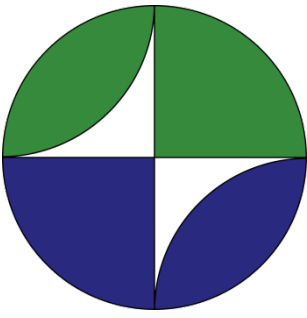


INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS
UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE

Annual Report 2020



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.

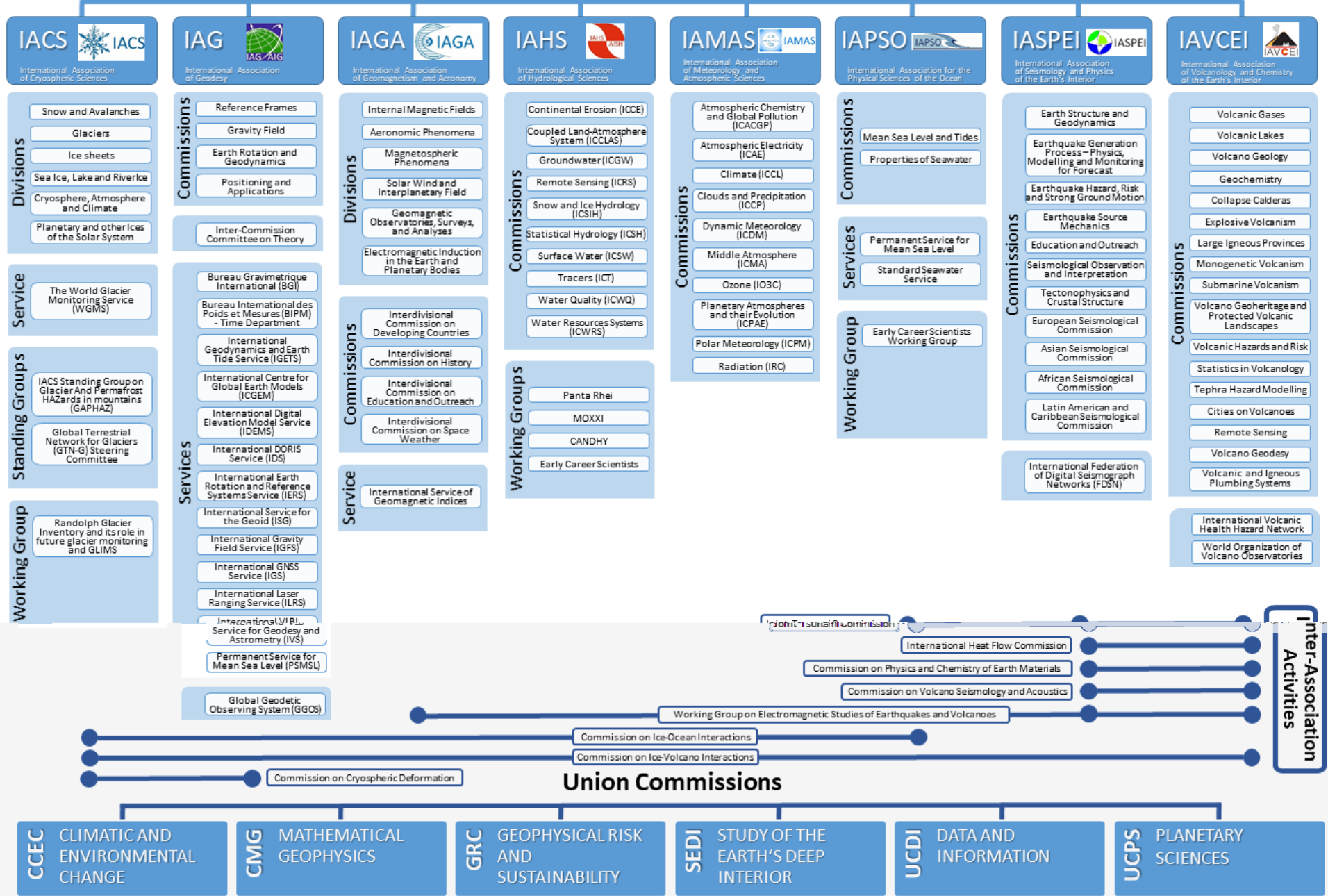
The IUGG is comprised of eight semi-autonomous International Associations, each responsible for a specific range of topics or themes within the overall scope of the Union activities. Each Association establishes commissions, divisions, services, working groups, or other entities. In addition, IUGG establishes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

IUGG is one of 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).

