote.

We supported IAMAS ECS activities on July 11th (*IAMAS ECS Special conference*) using the ICPAE Zoom webinar account.

We organized IUGG session M35, Exploration of the Diversity of Planetary Atmospheres: From the Solar System to Exo-Planets (Conveners: Ann Carine Vandaele, Yeon Joo Lee, Nigel Mason)

Our plans include inviting new members and selecting an ICPAE ECS representative.

ICPM (<https://www.iamas.org/icpm/>)

The International Commission on Polar Meteorology (ICPM) over the past year has worked on several activities described below.

The ICPM-endorsed 17th WAMC (Workshop on Antarctic Meteorology and Climate) was hosted by the University of Wisconsin-Madison on August 4 and 5, 2022. It was a hybrid meeting. The WAMC organizers thank IAMAS for their financial support. A manuscript about the meeting is nearly finished and will be submitted to the official IAMAS journal *Advances in Atmospheric Sciences* for review and publication. This was followed by the 7th International Year of Polar Prediction – Southern Hemisphere workshop on 6th August. Recordings from the meetings can be found here: <http://amrc.ssec.wisc.edu/meetings/meeting2022/recordings.shtml>

A working group was set up, comprised of ICPM members and an IAMAS past president, to review our statutes. These needed updating to reflect the hybrid way of holding meetings and to review how the voting and member terms were specified. The new statutes were approved by ICPM members and have been passed to the IAMAS bureau for approval.

ICPM continues its involvement with the IAMAS early career initiatives having a representative on the IAMAS Early Career Scientist committee (Lee Welhouse). The ICPM ECR and communications representatives (Jonathan Wille (ICPM ECR) and Amelie Kirchgaessner (social media/comms)) have been active in advertising ICPM activities and advertising postdoc and PhD opportunities in our field. Primarily using our active twitter account (@MetPolarIntl) and mastodon account (@ICPM@fediscience.org). The ICPM webinar series is planned to restart in 2023.

ICPM is involved in convening several sessions at the upcoming IUGG meeting. We have been advertising these through mailing lists and our social media. Conveners are now about to start sorting through the submitted abstracts.

[IRC \(https://www.iamas.org/irc/\)](https://www.iamas.org/irc/)

The Quadrennial Symposium of the International Radiation Commission

After two postponements due to the COVID-19 pandemic, the quadrennial International Radiation Symposium (IRS 2022) was held in Thessaloniki, Greece, from 4-8 July 2022. By all accounts, it was a major success. IRS 2022 was organized by the Laboratory of Atmospheric Physics of the Aristotle University of Thessaloniki in partnership with the International Radiation Commission (IRC) of the International Association of Meteorology and Atmospheric Sciences (IAMAS). IRS 2022 was held at the Thessaloniki Concert Hall Convention and Cultural Center. Over 360 scientists from 29 countries participated in the fully in-person symposium, with over 250 oral and 150 poster presentations.

IRS 2022 provided a comprehensive international forum for presenting and discussing recent research achievements and technological developments in atmospheric radiation and related disciplines in the following ten sessions: Topical Union Session: Current Problems in Atmospheric Radiation; Radiative Transfer Theory and Modeling; Particle Radiative Properties; General Remote Sensing; Ground-based Measurements and Field Observations; Radiation Budget and Forcing; Weather, Climate and Environment Applications; Solar UV Radiation; Ocean Optics; and Climate Change in the Mediterranean and Radiative Impacts of a Changing Environment. Internationally recognized senior scientists, young scientists, and students had a unique opportunity to discuss the most current scientific issues, exchange new ideas and establish far-reaching collaborations.

The first three days of IRS 2022 kicked off with keynote addresses presented in the topical union session. On Thursday, the topical union addresses were given by Gold Medal Award recipient Bill Smith (Professor Emeritus, University of Wisconsin-Madison) and Young Scientist Award recipient, Seung-Hee Ham (NASA Langley Research Center). Professor Smith and Dr. Ham were presented their awards at the IRS 2022 Banquet held the previous evening.

Participants of IRS 2022 had the opportunity to visit historical monuments and cultural establishments in Thessaloniki and in other locations in Northern Greece, to enjoy short escapes for swimming at the magnificent beaches of Khalkidhiki and to taste the local gastronomy and wines at the numerous small taverns in the city. For many, IRS 2022 marked the first in-person event they had attended since the start of the pandemic in 2020. The enthusiasm and gratitude from all participants to be finally meeting in person again was proof of the success of the symposium.

Annual Business Meeting

The annual IRC business meeting was held during IRS 2022 on the evening of Tuesday, 5 July 2022. Twenty-seven commissioners were present with an additional eleven members attending virtually. The primary business was the selection of the host for the next International Radiation Symposium (IRS). The current IRC officers and past presidents agreed that the next IRS should occur at its normal cadence in 2024.

The IRC received two worthy bids for IRS 2024, from Lei Bi (Zhejiang University) for Hangzhou, China, and Feng Zhang (Fudan University) Shanghai, China. After presentations of both proposals and questions from commissioners, a vote was taken. The results: IRS 2024 will be hosted in June 2024 at Zhejiang University in Hangzhou. The IRC thanks both Lei Bi and Feng Zhang for their proposals.

The IRC received reports from 10 of its 11 active working groups. It also received a bid for a new working group on Machine Learning in Radiative Transfer and Remote Sensing (MLRTRS) from Feng Zhang (Fudan University). The IRC approved the proposal, bringing the current number of new working groups to 12.

FUTURE ACTIVITIES

iCACGP (<http://www.icacgp.org/>): Planning continued for the IUGG conference in Berlin 2023; iCACGP will host M27 Atmospheric Chemistry in the Anthropocene: From the Urban to Global Scales and cohost JH04 Anthropocene: Perspectives From and Within. Planning has also commenced for the ICACGP/IGAC Atmospheric Chemistry Open Science Conference to take place in Malaysia in September 2024.

ICAE (<https://www.iamas.org/icae/>)

- 1) Organize three ICAE sessions for 28th IUGG.
- 2) Issue two newsletters, one in spring and one in the fall.
- 3) Maintain the website for ICAE.
- 4) Update the ICAE colleague mailing list as needed.

ICCL (<http://www.iccl-iamas.net/>)

- Organize sessions and participate in the IUGG meeting in Berlin in July.
- Nomination of new ICCL members as needed.

Steven A. Ackerman, IAMAS Secretary General

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



International Association
for the Physical Sciences of the Oceans

IAPSO website: <https://iapso-ocean.org/>

INTRODUCTION

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

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

For more information see <https://iapso-ocean.org>.

ADMINISTRATION

The IAPSO Bureau was renewed in July 2019 during the IUGG General Assembly in Montreal. Two additional members were added in 2020 after online election and one of them was replaced in 2021 (By Law n. 9-d).

It comprises:

President:	Trevor McDougall (Australia)
Past President:	Denise Smythe-Wright, (UK)
Secretary General:	Stefania Sparnocchia (Italy)
Treasurer:	Ken Ridgway (Australia)

The Executive Committee comprises the Bureau members and

Vice-Presidents:	Agatha de Boer (Sweden)
	Hans van Haren (The Netherlands)
Members:	Edmo Campos (Brazil)
	Juliet Hermes (South Africa)
	Rick Lumpkin (USA, until September 2021)
	Yukio Masumoto (Japan)

Jae-Hun Park (Republic of Korea)
Joellen Russell (USA, replace Rick Lumpkin from October 2021)
Alejandra Sanchez-Franks (UK)
Christa von Hillebrandt-Andrade (USA and Puerto Rico)
Peter Zavialov (Russia)

The IAPSO office is located at the Institute of Marine Science of the National Research Council of Italy, Trieste and day-to-day business is managed by Secretary General (SG), Stefania Sparnocchia. The SG is responsible for the IAPSO website and its continuous updating. The website was renewed during 2021-2022 and moved to the new address [iapso-ocean.org](https://www.iapso-ocean.org). A page on the Facebook social network is also active with the aim of facilitating the spreading of information in the community (see <https://www.facebook.com/iapso.iugg.org>).

IAPSO finances are managed by the Australian-based Treasurer, Ken Ridgway.

IAPSO business meetings were conducted by email and videoconference where appropriate.

ACTIVITIES

2023 General Assembly

The principal activity during the year was the organization of the 28th IUGG General Assembly to be held in Berlin, Germany, from 11 to 20 July 2023. The Secretary General has been active in the planning process and participated in several video conference of the Scientific Program Committee. IAPSO is sponsoring or co-sponsoring 27 symposia covering a wide range of topics. The program details can be found at the Assembly's website: <https://www.iugg2023berlin.org/iapso/>.

IAPSO ECS Medal

The call for the ECS medal for 2023 was issued on 3 October, 2022 with a deadline on 10 January, 2023. Three nominations for the medal in Physical Ocean Science were received. The Award Committee has been appointed by the IAPSO President and consists of 4 members plus the chair of the IAPSO Early Career Working Group. The results of the selection will be announced in March 2023.

SCOR Administration

IAPSO President Trevor McDougall attended the virtual SCOR Annual Meeting in October 2022. The many subsidiary bodies of SCOR were reviewed and memberships renewed. Many of these bodies coordinate physical, biogeochemical and fisheries research in the global ocean. Two new SCOR working groups were selected for funding, each receiving sufficient funds for three face-to-face meetings.

Early Career Scientist Working Group

In 2022, IAPSO ECS directed its focus toward the upcoming IUGG General Assembly of 2023, where activities for early career conference attendees will be organised together with the other member organisations of IUGG. In preparation for this effort, we recruited Marina Azaneu, who took over after Arvind Singh in liaising with other relevant Early Career networks. IAPSO ECS are in contact with a large and growing number of other networks, within and outside of the IUGG, and have been part of planning joint webinars for networks in the Early Career Ocean Professionals (ECOP) programme in 2023. Our website (<https://www.iapsoecs.org>) has been extended with educational resources, and fellowship opportunities, and continues to grow. We steadily reach 400+ subscribers across our communication channels.

Joint Commission on Ice-Ocean Interactions (JCIOI, joint with IACS)

The Joint Commission on Ice-Ocean Interactions hosted a workshop from 17-20 October 2022, the theme of which was identifying knowledge gaps in ice-ocean interactions in Antarctica and Greenland. The workshop brought together over 280 registered participants from 26 countries across 6 continents. Presentation topics included the physics of the ice-ocean boundary, the role of glacial melt in the wider ocean, new and emerging technologies for studying ice-ocean interactions, the impact of ocean-driven melt on glacier and ice sheet mass balance, and community linkages. The sessions were recorded, and are available via the JCIOI website: <https://www.youtube.com/channel/UC-K08KQA86pNh5oLHNZU0Hw>. We are preparing a white paper that summarises the key workshop outcomes from the workshop, and look forward to continuing the discussions in our joint symposia session at IUGG Berlin 2023 (JP04 Ice-Ocean Interactions: Challenges and Insights from Theory, Observations and Modelling).

Joint Committee on the Properties of Seawater (JCS)

JCS did not meet in person in 2022, but held a virtual meeting on June 14, 2022 for the salinity/density and pH taskgroups. A planned meeting for relative humidity (RH) taskgroup was postponed due to illness. Members continued work on tasks identified during the 2018 Workshops as well as other items relevant to JCS, including important future publications on the long-term stability of Standard Seawater. In addition, progress continued on the formation of a new taskgroup on chemical speciation to continue working on issues identified by SCOR WG-145 (Chemical Speciation Modelling in Seawater) with a planned initial taskgroup meeting in January 2023, as well as plans for a JCS website.

Permanent Service for Mean Sea Level (PSMSL)

The PSMSL dataset has continued to grow and from 1st January to 1st December 2022, 1325 stations years of data were added from 688 stations. In January, Citizen Scientists completed the digitisation of the Zooniverse UK Tides project (<https://www.zooniverse.org/projects/psmsl/uk-tides>). The PSMSL technical lead secured funding from IAPSO for the Best Practice Study group on Tidal Analysis (<https://iapso-ocean.org/activities/best-practice-study-groups.html>) to be held in Berlin in July 2023. The head of PSMSL joined the Intergovernmental Oceanographic Commission Inter-sessional Working Group on the Revision of the IOC Oceanographic Data Exchange Policy and the group has been working on revising the IOC Oceanographic Data Exchange Policy (see IOC Circular Letter No2864 - <https://unesdoc.unesco.org/ark:/48223/pf0000379785>). In October we recruited a full-time data manager, to replace the previous part-time data manager who left due to retirement.

Tsunami Commission (Joint with IASPEI and IAVCEI)

In 2022, members of the Tsunami Commission organized tsunami sessions at EGU and AGU and participated in these sessions. It should be noted that tsunami sessions in these meetings had special slots for the 2022 Tonga tsunami which propagated through Pacific as an air-ocean coupled wave and has recently attracted a large amount of attention because of new findings for tsunami excitation.

Awards

- Prof. Trevor McDougall AC (UNSW) and President of IAPSO has received the Prime Minister's Prize for Science (<https://www.industry.gov.au/publications/prime-ministers-prizes-science-2022/2022-prime-ministers-prize-science>) for his discoveries of new ocean mixing processes and his work to redefine the thermodynamic definition of seawater. This has been adopted by the Intergovernmental Oceanographic Commission as the new international standard.

- IAPSO scientist, Prof. Toshiyuki Hibiya (University of Tokyo, Japan) is awarded the IUGG Fellowship for being a global leader in understanding the production of ocean turbulence by the internal tide and the parameterization of mixing in ocean and climate models.

Obituaries

Prof. Robin Muench (USA) passed away on 25 January 2021 at the age of 78. Prof. Muench had a long career as a polar physical oceanographer having participated in field-based physical oceanographic research, primarily in the Arctic and Antarctic. Robin also served in many oceanographic service roles and was the President of IAPSO in the years 1991-1995.

Dr. David Pugh (UK) passed away on 1 August 2022 at the age of 79. Dr Pugh was Director of the Permanent Service for Mean Sea Level and chairman of the IAPSO Commission on Mean Sea Level and Tides. His career was concerned with understanding the changes in sea level due to the tides and other processes that are so much a feature of the UK coastline.

Prof. Dr. Wilhelmus P.M. de Ruijter RSSA (Netherlands) passed away 12th January 2023, age 71. He was well recognised as one of the great original thinkers on ocean dynamics and stimulated the cohesive efforts of a large group of creative colleagues to work on central problems at the forefront of ocean science. He received the Royal decoration in the Order of the Dutch Lion in 2011 and he was an Ordinary Fellow (foreign) of The Royal Society of South Africa since 2001. Prof. Dr. de Ruijter has participated for a long time in the activities of IAPSO, also in the functions of National Correspondent of the Netherlands. He was well loved by his colleagues and students given his vibrant mentorship and inquisitive nature.

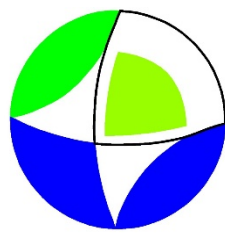
FUTURE ACTIVITIES

The following activities are scheduled for 2023 and beyond:

- Participation in the 28th IUGG General Assembly, July 11-20, 2023, at the Messe Berlin – City Cube, Berlin, Germany.
- Participation in the 2023 SCOR Annual Meeting in Guayaquil, Ecuador from 17 to 19 October 2023.
- Organization of the next Joint Assembly with IAMAS and IACS in Busan, Republic of Korea, in 2025.

Stefania Sparnocchia, IAPSO Secretary General
Trevor McDougall, IAPSO President

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



IASPEI

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

IASPEI website: <http://iaspei.org>

INTRODUCTION

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

Most IASPEI efforts during 2022 were directed towards the Assemblies of IASPEI's four Regional Commissions and the preparation of the 2023 IUGG General Assembly.

ADMINISTRATION

EC & Bureau meetings. The IASPEI Bureau / Executive Committee (EC) had one joint meeting in 2022, organized as video conference. There were additional, regular e-mail exchanges regarding all Association related questions (as e.g., financial support, requests, planning of future Assemblies or business to be solved immediately) between the members of the IASPEI Bureau and EC throughout the year.

Website. The IASPEI website has the address <http://iaspei.org>.

Statutes. The IASPEI statutes and by-laws were not changed in 2022. IASPEI is registered as a Norwegian organization (Norwegian Org. Number 916 047 495).

Newsletters. IASPEI Newsletters were regularly sent as PDF-file attachments to more than 3000 e-mail addresses. After the Assemblies of the Regional Commissions in 2022, the number of IASPEI members and Newsletter recipients increased to more than 4000. The Newsletters are also available for download from the IASPEI website. Four Newsletter issues as well as one bulk-mail with ad-hoc information about phishing e-mail attacks were distributed in 2022.

ACTIVITIES

Scientific Assemblies, Workshops/Symposia etc.

All meeting activity in 2022 was still influenced by the still on-going COVID-19 pandemic but in the second half of the year, the IASPEI Regional Commissions could organize their Assemblies.

The European Seismological Commission (ESC) had its 38th General Assembly together with the European Association of Earthquake Engineering (EAEE) as joint **3rd European Conference on Earthquake Engineering and Seismology (3ECEES)** in Bucharest, Romania, from 4 to 9 September 2022. As originally planned, the Assembly was organized as an in-person meeting with about 800 participants from more than 60 countries. During the week after its General Assembly, ESC organized the Peter Bormann Young Seismologist Training Course (YSTC) of 2022 with the title “Intermediate-depth seismicity and strong ground motions with large displacement demands – Challenges and Insights in Seismology and Earthquake Engineering”.

The **4th General Assembly of the Latin American and Caribbean Seismological Commission (LACSC)** was held as a hybrid meeting in Quito (Ecuador), from 3 to 5 October 2022. The Assembly had 209 in-person participants from 28 different countries and 33 people participated on-line. Two pre-congress courses were given on the weekend before the start of the meeting. A 2-day course on SeisCompP platform for beginners was attended by 18 people and an afternoon course on the new developments of the "Shake Map" was attended by about 30 people.



In-person participants of the 1st Joint Assembly of AfSC and ASC in Hurghada, Egypt, in October 2022

The 3rd General Assembly of the African Seismological Commission (AfSC) was originally planned to be held as a virtual conference in Kasane (Botswana) in 2022. Because of the high costs involved, this was not possible. The 14th General Assembly of the Asian Seismological Commission (ASC) was planned as hybrid meeting in Hurghada, Red Sea (Egypt), in October 2022. After cancellation of the AfSC in

Botswana, the Egyptian colleagues also invited the AfSC community to join the ASC in Egypt. This **1st Joint ASC-AfSC Assembly** was held as hybrid meeting with more than 180 participants (about 40 on-line) from 38 different countries, between 10 and 13 October 2022. On the sidelines of the conference, the Organizing Committee convened a training course for early career seismologists that focused on the modern methods for nanoseismicity and infrasound monitoring. The three-day training course was attended by 20 seismologists and included hands-on training.

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

IASPEI supported **Čermák7, the “7th International Meeting on Heat Flow and the Thermal Structure of the Lithosphere”**, which was held from 20 to 22 June 2022, in Potsdam, Germany, and was hosted by the GFZ German Research Center for Geoscience under the auspices of the International Heat Flow Commission (IHFC) of the IASPEI/IUGG.

IASPEI supported the Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV), which is a joint Inter-Association (IAGA, IASPEI, and IAVCEI) working group in IUGG. From 22 to 24 August 2022, **EMSEV2022** was held at the National Central University in Taiwan. The meeting was initially scheduled for the summer of 2020 but was postponed for two years due to COVID-19.

Some 2,000 hard copies of the first printed edition of the **IASPEI New Manual of Seismological Observatory Practice (NMSOP, 2002)** are currently being used in more than 100 countries at seismological observatories, data and analysis centers, and for teaching, research, and field applications. In addition, it is used as basic material within national and international seismology training courses, or by private enterprises and individual scientists. In 2014, a rigorously updated and amended electronic second edition, **NMSOP-2**, was completed and put online, thanks to the efforts of the late Peter Bormann. This version, as well as future ones, are professionally maintained, further developed and edited by the GFZ German Research Centre for Geosciences under a long-term commitment and the auspices of IASPEI and its Commission on Seismological Observation and Interpretation (CoSOI). All versions are freely available and downloadable from the website of the GFZ Library (<http://bib.telegrafenberg.de/publizieren/vertrieb/nmsop/>).

Scientific Programs, Projects, Publications

In 2022, IASPEI continued to financially support the work of the Inter-Association Working Group on Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV).

Awards

The **IASPEI Medal** is awarded for distinguished contributions in seismology: for sustaining IASPEI goals and activities and for scientific merits in the field of seismology and physics of the Earth's interior. The Medal is awarded every 2nd year during the IASPEI Assemblies. The next Medal will be awarded during the 2023 General Assembly in Berlin.

In 2016, the IASPEI Bureau established an **IASPEI Early Career Scientist Award** program aimed at engaging excellent young researchers in the IASPEI community. Each of the four IASPEI Regional Commissions was asked to select one Early Career researcher (graduate student, postdoctoral researcher, pre-tenure faculty member) from their commission at each even-year Assembly of that Regional Commission. The ESC decided during its General Assembly in September 2022, to give an IASPEI Early Career Scientist Award to Luca Laudi from the University of Valetta (Malta). The AfSC decided during the Egypt Assembly in October 2022 to give an IASPEI Early Career Award to Olivier Munguiko from the Goma Volcano Observatory, Goma, Congo DR.

Obituaries

Obituaries for prominent scientists of the IASPEI community are regularly published in the IASPEI Newsletters and on the IASPEI webpage. In 2022, sadly, four obituaries had to be published.

FUTURE ACTIVITIES

In 2023, the IASPEI main activity will concentrate on the 28th IUGG General Assembly, planned for 11 – 20 July 2023, in Berlin, Germany (<https://www.iugg2023berlin.org/>).

The IASPEI Bureau / ExeCom decided during its joint meeting in September to organize the 2015 Scientific Assembly again as a Joint Assembly together with IAGA in Lisbon, Portugal.

Johannes Schweitzer, IASPEI Secretary General

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



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

IAVCEI website: www.IAVCEIvolcano.org

INTRODUCTION

IAVCEI is the international focus for research in Volcanology and for efforts to mitigate volcanic disasters. IAVCEI scientists belong to 74 different countries. Their researches involve a great variety of disciplines of Earth Sciences, including igneous geochemistry and petrology, geochronology, seismology, geodesy, acoustics, ground and satellite remote sensing, HP-HT laboratory experiments, numerical modeling of the physics of magma genesis, storage and ascent from the mantle to the surface. Moreover, many IAVCEI members are implied in continuous monitoring of active volcanoes in Volcano Observatories worldwide.

ADMINISTRATION

The 2019-2023 IAVCEI Executive Committee is composed of the following elected members:

President	Patrick Allard	France
Secretary General	Roberto Sulpizio	Italy
Vice-President	Masato Iguchi	Japan
Vice-President	Jan Lindsay	New Zealand
Immediate Past President	Donald Bruce Dingwell	Germany
Officers	Lizzette Rodriguez	Puerto Rico
	Eisuke Fujita	Japan
	Fidel Costa Rodriguez	Singapore
	José Viramonte	Argentina
	Julia Eychenne (ECR)	France

It also includes Eugenio NICOTRA (Italy), webmaster/communication leader, and Andy HARRIS (UK), Editor-in-Chief of our journal *Bulletin of Volcanology*.

ACTIVITIES

Like for other Associations, the meeting plans and activities of IAVCEI were strongly impacted by the Covid-19 pandemic during 2020-2021. In particular, two of our major meetings – the 11th Conference Cities on Volcanoes (COV11) in Crete and our Scientific Assembly in New Zealand (Rotorua) - ought to be twice postponed and re-programmed. In 2023 the IAVCEI will face the unexpected situation of

having to hold its Scientific Assembly in New Zealand (January-February) then, only 6 months later, its General Assembly in Berlin (28th IUGG,).

In 2022 the IAVCEI Executive board has continued working through routine mailing exchanges and online meetings (every 2 months, depending on priorities). Regular communication with members and external bodies was made through the quarterly published Newsletter "IAVCEI News", through mailing and communiques, and our new website and social media accounts. Communication activities have been managed by our dedicated new Communication team, with efficient support from our private partnership with Guarant international (Praga).

Membership

By the end of 2022 the IAVCEI totaled 2239 members, representing 74 countries, an increase by 31% compared to four years ago. Members with due-paid membership fee were 1282, increased by 38% compared to 2019. This highly positive trend results from a renewed involvement of previous members but also from the arrival of prevalently young new members, therefore attesting of the vitality and attractiveness of our Association.

Equality, diversity and inclusion

Improving gender equity and diversity within IAVCEI is one key objective of the current Executive Committee. By the end of 2022 our overall membership is going in the right direction, with a proportion of 54% male vs 46% female. Especially, our population of Young Researchers displays a reversed proportion (55.1% female vs 44.9% male), which highlights a growing involvement of young women in Volcanology and the international volcano community. Perfect gender equality was respected within the 2019-2023 IAVCEI sub-Committees for Elections and Awards. The same will apply to our awardees and nominated Honorary Life members in 2023.

Furthermore, in 2022 we made accelerated efforts to support colleagues from low-income countries in prioritizing them with travel grants to attend our meetings and workshops. Together with IASPEI, we also supported the project entitled *Towards creating and launching the Network for African Volcanologists (NAV)*, funded by the 2022-2023 IUGG Grants Program.

Website, communication and webinars

- In 2022 we created new sub-domains on the IAVCEI website (<https://www.iavceivolcano.org>) to host the **webpages of 14 of our Commissions and Networks** (previously hosted elsewhere). A newly created sub-domain now also hosts the *Bulletin of Volcanology*. This work was done by our webmaster, with assistance of our partner Guarant. We expect the transfer and hosting of other Commissions' webpages in 2023.
- Our **IAVCEI Communication Team**, led by our webmaster and including 3 young volunteer researchers from different countries, has played its role efficiently.
- The **e-Volcano platform** we set up in 2021 to provide peer-reviewed video documents, with DOI, on all subjects and lessons in Volcanology, aimed at professionals, teachers, students and the general public, now hosts 2 e-video sessions. Two more projects are ready for future display.
- **Webinar series:** like for others, traveling restrictions imposed by the Covid-19 pandemic in 2020-2021 stimulated us to organize special IAVCEI webinars on ongoing or/and recent eruptions of major interest. These attracted a wide audience and promoted membership increase. In 2022, we also activated and sponsored several online webinars of our Early Researchers Career Network (having started in December 2021), as well as thematic webinars of our Commissions. Recording of each webinar was subsequently posted on our website.

Bulletin of Volcanology

Bulletin of Volcanology, the official journal of IAVCEI edited by Springer, is the most ancient journal in Volcanology (since 1922). By the end of 2022, the number of published papers and the journal's impact factor has noticeably increased with respect to four years ago, thanks to a great job made by the present Editor-in-Chief, Andy Harris, and its Editorial Assistant, Frances van Wyk de Vries.

As these latter will complete their service term in June 2023, the IAVCEI Exec Committee launched a call for candidatures in 2022. Profs. Marie Edmonds (UK) and Richard Herd (UK) were appointed as the new Editorial board for 2023-2027.

Meetings, workshops and courses

- **11th Conference Cities on Volcanoes (COV11), Heraklion, Crete (Greece)** COV11 has been the very first large IAVCEI meeting with physical participation held since our July 2019 General Assembly in Montreal. The Conference, hosted in the Cultural Center of Heraklion (June 12-17), resulted to be a very successful event, attended by 354 in person and about 240 virtually. Participants included both volcanologists and emergency managers. In terms of physical attendance, the top countries were Italy (77), United Kingdom (44), USA (32), France (24), Germany (21), Spain (19), Greece (14), New Zealand (13) and Belgium (11). The top countries for both physical and virtual participation were Italy (117), USA (77), UK (65), France (33), New Zealand (30), Greece (26), Germany (24), Japan (20), Singapore (15), Switzerland (14), Belgium (13) and Columbia (11).

It was followed by a 3-days field excursion on Santorini volcano. We would like to thank our Greek colleagues of the Local Steering Committee, headed by Paraskevi Nomikou (National University of Athens), our Greek professional partner CONVIN, and the national, regional and local Greek authorities for making this conference a success.

- **Other meetings co-organized and/or sponsored by the IAVCEI in 2022**

- The 1st International Conference on “*Mitigating Volcanic Risks in the Virunga Region*”, Goma, R.D. Congo, with both on-site (250) and virtual (19) participants including 22 foreign experts, March 19-21
- IAVCEI-EAG co-sessions on “*Magma and Volcanoes*” at the 2022 Goldschmidt Conference, Honolulu, Hawaii, hybrid, July 10-15
- 5th *Alfred Rittmann Conference*, AIV (Italian Association of Volcanology), Catania, Italy, 176 participants, on-site, September 29-October 1. In October 2022, the IAVCEI officially signed a Memorandum of Understanding with the Italian Association of Volcanology, by far the biggest national Association in this field.
- Symposium on “*Submarine Volcanism*”, IAVCEI Commission SV-Early Career Researchers, virtual, November 8-9
- 14th Field Workshop of IAVCEI *Commission on Chemistry of Volcanic Gases (CCVG)*, Arequipa, Peru, on-site (85 participants, among which 24 Peruvian and 67 internationals from 18 different countries), November 6-16

IAVCEI Awards

The Award for *Volcano Surveillance and Crisis Management (VSCM)* honors the personnel of volcano observatories and/or Institutions responsible of monitoring volcanoes that have made a remarkable contribution to the mitigation of volcanic hazards and volcanic risks. This award is presented every 2 years during our Conferences Cities on Volcanoes (COV).

After evaluation of submitted nominations by the IAVCEI Awards Committee, the 2022 VSCM award was presented to the ***Seismic Research Center (SRC) of the University of the West Indies***. The ceremony took place during COV11 in Heraklion, in June 2022.

The other IAVCEI awards will be delivered in 2023. Calls for nominations for the first awards (delivered during our SA2023) were launched in autumn 2022.

IAVCEI Commissions, Networks and Working Groups

In 2022 the Exec Committee has continued its work to improve the functioning and interconnection of IAVCEI's Commissions, Working Groups and Networks:

- The Commission Guidelines have been updated and displayed on our website, with a new template for annual Commission's report, and application forms for proposing either a new Commission or a new Working Group.
- After the disestablishment of the former Liaison Committees in 2021, better communication between Commissions is now facilitated by:
 - A new email distribution list of Commission leaders kept up-to-date by Guarant (commissions@iavcei.eu)
 - More accurate and up-to-date information about Commission leadership and contact information on our IAVCEI website
 - A regular Commission Leaders workshop that will be systematically hosted by the IAVCEI Exec via the VPs at our major meetings (ideally both IAVCEI SA and IUGG). The first such meeting will occur during our Scientific Assembly in Rotorua (NZ) in January-February 2023.

In 2022 the Exec received 22 reports from our 28 Commissions, Working Groups and Networks, which is a pretty good outcome!

The updated list of Commissions, Networks and Working Groups (joint Commissions) is reported below. Today the IAVCEI hosts 18 purely IAVCEI Commissions, 3 Networks, and 7 Joint Commissions (with other IUGG's Associations):

1) Purely IAVCEI Commissions

1. Chemistry of Volcanic Gases
2. Volcanic Lakes
3. Volcanic Clouds (ex-Remote Sensing)
4. Collapse Calderas
5. Explosive Volcanism
6. Monogenetic Volcanism
7. Submarine Volcanism
8. Volcanic and Igneous Plumbing Systems
9. Large Igneous Provinces
10. Volcano Geology
11. Volcanogenic Sediments
12. Tephrochronology
13. Tephra Hazard Modelling
14. Statistics in Volcanology
15. Volcanic Hazards and Risk
16. Cities and Volcanoes
17. International Volcanic Health Hazard Network (IVHHN)
18. Volcano Geoheritage and Protected Volcanic Landscapes

2) Networks

- a. Early-Career Researchers Network (ECR-Net)
- b. International Network for VOLcanology Collaboration (INVOLC)
- c. World Organization of Volcano Observatories (WOVO)

3) Joint Commissions

1. IAG/IAVCEI Commission on Volcano Geodesy
2. IASPEI/IAVCEI Commission on Volcano Seismology and Acoustics
3. IASPEI/IAVCEI/IGA Commission Physics & Chemistry of Earth Materials
4. IAGA/IASPEI/IAVCEI Working Group on Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV)
5. IASPEI/IAVCEI International Heat Flow Commission
6. IAVCEI/IACS Commission on Volcano-Ice Interaction
7. IAPSO/IASPEI/IAVCEI Commission on Tsunamis

The World Organization of Volcano Observatories (WOVO)

Restructuring the WOVO as an efficient operational network *of and for* Volcano Observatories has been one of the primary objectives of the current IAVCEI Executive Committee. This project has been slowed down by the 2 years of Covid pandemic, but several steps were pushed ahead. In 2021 a working group of about 20 different specialists in charge of making proposals to the Exec was activated. In the same time a dedicated Survey was sent to all VOs worldwide in order to check their expectations and suggestions. Replies from 25 VOs representative of volcanic countries in various parts of the world were received and collected in 2022. These replies were transmitted to the working group and are now under analysis for establishing proposals for the future of WOVO.

IAVCEI and the UN's Initiative for 'Global Early Warning Systems'

After discussions during COV11 in Crete, an official exchange between the Secretary-General of WMO, Prof. Petteri Taalas, and the IAVCEI President in June 2022 resulted in the Association being included in the UN's Initiative on Global Early Warning Systems, coordinated by WMO and developed within the Sendai Framework for Disaster Risk Reduction 2015-2030. The IAVCEI is highly interested in participating in this 5-yr UN's initiative through its specific competences in early warning systems devoted to the survey of volcano-atmosphere interactions and the mitigation of volcanic disasters.

FUTURE ACTIVITIES

The first half of 2023 will be a very dense period for the current Executive Committee whose mandate will end by mid-July during the 28th IUGG Assembly in Berlin. Major milestones will include:

- Our **Scientific Assembly** in Rotorua, New Zealand, from January 29 to February 3. It will be followed, still in Rotorua, by the 8th IWVA workshop coordinated by WMO and timed with IAVCEI.
- Delivery of the first-round **G. Walker Award and Wager Medal** during our SA2023. Then, calls for nominations to the awards which will be presented during our General Assembly in Berlin (Thorinsson, Fisher and Krafft Medals, plus the second-round of Walker and Wager awards)
- Call for **nominations/candidatures for the election of the new IAVCEI Executive Committee 2023-2027**. The 2023 Election Committee, responsible for overseeing the entire submission and online voting process, has already been appointed and will be chaired by Prof. Ray Cas, former IAVCEI President, in accordance with our Statutes and Bylaws.
- Publication of the **IAVCEI Newsletters 2023-1 and 2023-2** by the current Exec board.

- Further steps to **restructure the World Organization of Volcano Observatories** (WOVO), redesign its webpage and update its Directory, and elect new board leaders.
- Financial updates (reports, support for meetings and Commissions' activities, etc.)

Patrick Allard, IAVCEI President

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 website where much more information can be found.

Union Commission on Climate and Environmental Change (CCEC)



CCEC website: <https://iugg.org/associations-commissions/commissions/cceg/>

INTRODUCTION

The history and purpose of CCEC may be found on the [CCEC website](#).

ADMINISTRATION

The Chair is Jianping Li (China), the Vice-Chair is Keith Alverson (Canada/USA), the Secretary-Treasurer is Tonie van Dam (USA/LU), and the Immediate Past Chair is Tom Beer (Australia).

Commission members include Harry Bryden (UK), Mark Clilverd (UK), Annette Eicker (Germany), Domenico Giardini (Switzerland), Andrew Mackintosh (Australia), Alberto Montanari (Italy), Joyce Penner (USA), Alan Robock (USA), Dan Rosbjerg (Denmark).

ACTIVITIES

Business meeting. On 23 April 2022, we organized a business Zoom meeting. In attendance: Jianping Li, Keith Alverson, Tom Beer. Absence: Tonie Van Dam. The themes included Website status and plans, discussion on CUP and Springer, IUGG congress session status and plans, IUGG elections (including but not limited to CCEC leadership), and CCEC International Year of Basis Sciences in Sustainable Development proposal.

Proposal on Earth Sciences for Sustainable Development. CCEC officers prepared a proposal to IUGG on Earth Sciences for Sustainable Development. The proposal was awarded 5k.

Scientific Meeting Organization. For EGU 2022 Assembly (23-27 May 2022), Session AS1.18: Monsoon systems in a changing climate: past, present and future (Conveners Andrew Turner, Roberta D'Agostino, Kyung-Ja Ha, and Jianping Li) was organized.

Zoom meeting. On 19 December 2022, a zoom meeting on the organization of IUGG U01 session was organized. In attendance: Jianping Li, Ismail-Zadeh Alik, Keith Alverson, Llia Zaliapin. The themes include ranking the proposed speakers and selecting the first 9 of them, ranking the proposed panellists and selecting the first 3 of them, discussion on the topic of travel support and decision on the allocation of funds from CCEC and CMI to a joint pot to support invited people, and discussion on invitation of selected people.

Keynote Speeches and Invited Talks

- Invited Talk, Jianping Li, Influence of the NAO on Wintertime Surface Air Temperature Over the East Asia: multidecadal variability and decadal prediction, 2022 International Conference on international Cooperation and Integration of Industry, Education, Research and Application for Future Ocean, November 27-28 2022, Qingdao, Virtual online conference.
- Invited Talk, Jianping Li, Climate Change, Carbon Neutrality and Blue Governance, OUC-UoP Joint Centre for Blue Governance Workshop, November 25 2022, Qingdao, Virtual online conference.
- Invited Talk, Jianping Li, Climate Change, Carbon Neutrality and Sustainable Development, International Year of Basic Sciences for Sustainable Development – International Forum for Climate and Environmental Changes and Sustainable Development, November 22-26, Beijing, Virtual online conference.
- Invited Talk, Jianping Li, Influence of the NAO on wintertime surface air temperature over the East Asia: multidecadal variability and decadal prediction, China-Norway Marine University Consortium Alliance Annual Academic Conference 2022, November 14-16 2022, Qingdao, Virtual online conference.
- Invited Talk, Jianping Li, Influences of tropical cyclones over the western North Pacific on El Niño intensity and diversity, 4th Open Science Symposium on Western Pacific Ocean Circulation and Climate, October 25-27 2022, Xiamen, Virtual online conference.

FUTURE ACTIVITIES

Business meeting

CCEC president Jianping Li will chair the next CCEC business meeting, assisted by vice-president Keith Alverson. The meeting is tentatively planned to be held on July 13th with a light lunch provided. Scientists interested in taking on leadership positions in CCEC after the congress are encouraged to inform CCEC president Jianping Li, and will be invited to attend the business meeting in Berlin.

Scientific Meeting Organization

- CCEC is co-convening the IUGG U01 session CMG. We now have a list of 12 Invited speakers who have all agreed to present. The list of speakers will be updated to the congress website shortly after the abstract submission deadline in February.
- Co-Convener, EGU 2023 General Assembly session AS1.24 (CL1.2), Monsoon systems in a changing climate: past, present and future, 23-28 April 2023.
- Convener, IAMAS symposia M06: Monsoon Systems in Rapid and Intensifying Climate Change and Their Role in Extreme Events, IUGG 2023, 11-20 July 2023, Berlin, Germany.
- Co-Convener, IAMAS symposia M10: El Niño/Southern Oscillation and its Regional and Global Impacts, IUGG 2023, 11-20 July 2023, Berlin, Germany.

Jiangping Li, CCEC Chair

Union Commission on Mathematical Geophysics (CMG)

CMG website: <https://iugg.org/associations-commissions/commissions/cmg/>

INTRODUCTION

During 2022 the Commission (1) held the 33rd IUGG Conference on Mathematical Geophysics (CMG2022) in Seoul, South Korea, (2) finalized and submitted a book to the Cambridge University Press as a contribution to the IUGG Special Publication Series, (3) worked on organizing a Union Symposium at the IUGG General Assembly 2023, and (4) solicited a proposal for organizing the 34rd IUGG Conference on Mathematical Geophysics in 2024.

ADMINISTRATION

The CMG Executive Committee membership remained the same in 2022. Officers: Alik Ismail-Zadeh, Chair (Germany; IUGG), Ute Herzfeld Vice Chair (USA; IACS), Malcolm Sambridge, Vice Chair (Australia; IASPEI), and Ilya Zaliapin, Secretary (USA; IAHS). Members: Yehuda Ben-Zion, Past Chair (USA; IASPEI), Roberto Carniel (Italy; IAVCEI), Enamundram Chandrasekhar (India; IAGA), William Dewar (USA, IAPSO), Alexander Fournier (France, IAGA), Salvatore Grimaldi (Italy, IAHS), Shin-Chan Han (Australia, IAG), Sang-Mook Lee (Korea, IUGG), Annick Pouquet (USA, IAMAS). Advisory Committee: Dick Peltier (Canada), and Daniel Rothman (USA).

ACTIVITIES

The 33rd IUGG Conference on Mathematical Geophysics



Group photo of the CMG2022 participants

The 33rd IUGG Conference on Mathematical Geophysics (CMG2022) “*Geophysics in the World of Modern Mathematics and Artificial Intelligence*” was held at the Seoul National University, Republic of

Korea, during 20-24 June 2022 in a hybrid format. The CMG2022 Program (<http://www.cmg2022.org/index.php/scientific-program>) covered several important topics related to data sciences, AI, machine learning, geophysical fluid dynamics, mathematics for natural hazards and climate science, and geophysical inversions. Two keynote lectures were delivered by Frederik J. Simons of Princeton University and Kwang-Yul Kim of Seoul National University. A panel of eminent experts in geosciences, physics, and mathematics raised awareness about the 2022 United Nations International Year of Basic Science for Sustainable Development in promoting basic sciences (<http://www.cmg2022.org/index.php/panel-discussion>). Over five days, fourteen invited speakers from Czech Republic, France, Hungary, Oman, Russia, Rwanda, Saudi Arabia, Switzerland, UK, and USA presented cutting-edge mathematical applications to geosciences. More than 140 people from 33 countries attended the conference. The conference was highlighted in local media (<http://www.theasian.asia/archives/120063>). The Chair of the Local Organizing Committee was Sang-Mook Lee. Conference site: <http://www.cmg2022.org>

Book “Applications of Data Assimilation and Inverse Problems in the Earth Sciences”

The book has been submitted to the Cambridge University Press and its release is expected in June 2023 as a part of the IUGG Special Publication Series. This book provides a comprehensive reference on data assimilation and inverse problems, as well as their applications across a broad range of geophysical disciplines. With contributions from world leading experts in the field, it covers basic knowledge about geophysical inversions and data assimilation and discusses a range of important research issues and applications in atmospheric and cryospheric sciences, hydrology, geochronology, geodesy, geodynamics, geomagnetism, gravity, near-Earth electron radiation, seismology, and volcanology. Book’s editors are Alik Ismail-Zadeh (Germany), Fabio Castelli (Italy), Dylan Jones (Canada), and Sabrina Sanchez (France). Editorial Advisory Board consists of the Members of the CMG Executive Committee. More information can be found at the website of the Cambridge University Press: <https://www.cambridge.org/de/academic/subjects/earth-and-environmental-science/solid-earth-geophysics/applications-data-assimilation-and-inverse-problems-earth-sciences?format=HB>

The Vladimir Keilis-Borok Medal

The Vladimir Keilis-Borok Medal was established by the IUGG Bureau in 2021, and recognizes middle career scientists who made important contributions to the field of mathematical geophysics. The aim of the Medal is to honor the legacy of Keilis-Borok – a visionary science leader and organizer, prolific seismologist and mathematical geophysicist, the CMG founder, and former IUGG President – in promoting transformative scientific advancement and selfless leadership. As a response on the call for nominations, five nominations were received. The Medal Committee was comprised of Alik Ismail-Zadeh (Chair), Ute Herzfeld, Malcolm Sambridge, and Ilya Zaliapin. The inaugural Vladimir Keilis-Borok Medal was awarded to Dr. Frederik J. Simons, professor of Princeton University (USA) for his outstanding contributions to mathematical geophysics and development of cutting-edge mathematical methods in geoscience data analysis. The Medal was virtually presented to Dr. F.J. Simons at the CMG2022, and is expected to be handled to the Medalist at the IUGG General Assembly in Berlin.



The crystal Vladimir Keilis-Borok Medal 2022

Union Symposium at the IUGG General Assembly 2023

The IUGG General Assembly (IUGG2023) will be held in Berlin from 11 to 20 July 2023. The CMG has been working jointly with the IUGG Commission on Climatic and Environmental Changes (CCEC) to organize the Union Symposium "*Geoscience and Mathematics for Sustainable Development*". Potential speakers have been identified and contacted by the key conveners: Keith Alverson (CCEC) and Alik Ismail-Zadeh (CMG). Twelve experts agreed to contribute to the symposium.

FUTURE ACTIVITIES

The Commission will select the venue of the 34th IUGG Conference on Mathematical Geophysics to be held in 2024. A formal proposal to hold the conference has been solicited and is discussed by the CMG Executive Committee.

The Commission, together with the IUGG Commission on Climatic and Environmental Changes, will organize the Union Symposium U01 "Geoscience and Mathematics for Sustainable Development" on 12 July 2023 at the 28th IUGG General Assembly in Berlin, Germany (<https://www.iugg2023berlin.org/980-2>).

Alik Ismail-Zadeh (CMG Chair) and Ilya Zaliapin (CMG Secretary)

Union Commission on Geophysical Risk and Sustainability (GRC)



GRC website: <https://iugg.org/associations-commissions/commissions/grc/>

INTRODUCTION

The IUGG Commission on Geophysical Risk and Sustainability (IUGG GeoRisk Commission, or GRC) was established by the IUGG Bureau in August 2000. The GRC seeks to advance the role of science in the reduction of natural disasters through better societal understanding of environmental natural hazards. Fully understanding the risk posed by natural hazards also requires an understanding their environmental and economic impacts. Areas of development include accurate early warning through the robust and effective flow of critical information to decision making by emergency managers, policy-makers, scientists and the general public via initiatives, meetings, workshops, and publications.

ADMINISTRATION

Executive Committee:

Chair: John LaBrecque (IAG, USA)

Vice-Chair: Vyacheslav Gusiakov (IAPSO, RUSSIA)

Vice-Chair: Chun-Chieh Wu (IAMAS, CHINA: ACADEMY OF SCIENCES IN TAIPEI)

Secretary/ Treasurer: Yekaterina Kontar (IACS, IAHS, USA)

Past Chair: Joan Marti (IAVCEI, Spain)

- Mohsen Ghafory-Ashtiany (IASPEI, IRAN)
- Michael Krautblatter (IACS, GERMANY)
- Christa von Hillebrandt-Andrade (IAPSO, PUERTO RICO)
- George Balasis (IAGA, GREECE)
- Roberto Sulpizio (IAVCEI, ITALY)
- Kosuke Heki (IAG, JAPAN)

Members in Active Advisory Capacity:

- Tom Beer (IAMAS, AUSTRALIA)
- Harsh Gupta (IASPEI, INDIA)
- Alik Ismail-Zadeh (IASPEI, GERMANY/RUSSIA)
- Vladimir Kossobokov (IASPEI, RUSSIA)
- Gordon McBean (IAMAS, CANADA)
- Ramesh P. Singh (IASPEI, USA)
- Stephen McNutt (IASPEI, USA)
- Ester Sztein (USA)

Business Meetings

1. **June 29-30, 2022:** Discussion of GRC Commission responsiveness to Association Goals following a request by President-elect Chris Rizos. Recordings of these meetings were forwarded to the Union secretariat.

1. **June 29: Recording at:** [June 29, 2022 meeting](#)

2. **June 30: Recording at: [June 30, 2022 meeting](#)**
2. **February 28, 2023 to Present:** Monthly GTEWS_Oceania organizational meetings in support of the GRC GTEWS_Oceania Initiative.
1. **February 28, 2023**
https://www.dropbox.com/s/wcibezix6tul9b7/GTEWS_Oceania%20Mtg_1_02%3A28%3A2023.mov?dl=0
 2. **April 11, 2023**
https://www.dropbox.com/s/0l3qe1u9zcm4r1/GTEWS_Oceania%20Mtg_2_04%3A11%3A2023.mov?dl=0
 3. **May 9, 2023:**
https://www.dropbox.com/s/kvrjf3vnet8c4wp/GTEWS_Oceania%20Mtg_3_05%3A09%3A2023.mov?dl=0
 4. **June 13, 2023:**
https://www.dropbox.com/s/tx3s2wx2ob4gdf4/GTEWS_Oceania%20Mtg_4_06%3A13%3A2023.mp4?dl=0
 5. **July 16, 2023:** Joint meeting with GTEWS_Oceania Discussion Group at the 2023 IUGG General Assembly in Berlin.

GRC Financial Status (Yekaterina Kontar, GRC Secretary/Treasurer):

Planned Expenditures:

- The GRC treasury includes \$10,000 grant from the IUGG in support of the current GTEWS_Oceania Initiative. Expenditure of these funds is under discussion by the members of the GTEWS_Oceania initiative. Likely use will be to support a GTEWS_Oceania symposium.
- The upcoming 2023 General Assembly will involve the expenditure of funding in support of a GRC membership meeting and a review of the GTEWS_Oceania Initiative.
- The GRC must support a web presence with the available funds.

ACTIVITIES

The COVID-19 pandemic significantly impacted GRC plans. The curtailment of international travel and associated meetings and reliance on virtual meetings persisted well into 2022. During this time, the GRC developed interactions with the International Consortium on Landslides (ICL) and developed representation within panels of the Group on Earth Observations (GEO), the Global Geodetic Observing System (GGOS), International Consortium on Landslides (ICL), and the International Science Council-GeoUnions Standing Committee on Disaster Risk Reduction (ISC-CDRR). The following describes some of these activities.

GNSS Tsunami Early Warning System Project: *The GRC worked during the past eight years in support of the 2015 IUGG General Assembly [Resolution #4](#) for the implementation of GNSS Tsunami Early Warning Systems for the Indo-Pacific. The GRC and the IAG’s Global Geodetic Observing System worked in close collaboration including the development of the IAG [GNSS Augmentation for Tsunami Early Warning \(GATEW\) working group](#) that now includes 18 institutions from 12 nations with substantial experience and roles in the development of geodetic applications to disaster risk reduction. The GRC and the GGOS collaborated with the Association of Pacific Rim Universities (APEC), and NASA. and the IUGG Commission on Geophysical Risk and Sustainability (GRC) to conduct the GTEWS 2017 workshop to explore the feasibility and utility of GTEWS. The following describes some of these activities.*

- [GTEWS Demonstrated Capability during Tohoku Oki](#)
- [GTEWS 2017 workshop- UNDRR GAR-19 Contributing Paper](#)

The IGS, GRC and the GGOS/Geohazards FA worked with GEO to develop the Geodesy for Sendai framework to foster collaborations for the application of GNSS to goals of the Sendai Framework of the UNDRR. [Geodesy for Sendai](#) was codified in the [GEO Work Programme](#) of 2020-2022 and 2023 to 2025. The GRC applied for and was granted \$10K by the IUGG to support the organization of the GTEWS Coordinating Committee as recommended by the GTEWS 2017 workshop.

GTEWS Oceania activities 2022-2023: The implementation of GTEWS continued as recommended by the IUGG Resolution #4 within the individual programs of Indian, Japanese, Chilean, and US agencies. Unfortunately, as noted by the GTEWS 2017 workshop report, a reticence persists among several Indo-Pacific nations to engage in the sharing of real time GNSS essential for the realization operation of an Indo-Pacific GTEWS.

The GRC, GGOS Geohazards and the IGS joined in support of the UN ICG task force on “Applications of GNSS for Disaster Risk Reduction” (Geodesy4DRR). The IGS published [Stop 5 of the Tour de l’IGS](#) that focussed upon GNSS Applications to the South Pacific Disaster Risk Reduction. Stop 5 included a [report by the GRC/GGOS Geohazards recommendation on the formulation of GTEWS Oceania](#). The GTEWS_Oceania concept recognizes the need to develop a South Pacific real time GNSS network in support GTEWS as well as numerous other GNSS applications to environmental hazard risk reduction. The GRC, the GATEW working group, the IGC Geodesy4DRR task force and member nations of the Oceania region are holding monthly meetings to develop the GTEWS_Oceania Initiative.

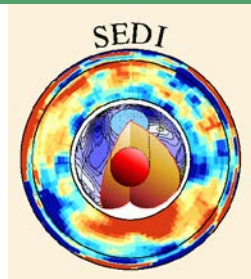
FUTURE ACTIVITIES

Following the GTEWS 2017 workshop report, the objective is to establish a governing council to determine data policy, identify resources, and establish a development plan to establish a GTEWS_Oceania network and analysis capability. It is too early to resolve the success of the GTEWS_Oceania Initiative but there is a growing participation by the nations of Oceania. Notably, the Pacific Geospatial and Surveying Council has expressed interest in joining the GTEWS_Oceania Initiative.

A draft Charter (Terms of Reference) is under review and implementation plans are being developed by a growing number of participating nations. The Oceania region has a significant number of GNSS receivers of varying quality and varying communications capability. Resources will be needed to upgrade these receiver stations and provide the regional broadband communications as well analysis systems. Discussions are underway to apply the \$10K IUGG/GRC grant as a matching grant to further develop resources for GTEWS_Oceania as noted in the Treasurer’s report.

John LaBrecque, GRC Chair

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



SEDI website: www.sedigroup.org

INTRODUCTION

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

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

ADMINISTRATION

SEDI is currently chaired by Christine Thomas (WWU Münster, Germany) who took over from Jonathan Aurnou (UCLA, USA) at IUGG2019: Vice-chair is now Mathieu Dumberry (U. Alberta, Edmonton, Canada), with Michael Bergman (Simon's Rock College, USA) acting as Secretary-General. SEDI has a membership of about 600, as recorded on the email list used to broadcast information related to SEDI activities, upcoming meetings, funding opportunities, and academic openings.

ACTIVITIES

SEDI meeting 2022

In 2022, the SEDI meeting was supposed to be held in Taipei, at the National Taiwan University at the Institute of Earth Sciences (Academia Sinica) after cancellation of the 2020 meeting in Taipei. The local organizing committee included Frederic Deschamps and Ban-Yuan Kuo (co-leads) along with Wen-Che Yu, Wen-Pin Hsieh, Kenny Vilella and Hsing-Wen (Samantha) Hsieh. However, due to the continuation

of the Covid pandemic and the travel restrictions and quarantine requirements that were in place for Taiwan, we held the 2022 SEDI meeting at ETH Zürich with a very short preparation time. The organizing committee was the same as for Taipei and in addition included Jerome Noir and Karin Emmenegger of the ETH. The speakers and chairs were similar to those planned in 2020 but there were restrictions for flights from Japan and other Asian Countries (due to the war in Ukraine AND the pandemic), which reduced the presence of those scientists. The scientific program of the meeting is available at the web site <https://sedi2022.earth.sinica.edu.tw/>

The atmosphere during SEDI was marked by a happiness to meet with colleagues again after a long time of virtual conferences and many young scientists were present and benefitting from talking with each other and colleagues from different institutions. The organization, even though the ETH and Taipei team had only 4 months for preparation, was excellent and we believe people enjoyed the conference and the presentations. While many participants were present at ETH, there was also the possibility to follow talks online on the ETH platform or on Zoom.

We feel that as a small conference SEDI fosters strong collaborations/interactions and is a good way for early career scientists to present their work, and a physical meeting is therefore the best form for SEDI meetings also in the future.



Participants of the 2022 SEDI meeting at ETH Zurich

FUTURE ACTIVITIES

The next regular SEDI meeting is scheduled for 2024 and we are currently preparing a poll to SEDI member about the location on the US East Coast. Two SEDI members offered to organize the SEDI meeting: Peter Driscoll in Washington DC and Mike Bergman in Simon's Rock College, Great Barrington, MA.

The SEDI officers are convening a Union session at 2023 IUGG in Berlin (New discoveries in Deep Interior of Earth and Planets) with 8 invited talks covering topics related to SEDI activities and several members of the SEDI community are organizing and convening further sessions at IUGG2023.

Christine Thomas, SEDI Chair
Mathieu Dumberry, SEDI Vice-Chair
Michael Bergman, SEDI Secretary-General

Union Commission on Planetary Sciences (UCPS)



UCPS website: <http://202.127.29.4/geodesy/ucps>

INTRODUCTION

The IUGG Union Commission on Planetary Sciences (UCPS) aims to promote and coordinate scientific (physical, chemical, and mathematical) studies of planets in the solar system and around other stars. UCPS intends to advance planetary science through advocacy of solar system and extrasolar exploration, seeking insights on the origin, formation and evolution of planets and systems, including a search for habitable worlds beyond Earth. The UCPS together with other IUGG associations will share knowledge through scientific research and comparative studies between planetary objects and the Earth in the fields of atmosphere, surface and interior science. Additional information about UCPS can be found at <http://202.127.29.4/geodesy/ucps>.

Objectives:

- To advance and foster the study of scientific problems in the planetary sciences;
- To promote and coordinate international cooperation in planetary science, and promote planetary science activities in developing countries;
- To facilitate, on an international basis, discussion and publication of the results of the studies, research and work indicated above;
- To contribute to coordinating activities for future space missions.

ADMINISTRATION

Executive Committee

- Shuanggen Jin (IAG, China) (Chair)
- Nader Haghighipour (University of Hawaii, USA) (Vice-Chair)
- Paul Hartogh (MPI, Germany) (Vice-Chair)
- Scot Rafkin (IAMAS, USA) (Secretary/Treasurer)

ACTIVITIES

- 26-28 September 2022, Shuanggen Jin co-organized and attended 3rd International Workshop on GNSS Ionosphere (IWGI2022) - Observations, Modelling and Applications as Co-Chair, Neustrelitz, Germany.



- 31 October 2022, Shuanggen Jin was elected as Fellow of African Academy of Sciences with receiving the certificate from President Fellex Dapare Dakora, Beijing, China.



FUTURE ACTIVITIES

- 2nd IUGG Symposium on Planetary Science (IUGG-PS 2024): New Observations and Advances in Solar System, 2024, Shanghai, China.
- Session: Science and Exploration of Mars and Venus at AOGS 20th Annual Meeting, 30 July - 4 August 2023, Singapore.

Conveners:

- Prof Varun Sheel (Physical Research Laboratory, India)
- Dr Takeshi Imamura (The University of Tokyo, Japan)
- Prof Shuanggen Jin (Henan Polytechnic University, China)
- Dr Yeon Joo Lee (Institute for Basic Science, Korea, South)

- Session: General Topics in Planetary Science at AOGS 20th Annual Meeting, 30 July - 4 August 2023, Singapore.

Conveners:

- Dr Steven Vance (Jet Propulsion Laboratory, Caltech, USA)
- Prof Shuanggen Jin (Henan Polytechnic University, China)
- Dr Kyeong Ja Kim (Korea Inst. Geoscience & Mineral Resources, S. Korea)

Shuanggen Jin, UCPS Chair

THE INTER-ASSOCIATION WORKING GROUP: Electro-magnetic Studies of Earthquakes and Volcanoes (EMSEV)



EMSEV website: www.emsev-iugg.org/emsev

INTRODUCTION

EMSEV (Electromagnetic Studies of Earthquakes and Volcanoes) is an Inter-Association Working Group of the [IUGG](#). [IAGA](#), [IASPEI](#), and [IAVCEI](#) strongly support EMSEV and promote its activities. EMSEV continuously investigates electromagnetic (EM) and other related physical processes related to the occurrence of earthquakes and eruptions from active volcanoes and is primarily focused on better understanding of these physical and dynamic processes. Calling upon expertise from a worldwide community of more than 350 researchers and students, EMSEV encourages innovative research in electromagnetism (EM) to be integrated with other geophysical data in order to describe, monitor, analyse, and model fault systems and volcanoes.

EMSEV objectives are (1) evaluation and endorsement of advanced studies in the electromagnetic field through international cooperation, conferences, and workshops, (2) integration of electromagnetic methods together with other geophysical techniques to identify physical processes on all scales before, during, and after earthquakes and volcanic eruptions, (3) organization and management of international and regional workshops, and (4) participation in educational and field programs on a global basis relating to observed results and the reduction of the earthquake and volcanic hazards.

ADMINISTRATION

In 2018, the structure of the EMSEV changed significantly. The current EMSEV structure is now as follows: 1) Bureau, 2) Country Liaison Members, 3) EMSEV members, and 4) EMSEV Collaborators.

EMSEV bureau. Since March 2019, Toshiyasu Nagao (Japan) assumes the EMSEV Chair, Valerio Tramutoli (Italy) was elected as Vice-Chairperson, and Jann-Yeng Liu (Taiwan) was selected as Secretary.

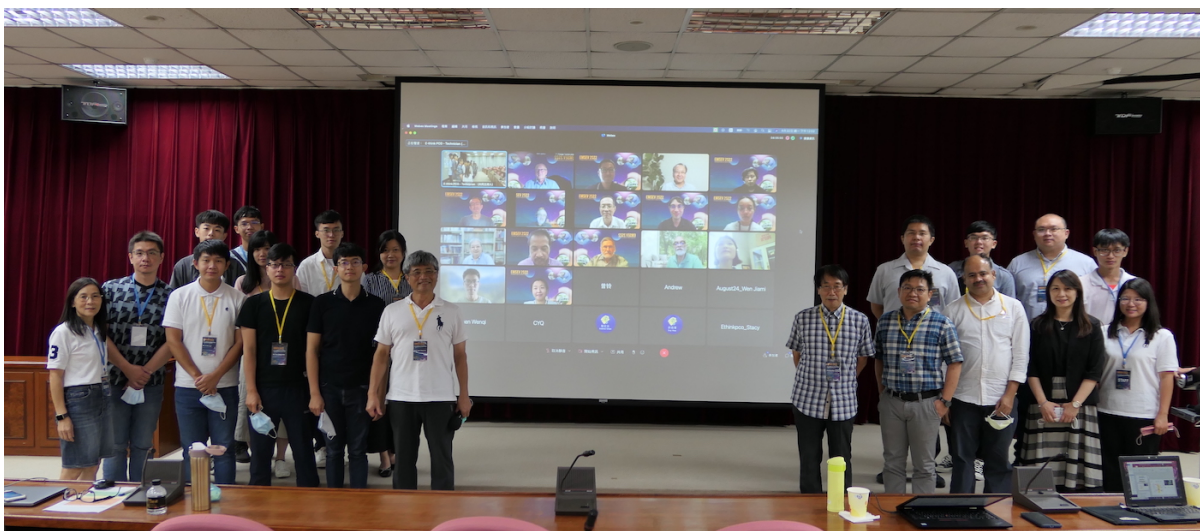
EMSEV bureau elected the following to be association liaison members:

- IAVCEI: Takeshi Hashimoto from Hokkaido University (Japan),
- IASPEI: Qinghua Huang from Beijing University (China),
- IAGA: Jann-Yeng Liu from the National Central University (Taiwan),

At this moment, EMSEV bureau contains 15 members from 10 countries. Detailed member list is presented on <https://www.emsev-iugg.org/emsev/profile.html>. You can find **Country liaison members** and **EMSEV Members**, and **EMSEV Collaborators** at <https://www.emsev-iugg.org/emsev/>.

ACTIVITIES

In 2022, in addition to joint meetings at EGU, JpGU, AOGS, and AGU, EMSEV also held its normally bi-annual meeting, called EMSEV2022, in Taiwan. This meeting was originally scheduled for 2020 but was postponed due to COVID-19. **EMSEV2022** was held at National Central University in Taiwan from August 22 to 24, 2022. The primary meeting organizer was Professor J. Y. Liu of the National Central University, Taiwan (EMSEV Bureau, IAGA liaison). The meeting was held both in-person and online. The final submitted abstracts were 60 and the number of participants was slightly over 80 ([Abstracts](#)). There were 10 participating countries and regions (Taiwan, China, USA, Japan, France, Italy, Russia, Greece, India, and Fiji).



Local and online participants of EMSEV2022

OTHER 2022 MEETINGS

EGU 23-27 May 2022, NH4.1 Short-term Earthquakes Forecast (StEF) and multi-parametric time-Dependent Assessment of Seismic Hazard (t-DASH), Co-organized by EMRP1/ESS1/GI5/SM3, co-sponsored by JpGU and EMSEV, Conveners: V. Tramutoli, P. F. Biagi, C. Filizzola, N. Genzano, I. A. Moldovan.

JpGU May 22-27 2022 (Oral), May 29 - June 3, 2022 (Poster), M-IS10 Interdisciplinary studies on pre-earthquake processes, Conveners: J. Y. Liu, D. Ouzounov, Q. Huang, K. Hattori.

AOGS 01-05 August, ST19 Lithosphere-Atmosphere-Space Coupling, Conveners: C. H. Chen, K. Hattori, J. Y. Liu, D. Ouzounov, V. Tramutoli.

AGU 12-16 Dec. 2022, NH13A, Integrated Studies of Geospheres' Interaction Associated with Pre-earthquake Processes, Geohazards, and Space Weather by Ground and Space-Borne Multi-instrument Observations, Conveners: D. Ouzounov, J. Y. Liu, P. Taylor, L. Conti.

JOINT INTERNATIONAL ACTIVITIES

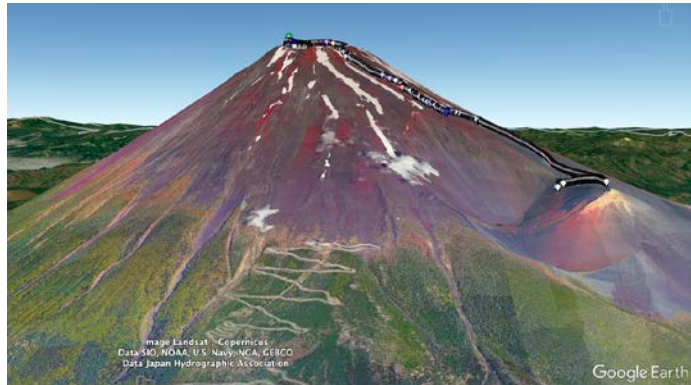
Activity on volcanoes (Taal, Philippines)

After its eruption in 2020, Taal Volcano in the Philippines continues to exhibit unrest. This comprises of episodes of volcanic earthquakes and tremors, active degassing of SO₂, and frequent phreatomagmatic bursts from the Main Crater. Geochemical sampling using remotely-piloted aircraft shows the temperature of the Main Crater Lake to be 65.1 degrees Celsius with a pH of 0.76. Due to the current instability of the volcano, geophysical and geochemical observations are confined to the shoreline of Taal Volcano Island and Taal Caldera on the mainland, emplaced remote monitoring stations, and the use of remotely-piloted aircraft.

The EM stations along with all real-time geochemical and a few geophysical and geodetic stations on Taal Volcano were lost during the eruption. Electromagnetic observations have restarted in 2022 with the establishment of benchmarks around the coastline and a baseline post-eruptive total magnetic field anomaly field of Taal Volcano Island.

Activity on volcanoes (Mt. Fuji, Japan)

In FY2022, preliminary observations were conducted to establish permanent geomagnetic observation points at and around the summit of Mt. Fuji. As a result, a location in the electromagnetic environment suitable for observation was found near the 8th station on the path to top. The photo shows the route taken for the magnetic observation on foot.



Continuation of atmospheric electric field measurement in Kakioka, Japan

For nearly 100 years, Kakioka Geomagnetic Observatory, JMA has conducted atmospheric electric field observations with the classical water-drop type instrument by Lord Kelvin, which ended in February 2021. EMSEV conducted parallel observations with two different instruments to ensure the continuity of observations. Both records were in good agreement with each other, and we succeeded in continuing the observation of the atmospheric electric field at Kakioka. We have already submitted the paper entitled "Successive measurement of atmospheric electric field/potential gradient after long-term water dropper measurements at Kakioka, Japan" for Geoscience Data Journal.

IAVCEI eVolcano project

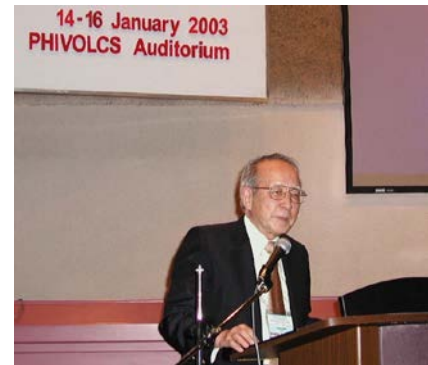
As for IAVCEI's eVolcano 2020 project, improvements were made to the PowerPoint presentation materials, etc., as was the case last year. We are currently waiting for instructions from IAVCEI. EMSEV proposed to organize topics on "Electromagnetic Effects related to Volcanic Structure and Activity". J. Zlotnicki, M.J.S. Johnston, T. Hashimoto, N. Pergola, and Y. Sasai have worked on this IAVCEI proposal. In 2021, two presentations were nicely achieved. T. Hashimoto developed a presentation on "Magnetic monitoring" and N. Pergola covered the theme "Satellite imaging and monitoring of active volcanoes". Another one could follow depending on the progress of the eVolcano website.

Obituary

EMSEV's first Chair, Seiya Uyeda passed away on January 19 at the age of 93 (1929-2023). He served the IUGG Bureau (1995-1999), the Chair of the LOC of the IUGG GA 2003 (Sapporo, Japan), and the Chair of the EMSEV (2003-2007).

During the 1999 International IUGG General Assembly in Birmingham, the discussion started anew. Prof. Uyeda's breakthrough concept was to build a joint Inter-Association (IAGA, IASPEI, and IAVCEI) Working Group able to link these isolated scientific groups for developing interconnected field research.

This led to the formal submission of a proposal to the IUGG Executive Committee to form such an inter-association Working Group focused on a joint understanding of the physical processes related to earthquake ruptures and volcano eruptions. Thus, the EMSEV Working Group was born. Without his immense efforts, EMSEV would not exist.



FUTURE ACTIVITIES

At the business meeting held in conjunction with EMSEV2022, it was decided to hold the next EMSEV General Assembly in Crete, Greece, in late September 2024. Here, the local meeting organization will be led by Professor F. Vallianatos of the National and Kapodistrian University of Athens.

Support for EMIW (The international Electromagnetic (EM) Induction Workshops of IAGA Division VI), 2024 Beppu, Japan, which is closely related to EMSEV activities, will be provided within the budget year 2023.

In summary, EMSEV continues to work on both strong participation in international meetings primarily organized by IUGG, EGU, AOGS, JpGU, CSES, and AGU and also towards strengthening EMSEV activities through international cooperation. Examples of the latter effort include cooperation with Philippines researchers on activity associated with Taal volcano, the Bishkek-Research station on EM triggered seismicity on active faults, the development of satellite EM monitoring with the Chinese (CSES) satellite mission, and another joint global hazard research.

Toshiyasu Nagao, EMSEV Chair
Valerio Tramutoli, EMSEV Vice-Chair
Jann-Yeng Liu, EMSEV Secretary

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



ILP website: <https://ilp.nju.edu.cn>

INTRODUCTION

The International Lithosphere Program (ILP) is a joint project of IUGG and IUGS and receives additional funding from member countries (cf. financial report). ILP seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere through international, multidisciplinary geoscience research projects in Task Forces (TF) and Regional Coordinating Committees (CC).

The major ILP themes are: I. Geoscience of global change, II. Contemporary dynamics and deep processes, III. Continental lithosphere, IV. Oceanic lithosphere.

All TF and CC are led by international teams and supported by ILP with 4,000 Euro per year over a period of 5 years. This “seed money” is used by the project leaders to raise additional funds and build strong interfaces with other projects (ICDP, SINOPROBE, TOPO-EUROPE, etc.).

ADMINISTRATION

ILP operates on the base of terms of reference and has an international Bureau. The Bureau meets regularly to monitor the progress and to select new projects in close consultation with the representatives of National Committees. The Bureau is chaired by the President with support from the Secretary General. ILP is supported by a science advisory board and its honorary members. The ILP Secretariat is complementarily located at Nanjing University, China. The 2022 ILP Bureau membership is as follows:

President	H. Thybo	Turkey/Denmark
Secretary General	M. Liu	USA
Executive Secretary	Q. Wang	China
Representative of IUGG	A. Rudloff	Germany
Representative of IUGG	J. Ludden	France
Chair Committee National Representatives	A. Tibaldi	Italy

The Advisory Board to ILP includes the following members:

Ö. Adiyaman Lopes	UNESCO, France
S. Dong	China
C. Ebinger	USA
D. Mueller	Australia
V. Ramos	Argentina
Atalay Ayele	Ethiopia
Kristine Asch	Germany

The Bureau is further supported by:

Past President

S. Cloetingh

Netherlands

Honorary President

A. Green

Switzerland

ILP Fellow

J.F.W. Negendank

Germany

ACTIVITIES

ILP had a strong representation at the EGU, AGU and Goldschmidt Geochemical Conference meetings, where several symposia were co-sponsored by ILP and convened by members of the Task Forces and Coordinating Committees. A book is being planned with articles on the history and science of Task Forces/Coordinating Committees of ILP as a Special Publication of Geological Society London.

A **bureau meeting** was held on 23 May 2022 and the hybrid business meeting was held on 24 May 2022. The Evgueni Burov Medal for 2022 was awarded to Prof. Jun Korenaga, Yale University, USA, for his outstanding contributions to studies of Geodynamics based on excellent questions, integration of a huge range of observations and approaches, and his noteworthy scientific leadership.

The **Flinn-Hart** award was given to Dr. Pietro Sternai, University of Milano-Bicocca, Italy, in recognition of his important achievements in exploring the feedbacks between geodynamic and climate changes throughout the Earth's geological history.

Highlights for the current projects

TF1 on the lithosphere and mineral resources had focus on geodynamics, geological evolution and geophysical modelling of major Palaeozoic orogenic belts worldwide, including the Eastern Tethys Belt, the Central Asia Orogenic Belt, the Central Tethys Belt, and the Western Tethys Belt; Geological, geophysical and geochemical results were directly linked and discussed in terms of related lithosphere mineralization. The leaders gave several invited presentations at international meetings.

TF2 developed studies at several volcanic areas in different continents, and merged field geological, geomorphological, and geophysical data with analogue and numerical modelling, resulting in 71 peer reviewed papers.

TF3 on the world Stress map has launched a new website, including a new setup of the service CASMO - Create A Stress Map Online. The team analysed and compiled great numbers of stress data (both orientation and magnitudes) from large parts of the world; and the leader did a successful online lecture tour in Pacific South countries.

TF4 on Continental Lithosphere played a leading role in the AdriaArray initiative and participated in the successful drilling of the DIVE DT-1b borehole in Italy. The team presented a new geophysical study of the lithosphere in the Carpathian-Pannonian region, and made on-line release of 5 pre-recorded talks on the LAB.

TF5 on Relationships Between Lithospheric Processes and Seafloor Topography acquired a large wealth of new data from the oceans, and launched a dedicated data website.

TF6 on sedimentary Basins held another large international meeting with excursions; they published an extensive volume of studies.

TF7 was building, stimulating, and coordinating the international multi-disciplinary bio-geodynamical research community related to Bio-Geodynamics of the Lithosphere, and took part in the founding of two excellence centres on planetary habitability.

TF8 on Global assessment of heat Flow Data has developed quality criteria for the database during a series of monthly virtual workshops; they have initiated an annual 24 hours online video meeting session as well as prepared for the 7th Cermak Heat Flow meeting.

CC1 (TopoEurope) has further expanded its research on mantle-lithosphere interactions by including effects of hydrous nature of secondary plumes; they brought new focus on the role of fluids and mantle-lithosphere interactions on lower crustal seismicity and have been active in the AdriaArray project.



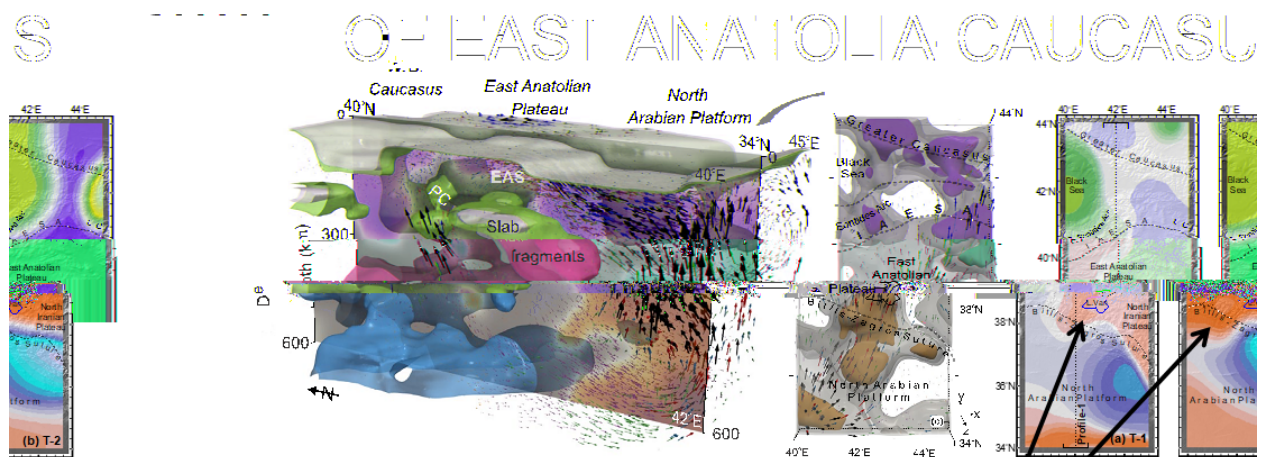
2022-CC1 TOPO-EUROPE workshop participants

CC2 on seismicity in the Himalaya has expanded its network in the region and set up an IUGG sponsored teaching programme in Bhutan, Nepal and India together with TF4.

CC3 on Anatolian Tectonics has developed new models for the sources of large amplitude and large-scale topographic changes in Anatolia as well as the North Anatolian Fault Zone.

CC4 on Global geoscience Transects has substantially expanded its global network and made progress with its major transect across Eurasia, in particular with new contacts in Mongolia. CC5 on Eastern Antarctica has made progress in the determination of heat flow in Antarctica in collaboration with TF8, and made progress on coordinating best-practice in remote field instrumentation.

DYNAMIC TOPOGRAPHY



2021-CC4 ANATEC on Anatolian Tectonics. O. Gogus (Turkey) et al.

3-D and plan view of mantle flow model beneath East Anatolia-Caucasus. Mantle flow from south to the north (Black sea) and local flow/circulation generated by cold downwellings. Positive dynamic topography (up to 1.2 km) within the plateau and negative beneath the Black sea and the Arabian plate (Şengül Uluocak, E., Göğüş, O. H., Pysklywec, R. N., & Chen, B. (2021). Geodynamics of East Anatolia-Caucasus domain: Inferences from 3D thermo- mechanical models, residual topography, and admittance function analyses. *Tectonics*, 40, e2021TC007031. <https://doi.org/10.1029/2021TC007031>).

FUTURE ACTIVITIES

- Provide support to the new Task Forces/Coordinating Committees.
- Presence at the IUGG General assembly in Berlin 2023.
- Several sessions with TF and CC contributions at EGU-23 in Vienna and at AGU 2023 in San Francisco.
- Several workshops of individual task forces are planned.
- ILP Business meeting and meeting of the bureau during EGU annual meeting in Vienna, April 2023.
- Strategic discussion of ILP's role in the scientific community.
- An ILP townhouse meeting and a dedicated ILP session at AGU 2023.
- Award the E. Burov medal and Flinn-Hart award with lectures at EGU 2023.
- Strengthen connection to industry through the most relevant projects.
- Expand the national membership, e.g., with dedicated approach to African countries and Australia.
- Seeking new support from national science foundations and industry.

Budget request for 2023

To assure continuity and enable us to support the selected Task Forces and Coordinating Committees, we request an IUGG subvention of 15,000.00 USD as in previous years.

Hans Thybo, ILP President

IUGG FINANCIAL REPORT

INTRODUCTION

This report describes the status of the IUGG finances for the year 2022, the third year of the IUGG quadrennium 2020-2023. The report will be presented at the next Bureau meeting in connection with IUGG2023 GA in Berlin. The [budget](#) for 2020-2023 was approved at IUGG2019 in Montreal.

As of 1 January 2023, IUGG has 73 members, of which 59 are paying members representing 278 units. On January 1st, 2023, Latvia changed from associate member status to cat. 1 paying member status. Otherwise, the membership situation has not changed; for details, see section *Membership information and statistics as of January 1, 2023* below.

The paying members pay membership dues according to their category. Each category is assigned a certain number of units. The price of 1 unit in a given year is calculated using the September value of the US inflator index for the previous year. The September 2021 index was up 5.4 % compared to its value one year earlier. Consequently, in 2022 the price was USD 2,195/unit as compared to \$2,140 in the budget.

The membership dues are the economical basis for the activities of IUGG, with the US Dollar (USD) as the basic currency. The situation right now is steady in the sense that the union has a constant number of members and thereby also a stable income base. There is, however, an on-going debate worldwide about the value for money of memberships in scientific organizations like IUGG. Therefore, IUGG continues to place great emphasis on the benefits of membership.

The COVID-19 pandemic has affected the finances of IUGG considerably due to less travel and in person meeting activities. However, in 2022 the activities of international scientific cooperation, including those of IUGG, are coming closer to the situation we saw before the pandemic.

The accounting method is a cash flow system, with the money kept in three bank accounts. Therefore, the 4-year accounting for the whole budget period is more representative for the financial status of the union than the individual accountings year by year. The IUGG accounts are audited by a chartered auditor.

For a period of 10 years, the webmaster of the IUGG [website](#) was based in Moscow. However, due to the war situation in Ukraine, IUGG could not continue the cooperation. The IUGG webmaster is today based in Potsdam in Germany.

Overview of the report:

- Summary of the IUGG accounts for 2022, in USD
- General comments and notes
- Overview of IUGG grants and allocations in 2022
- Membership information and statistics as of January 1, 2023

SUMMARY OF THE IUGG ACCOUNTS IN USD FOR 2022



SUMMARY OF IUGG ACCOUNTS 2022

US dollars	Accounts	Budget
RECEIPTS		
1. Membership Subscription	571.456,81	556.400,00
2. Assembly Surcharge	0,00	0,00
3. Royalties	106,02	200,00
4. Miscellaneous		
a. Interest	3.207,41	100,00
b. Gain on exchange	2.597,22	
c. Other	36.000,00	
d. Associations, surcharge	0,00	
5. Total Receipts	613.367,46	556.700,00
6. Cash in hand	700,00	0,00
7. Bank balance on 1/1 2022	1.133.795,78	642.800,00
Check Sum	1.747.863,24	1.199.500,00
EXPENDITURES		
11. Administration		
11.1 Personnel	13.312,18	15.000,00
11.2 Equipment	0,00	1.000,00
11.3 Supplies	0,00	4.000,00
11.4 Communications	13.001,79	4.000,00
11.5 Travelling	25.191,40	70.000,00
11.6 Miscellaneous	5.494,61	5.000,00
11.7 special	35.992,85	0,00
12. New initiatives		
12.1 Education and outreach	12.066,28	30.000,00
12.2 Science	89.494,28	40.000,00
13. General Assemblies		
13.1 Organizational expenses	0,00	0,00
13.2 Travel grants	0,00	0,00
14. Symposia	23.505,15	25.000,00
15. Annual allocations		
15.1 Annual allocations	375.132,93	273.000,00
16. Dues and Grants		
16.1 ISC	25.944,06	32.000,00
17. Union activities		
17.1 GRC, SEDI, CMG, UCDI, UCPS, CCEC	29.000,00	24.000,00
17.2 Inter-Union Science (ILP)	15.000,00	15.000,00
18. Fees		
18.1 Professional services	0,00	5.000,00
18.2 Bank fees	1.926,13	3.000,00
19. Contingencies	0,00	2.500,00
20. Loss on exchange	0,00	
21. Total Expenditures	665.061,66	548.500,00
22. Balance on 31/12 2022	1.082.801,58	651.000,00
Check sum	1.747.863,24	1.199.500,00

	USD/DKK	
	Exchange rates Line 8	6,552 =DEC 31, 2021
December 31, 2022	Line 24	6,987 =DEC 31, 2022
Niels Andersen/Aksel Walloe Hansen	Other:	7,050 average
	USD/EUR	
	Line 8	0,881 =DEC 31, 2021
	Line 24	0,939 =DEC 31, 2022
	Other:	0,948 average

GENERAL REMARKS AND NOTES TO THE IUGG SUMMARY

General Remarks

The finances of IUGG in 2022 are still affected by the COVID-19 pandemic. This is reflected in the bottom line of the summary of IUGG accounts with total assets of more than \$1M. The annual balance of the IUGG economy is now of the same size or bigger than two years' normal turnover.

It is expected that unused funds from 2020-2021 will be activated in the second half of the quadrennium. To some extent, this has already happened in 2022. In 2023, we probably will see even more activity.

The base currency of IUGG is USD. Therefore, the summary of the IUGG accounts is shown in USD. It is the sum of three different accounts at Danske Bank in USD, EUR, and DKK, respectively. In addition, IUGG has a Mastercard account, which is mainly used in connection with travel. Finally, the Treasurer has a small amount of cash in USD.

In 2022, financial transactions between Denmark and Russia ended in late winter time due to the international sanctions imposed on Russia.

Currently, IUGG also hosts the funds of the IUGG/IUGS inter-union activity "International Lithosphere Program" (ILP), and the Union Commission on Climatic and Environmental Change (CCEC). The corresponding accounts are not included in this report.

Notes

Income

Line 1, Membership Subscription

The amounts given in the summary is a mix of late payments for previous years and regular payments for 2022 plus two early payments for 2023. On 1 January 2023, the total payment received in 2022 for the year 2022 was equivalent to 228 units. Additional 3 units were already paid in 2021. Therefore, a total of 231 units was paid by 40 members at the end of the year 2022. 38 units (from 16 members) are still in arrears as of February 1st, 2023.

Line 3, Royalties

IUGG has a publishing contract with Cambridge University Press which results in a small royalty fee.

Line 4.a, Interest

In 2022, Danske Bank again paid interest on the IUGG accounts, but only until the end of the year. During most of 2022, IUGG paid negative interest on funds in EUR and DKK.

Line 4.b, Gain on exchange

This line, together with the corresponding line 20 (loss on exchange), is used to balance the accounts for a particular year. In reality the loss/gain is not realized in the given year. Due to fluctuations in currencies, gains/losses will change from year to year. In the long run, the gains/losses tend to cancel each other out. It should also be noted that an averaged exchange rate is used for all account movements within the year.

Line 4.c, Other

This line was introduced in 2020 to handle the payments of various contributions to ILP. Line 4.c should be compared to line 11.7 representing the transfer of all received ILP funds to the special ILP account, see below.

Line 4.d, associations surcharge

This line becomes only active after a general assembly and is used to record the surcharge from the general assembly, which is usually paid to the union instead of going directly to the associations.

Expenditures

In the expenditure part of the accounting (lines 11 – 20) we notice lines where accounting and budget differs noticeably, reflecting the effects of the COVID-19 pandemic as explained earlier.

Line 11.1, Personnel

As mentioned above, IUGG had to find a new webmaster as sanctions against Russia made it impossible to pay the former webmaster in Moscow, who has now been replaced by a webmaster in Potsdam. During 2022, Aksel Walløe Hansen, past treasurer, has acted as assistant treasurer and special consultant.

Line 11.2 – 11.3, Equipment, Supplies

No expenditures in 2022

Line 11.4, Communication

The new webmaster is paid via this line.

Line 11.5, travel expenses

Here, the expenditure is much smaller than the budget figure, due to the cancellation of the meeting in person of Bureau/Executive Committee.

This line includes all travel expenses, both those of the Bureau and Executive Committee and liaison officers. In 2021, the Bureau/Executive Committee did not meet for its meeting in Berlin. Instead, a teleconference took place.

The actual expenditure is related to IUGG's cooperation with ICTP. There is no representative travelling by liaison officers. The total number of liaison officers travelling on behalf of IUGG may be higher, as the IUGG liaison officers find other sources of funding. IUGG appreciates this very much.

Line 11.6, miscellaneous

IUGG has taken out a special insurance against attacks by hackers. This line also covers expenses in connection with promotion activities.

Line 11.7, special

This line will cover transfers of money paid into the IUGG accounts on behalf of ILP, which corresponds to line 4.c.

Line 12, New Initiatives

The line represents IUGG support for two types of initiatives: Co-funding IUGG-related activities of the International Centre for Theoretical Physics (ICTP) and a grant programme to support smaller scientific projects. Except for one workshop, the ICTP 2021 activities were postponed to 2022. One special grant was paid in 2022 to a project under the UNESCO programme IYBSSD, International Year of Basic Sciences for Sustainable Development.

Line 14, Symposia

The level of workshop activities in 2022 is now back at the level anticipated in the budget.

Line 15.1, Annual allocations to Associations

The annual IUGG allocation to the associations (50% of the dues paid the year before) is determined after receipt of the financial reports for the previous year. The distribution percentages for the period 2020-2023 and the allocations in 2021 are shown in the following table:

	%	2022 amounts in USD
IACS	10.50	31,044
IAG	12.56	37,135
IAGA	15.10	44,645
IAHS	12.55	37,105
IAMAS	15.06	44,526
IAPSO	10.79	31,902
IASPEI	12.94	38,258
IAVCEI	10.50	31,044
		295,659

This amount is app. \$80K less than what was actually paid out in 2022. The extra \$80K relates to a delayed payment of the 2020-2021 allocations to one association that was postponed for a few years due to some banking issues.

By definition, IACS will get the same contribution as that of IAVCEI. After 2023, IACS will no longer be coupled to IAVCEI. The allocations to IACS will then follow the normal procedure laid out in the IUGG Guidelines.

Line 16.1, ISC

Line 17, Union activities

Line 18.1, Professional fees

This line represents the cost of the audit of the IUGG accounts. The audit for the 4 years 2019-2022 will be done in 2023 before the IUGG2023 in Berlin.

Line 20, loss on exchange

For details, see the explanatory text for line 4.b



OVERVIEW OF IUGG GRANTS AND ALLOCATIONS

IUGG is supporting science in different ways:

- i) Annual allocation to Associations, line 15
- ii) New initiatives, line 12
- iii) Smaller scientific meetings/workshops, line 14
- iv) Union activities, line 17
- v) Travel grants in connection with General Assemblies, line 13.2

Below, find the main figures for the amounts allocated for the year 2022, in USD:

i) Line 15.1 (Associations)		
8 Associations		375,133
ii) Line 12 (New initiatives)		
Special grants, IYBSSD grants		101,561
iii) Line 14 (Symposia grants)		
13 grants, including postponed grants from 2020-2021		23,505
iv) Line 17 (Union activities)		
17.1, SEDI, CCEC, CMG	29,000	
17.2, ILP	15,000	
Total		44,000
v) Line 13		
13.2 Travel grants, General Assemblies		<u>0</u>
Grand total		544,199

MEMBERSHIP INFORMATION AND STATISTICS

On 1 January 2023, IUGG has 73 members, 59 paying members and 14 associate members. The 59 paying members represent 278 units. Latvia moved from associate membership to paying member in cat 1. On February 1, 2023, 16 paying members representing 38 units are in observer status.

In category 1, 8 members, 8 units

Iran (12. year as observer) special situation
 Azerbaijan (8. year as observer)
 Vietnam (7. year as observer)
 Jordan (6. year as observer)
 Mozambique (4. year as observer)
 Bulgaria (2. year as observer)
 Iceland (2. year as observer)
 Algeria (1. year as observer)

In category 2, 5 members, 10 units

Nigeria (9. year as observer)
 Saudi Arabia (7. year as observer)
 Pakistan (4. year as observer)
 Egypt (4. year as observer)
 New Zealand (2. year as observer)

In category 3, 1 member, 3 units

Brazil (2. year as observer)

In category 5, 1 member, 7 units

Australia (1. year as observer)

In category 6, 1 member, 10 units

Russia (1. year as observer) special situation

In summary, the membership overview is

Category	No. of members	No. of units/ member	Total units
11	1	35	35
8	3	20	60
7	1	15	15
6	5	10	50
5	3	7	21
4	6	5	30
3	5	3	15
2	17	2	34
1	18	1	18
A	14	0	0
In total	73		278

ADDITIONAL UNION MATTERS

Awards and Honors

American Geophysical Union (AGU)

The AGU, at its 2022 Fall Meeting, awarded the following scientists who have been active in IUGG:

Chen-Tung Arthur Chen (China-Taipei), IACS National Correspondent (since 2015), was awarded Fellow.

Catherine Constable (USA), Executive Committee Member of the Union Commission on the Study of the Earth's Deep Interior (SEDI, since 2000), was named the Edward Bullard Lecturer.

Dorthe Dahl-Jensen (Canada/Denmark), Secretary of the Danish National Committee (2002-2006), was awarded Fellow.

Efi Foufoula-Georgiou (USA), IAHS National Correspondent (since 2017), was awarded the Robert E. Horton Medal.

Toshio Koike (Japan), Vice-President of IAHS International Commission on Remote Sensing (ICRS, 2003-2007) was awarded the Ambassador Award.

Gabi Laske (USA), Chair, IASPEI Working Group on Reference Earth Models (2002-2019), was awarded Fellow.

Philippe Lognonné (France), Executive Committee Member of the Union Commission on Planetary Sciences (UCPS, since 2016) was named the Beno Gutenberg Lecturer.

Marino Protti (Costa Rica), President of the IUGG National Committee (since 2011) was awarded the Ambassador Award.

Roger S. Pulwarty (USA), IUGG Liaison Officer to the World Meteorological Organization (WMO, since 2020) was awarded the Ambassador Award.

Harald Schuh (Germany), IAG President (2015-2019), was awarded the Ivan I. Mueller Award for Distinguished Service and Leadership.

Marc Spiegelman (USA), Secretary, Union Commission on Mathematical Geophysics (CMG, 2003-2006), was awarded Fellow.

Peter Ulmer (Switzerland), IAVCEI National Correspondent (2003-2019), was awarded the Norman L. Bowen Award and was named the Norman L. Bowen Lecturer.

European Geosciences Union (EGU)

The EGU, at its 2022 General Assembly, awarded the following scientists who have been active in IUGG:

Yehuda Ben-Zion (USA), Chair of the Union Commission on Mathematical Geophysics (CMG, 2011-2019), was awarded the Beno Gutenberg Medal.

Günter Blöschl (Austria), IAHS President (2017-2021), was awarded the Alfred Wegener Medal.

Wouter Buytaert (UK), President of the IAHS International Commission on Water Quality (ICWQ, since 2018), was awarded the Henry Darcy Medal.

Regine Hock (Norway), IACS President (2017-2021), was awarded the Julia and Johannes Weertman Medal.

Paola Passalacqua (USA), IAHS Vice-President since 2020, was awarded the Ralph Alger Bagnold Medal.

Peter J. G. Teunissen (Netherlands), IAG National Correspondent since 2003, was awarded the Vening Meinesz Medal.

International Science Council (ISC)

Harsh K. Gupta (India), IUGG President (2011-2015), was appointed Fellow of the ISC.

Alik Ismail-Zadeh (Germany), IUGG Secretary General (2007-2019), was appointed Foundation Fellow of the ISC.

Gordon McBean (Canada), IUGG Bureau Member (1987-1995), was appointed Foundation Fellow of the ISC.

Guoxiong Wu (China), IAMAS President (2007-2011), was appointed Fellow of the ISC.

International Association of Cryospheric Sciences (IACS)

Gavin Piccione (USA), **Devon Dunmire** (USA), and **Jonathon Preece** (USA), received the 2022 Graham Cogley Award, given by IACS and the International Glaciological Society (IGS).

International Association of Hydrological Sciences (IAHS)

María José Polo Gómez (Spain; Dooge medal) and **Francis Chiew** (Australia; Volker medal) were awarded the 2022 IAHS-UNESCO-WMO International Hydrology Prize.

Alexander Ross (USA) was awarded the 2022 Tison Award.

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

The 2022 IAVCEI Award for Volcanic Surveillance and Crisis Management (VSCM) was awarded to the **Seismic Research Centre of the University of the West Indies** (SRC-UWI).

IUGG Commission on Mathematical Geophysics (IUGG-CMG)

Frederik Simons (USA) was awarded the Vladimir Keilis-Borok Medal 2022.

Others

Tom Beer (Australia), IUGG President (2007-2011), was awarded Officer of the Order of Australia.

Priscilla Grew (USA), Member of the IUGG Finance Committee (2019-2023), was awarded the 2022 Presidents Medal of the Geological Society of America (GSA).

Shuanggen Jin (China), Chair of IUGG Commission on Planetary Science (UCPS; 2019-2023), was named elected Fellow of The Electromagnetics Academy and elected Fellow of the African Academy of Sciences (AAS).

Sang-Mook Lee (Rep. of Korea), President of the Korean National Committee for IUGG, was awarded the Manhae Practice Prize 2022.

Mioara Manda (France), IAGA President, 2019-2023 was awarded the 2022 Emil Wiechert Medal of the German Geophysical Society (DGG) and elected Member of the European Academy of Sciences (EAS).

Gordon McBean (Canada), IUGG Bureau Member (1987-1995), was awarded the Warren Washington Research and Leadership Medal of the American Meteorological Society (AMS).

Trevor McDougall (Australia), IAPSO President (2019-2023), was awarded the Prime Minister's Prize for Science.

Stephen R. McNutt (USA), IUGG Bureau Member (2019-2023), was named Fellow of the American Association for the Advancement of Science (AAAS)

Joyce E. Penner (USA), IAMAS President (2019-2023), was awarded the William Nordberg Medal of the Committee on Space Research (COSPAR).

Roger S. Pulwarty (USA), Principal IUGG Liaison Officer to the World Meteorological Organization (WMO; 2019-2023), was awarded the U.S. Presidential Rank Award.

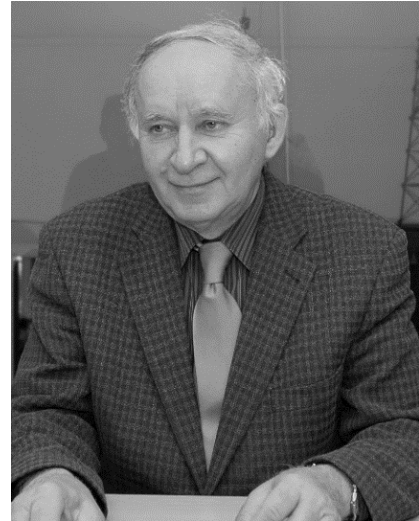
Thorsten Wagener (Germany), Chair of the IUGG Capacity Building & Education Committee (2015-2023), was awarded an Alexander von Humboldt Professorship of the Alexander von Humboldt Foundation.

Kathy Whaler (UK), IUGG President (2019-2023), was elected Honorary Member of the Hungarian Academy of Sciences and Associate Fellow of the Ethiopian Academy of Sciences.

József Ádám (1950-2022)

We are deeply saddened to inform the international scientific community that Prof. József Ádám, member of the Hungarian Academy of Sciences, president of the IAG National Committee and IAG National Representative, and the former President of the COB/Member of the EC passed away on December 29, 2022. Both the Hungarian and the international geodetic and geophysics community has lost a remarkable scientist, an outstanding professor and a good friend.

József Ádám was born in 1950 in Kocsér, a small village in Central Hungary. He was enchanted as a child by the work and the instruments of land surveyors, who were taking observations on the 3rd order geodetic control point in his home village. In the 1960s his teenage years coincided with the evolution of the space era. He read articles about artificial satellites, and these also determined his future activities. He studied land surveying at the Technical University of Budapest (now Budapest University of Technology and Economics, BME) and earned his PhD in 1977 with the thesis "Determination of station coordinates using satellite laser ranging".



József Ádám

He commenced his professional career in 1974 at the Satellite Geodetic Observatory of the Institute of Geodesy, Cartography and Remote Sensing in Hungary. He started to work on the application of the emerging satellite geodetic observation techniques in the development and refinement of geodetic networks. The datum transformation parameters between the Hungarian Datum 1972 and WGS-72 as well as WGS-84 were determined by him using Doppler and GPS observations, respectively. Later he joined the research group studying VLBI and space-VLBI techniques. He held an Alexander von Humboldt Fellowship in Stuttgart in 1985 and a research associate position in the late 1980s at the Ohio State University, where he did fundamental research on the geodetic applications of space VLBI observations and wrote his well-known work "Estimability of geodetic parameters from space VLBI observables". In 1995 he held a research associate position at The Observatoire de Paris as well.

He was continuously active in teaching as the lecturer in Geodetic Control Networks and Satellite Geodesy at BME. In 1992 he earned his DSc in Geodesy at the Hungarian Academy of Sciences and was appointed as professor of the Department of Geodesy at BME. He taught several generations of land surveyors and geodesists in the next more than 30 years.

His research activities focused on the application of satellite geodetic techniques in the establishment and maintenance of geodetic control networks, on geoid determination as well as on the development of continental and international reference frames. The Hungarian Academy of Sciences appointed him as a corresponding member in 1998 and as a regular member in 2004. He was a very enthusiastic member of the HAS, served as vice president and later president of the Department of Earth Sciences each for 6 years. As a member of the HAS he turned his interest to the history of earth sciences and technology as well as to the conservation and further development of the Hungarian technical and scientific language.

He was also active in the international geodetic community. He served as the Hungarian National Representative of the IAG since 1991, as the chairman of the IAG Special Study Group 2.109 (Application of Space VLBI in the Field of Astrometry and Geodynamics) and as the president of its Communication and Outreach Branch between 2003-2019. He organised several IAG conferences in Budapest, such as the 3rd EUREF Symposium in 1993; the 2nd Continental Workshop on the Geoid in Europe in 1998; the IAG Scientific Assembly in 2001, and the IAG International Geoid School at 2005. He was the convenor and/or co-convenor of IUGG union and Inter-Association Symposia in 2011, 2015 as well as in 2019, as well as a Fellow of the IAG since 1995.

He also made notable contributions to the IUGG. He was President of the IUGG National Committee of Hungary (1999-2022), IUGG Council Delegate of Hungary (1999-2022), member of the IUGG Finance Committee (2019-2022), and member of the IUGG Working Group on History (2014-2019).

Due to his long-term commitment to advancing geodetic research as well as to the promotion of international geodetic cooperation, the Bayerische Akademie der Wissenschaften elected him a corresponding member of the German Geodetic Commission in 2001. He became a member of the Leibniz Society of Sciences at Berlin in 2021. He was devoted to the science of geodesy and to serving the geodetic community both on the international and on the national level. He was an appreciated member of the geodetic community due to his knowledge, his deliberate and patient personality and positive, supporting attitude. May he rest in peace!

Szabolcs Rózsa, President of the IAG Communication and Outreach Branch

Helmut Moritz (1933-2022)



Helmut Moritz

With profound sadness we have taken notice of the death of a brilliant scientist and highly gifted academic teacher: Helmut Moritz, who passed away on October 21, 2022 at the age of 89.

Born on November 1, 1933 in Graz, Austria, Helmut Moritz attended the Academic high school in Graz. He lost his father during World War II, and as a consequence he grew up under very difficult circumstances. His high aptitude in general and his strong interest in mathematics, natural sciences, music and languages in particular became obvious already during his high school time. In 1956 he completed his study of surveying and geodesy at the University of Technology in Graz, followed by a PhD study which he completed in 1959. For his excellent performance and the outstanding quality of his PhD thesis „*Theory of errors in the function space*“ he was awarded the doctor’s degree by the President of the Republic of Austria – a top honor for an exceptional academic performance in Austria. In his thesis he introduced for the first time the infinite-dimensional Hilbert space into geodesy. In the same year he got married with his beloved Gerlinde, who gave birth to two children, Berta (1960) and Albrecht (1962).

After a three years employment at the Federal Bureau for Metrology and Surveying in Austria he received in 1962 an invitation by the Department of Geodetic Science of the Ohio State University, at that time the undisputed center of geodesy under the chairmanship of Weikko A. Heiskanen. Together with Heiskanen he wrote his first scientific book which became a bestseller in theoretical geodesy, which was translated into several foreign languages and is still up-to-date after more than 50 years: „*Physical Geodesy*“.

Shortly after his return from Columbus to Graz in 1964 he became appointed as an Associate Professor at the University of Hannover and in the same year he was offered the full professor position by the Technical University of Berlin. During this period of time he had devoted himself very intensively to research regarding the problem of Molodensky.

And suddenly, during the hot phase of the student revolution in 1968, he received an invitation by the Graz University of Technology, however, Helmut Moritz preferred to stay in Berlin and rejected the appointment thankfully. A few years later, in 1971 he was again approached by Graz University of Technology to become full professor for Physical Geodesy. This time he could no longer resist and accepted the invitation. And his time in Graz should become a very long and extremely fruitful professional phase of more than 30 years. In his early phase in Graz his research activities had been focused on „*Least squares collocation*“ – a newly developed adjustment technique in Hilbert space which had actually two scientific fathers: Helmut Moritz and Torben Krarup.

Helmut Moritz, a young and very dynamic professor in Graz - an outstanding scientist who had literally written the book of theoretical geodesy from scratch – the news went quickly public. The student community was enthusiastic and loved to attend lectures by Helmut Moritz. He had always been very devoted to his subject and had been carefully listening to his students, to their problems and also to their interests. His exceptional talent of explaining even very complex matters in an easily „digestible“ way has made him a highly appreciated academic teacher. In his lectures he had always followed the recommendation of Albert Einstein, that one should make things as simple as possible, but not simpler. Yes, simplicity is indeed a result of maturity.

His many years in Graz became probably the most intensive time in his life, scientifically, of course, but also in terms of his strongly growing international profile which could also be observed in his institute and its very international atmosphere. He himself considered the decade from 1975 – 1985 as the most interesting and creative in his entire life. During this time and the consecutive years he had published numerous scientific contributions regarding the geodetic boundary value, the Earth's rotation and the theory of nutation and polar motion, to relativistic effects in reference frames, to satellite gradiometry, and the realization of the Geodetic Reference System 1980. „*Least squares collocation*“ was further extended and developed in all its details, and became an exceptionally powerful and worldwide applied tool in physical geodesy. And it was once again Helmut Moritz, who had compiled and carefully structured the mathematical and statistical foundation of collocation in all its facets in his fundamental book „*Advanced Physical Geodesy*“. Jointly with Ivan I. Mueller he wrote the extensive volume „*Earth Rotation: Theory and Observation*“. His book „*Geometry, Relativity, Geodesy*“, jointly written with B. Hofmann-Wellenhof, may be considered a beautiful sort of bridge building, starting from the curved surface, known to every contemporary geodesist, towards the curved space, and his volume „*Science, Mind and the Universe*“ can be understood as a demanding journey into the vast dimensions of our universe, and its reflection by our human mind, enriched by a glimpse on the special and general theory of relativity and quantum physics. And finally, a strong international demand for a revised new edition of his fundamental early book „*Physical Geodesy*“, now jointly with B. Hofmann-Wellenhof, closed the circle of his scientific volumes in a very harmonic way.

In 2002 when he retired from his professor position at Graz University of Technology Helmut Moritz was very hardly hit by a personal tragedy: the sudden death of his beloved spouse Gerlinde, who was not just a wonderful partner of life and a strong retaining clip for the entire family, but also an adviser to her husband and a sparring partner in scientific matters. This personal break in his life was followed by his strong inclination towards philosophy of natural sciences, to philosophy and religion, up to metamathematics and metabiology. In total his scientific oeuvre comprises more than 230 scientific contributions and 9 scientific books, many of them translated into several languages.

Parallel to his enormous activities in writing scientific articles and books, Helmut Moritz has also been consequently climbing the stepladder of functions in scientific bodies, literally from his Berlin period

on. Starting with the chair of the German and, several years later, the Austrian Geodetic Commission, followed by the chair of an IAG Study Group, the section President of IAG, the IAG Vice President and then IAG President, followed by the big step to the position as the IUGG President, and finally the Bureau member of IUCC, the International Council of Scientific Unions as his culmination point – a three decades long most impressive climb – a storybook career of highest possible level! And as a kind of rounding off of his scientific profile he was appointed as President of the International League of Humanists in Sarajevo and in parallel Director General of the Inter-University Centre in Dubrovnik, positions which he was holding until 2006.

Some colleagues were wondering, if his series of exceptional and ever increasing international positions could be logically followed by comparable local positions within the university. As a consequence Helmut Moritz had been invited several times to become Dean of the University. All these invitations were rejected by him, thankfully and immediately with the argument that he prefers foreign politics over the handling of interior affairs. In his consequent way he always remembered the recommendation of Euripides: „*You are saying that the throne is attractive? For a wise man not at all!*“ (The author of this obituary can - from his own experience - very well understand Helmut Moritz' firm position in this matter: it is very wise indeed. Think how much theoretical geodesy would have missed with Helmut Moritz as a Dean, let away as a University President!)

Without any doubts Helmut Moritz was a scientific genius. But his scientific talent was also balanced by another outstanding talent; languages. To have a reasonable command of Greek and Latin as a student at a humanistic high school was considered quite normal at that time, and English was usually considered to be learned „on the job“. But in the course of his life Helmut Moritz made it to as many as 14 (!) languages, which he practiced regularly by conversation with native speakers – hard to believe, but true!. And during the last years of his long life he has even studied Hebrew and Arabic – for reasons of curiosity, as he argued!

Particularly gifted scientists often develop a personal inclination to music and literature. This is also true for Helmut Moritz: playing piano was his hobby already as a high school student and remained so for all his life. He particularly loved the weekly „training sessions“ with Sir Prof. Karl Haidmayer, a composer with international profile and a good friend of Helmut Moritz. Inspired by W.A. Mozart, who considered an organ as the „queen of all instruments“, Helmut Moritz took up this challenge and learned to play organ. Quite often one could listen him playing organ in his community church. Helmut Moritz was also particularly well-versed in literature. His interests were equally broad as they were deep-going. But it is was particularly Adalbert Stifter, who was most appreciated by him.

It goes without saying that a career of highest level combined with such an impressive dimension cannot remain unnoticed. As a consequence, Helmut Moritz became a strongly requested person, honoured by top international recognitions and awards: the Gauß-Medal, the Alexander-von-Humboldt-Medal and the Kopernikus-Medal, just to name a few particularly outstanding recognitions among numerous others. Worldwide scientific Academies became very much interested in having Helmut Moritz in their „hall of fame“, and Helmut Moritz contributed scientifically as well as strategically to the academic life of many academies and their development. To make a long story short: Helmut Moritz became member of as many as 15 (!) scientific Academies worldwide.

Three universities with highest international reputation had honored Helmut Moritz with an honorary doctorate for his outstanding scientific achievements in theoretical geodesy: The Technical University Munich, the Ohio State University in Columbus/Ohio and MIIGAIK, the Geodetic University in Moskau. And also the Wuhan University of Technology awarded an honorary professor position to him in recognition of his great scientific achievements and his continuous support of the Chinese geodetic community.

Top-class scientists are often accompanied by particularly sympathetic and supportive partners, and are sometimes even borne by their family. This was absolutely true for his beloved spouse Gerlinde as well as for his daughter Berta and his son Albrecht. Within his extended family, in terms of his co-workers and colleagues, Helmut Moritz found not just admiration, but much more a warm and beneficial embedding which he appreciated and which he very much deserved.

In this way we say goodbye to Helmut Moritz, to an exceptional personality, who was both a particularly gifted scientist and at the same time a very modest person with humor and also with a firm determination - a wonderful friend who was always committed to excellence.

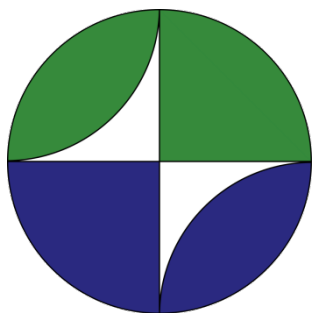
Thank you, Prof. Moritz, for all what you have done for science and for our community at large.

Hans Sünkel, Graz, October 2022

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 Science Council
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
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Ocean Research
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics
SEDI	Study of the Deep Interior of the Earth
UCDI	Union Commission on Data and Information
UCPS	Union Commission on Planetary Sciences
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNISDR	United Nations International Strategy on Disaster Reduction
UNOOSA	United Nations Office for Outer Space Affairs
UN-SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
URSI	International Union of Radio Science
WCRP	World Climate Research Programme
WDS	ISC 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



INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE

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