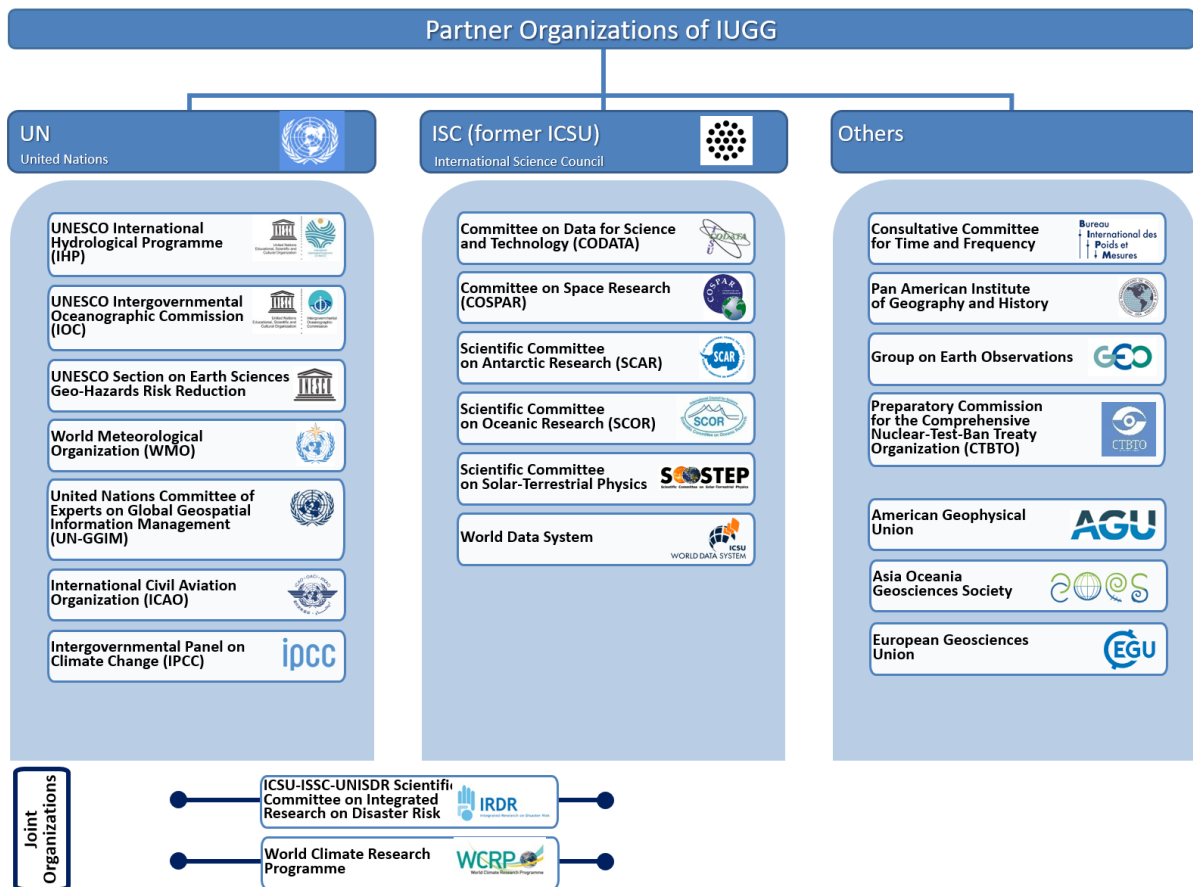
Associations



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 (YIGU) • 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 Deltas (IYD, 2013-2014) • Extreme Natural Hazards and Societal Implications (ENHANS, 2010-2014) • International Year of Planet Earth (IYPE, 2007-2010) • Electronic Geophysical Year (eGY, 2007-2008) • International Polar Year (IPY, 2007-2008) • International Heliophysical Year (IHY, 2007-2008) • International Decade for Natural Disaster Reduction (IDNDR, 1990-1999) • Geodynamics Project (1972-1979) • Global Atmospheric Research Program (1967-1980) • 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



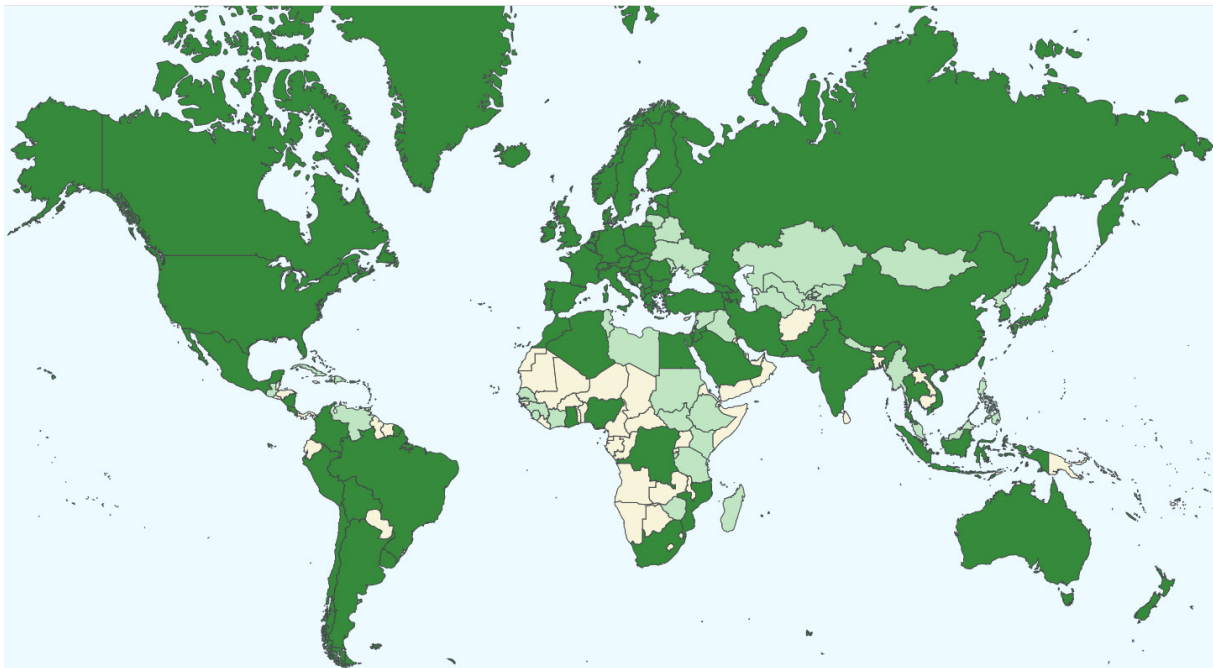
Partner Organizations of IUGG

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 2020, IUGG has 73 National Members including 58 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 2020, the price of 1 unit was US\$ 2,055. The 58 paying members represent a total of 276 units, which is equivalent to a total income of US\$ 567,180. 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 31.12.2020)

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 2020 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 2020, 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, 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:	Magdalena Scheck-Wenderoth	GERMANY

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>	Dmitry Krupsky	RUSSIA

MESSAGE FROM THE PRESIDENT

2020 certainly was a year like no other! It started off much as normal, despite the reports of a new virus already coming from China, with a meeting in Busan, Republic of Korea in January 2020 as a member of the Scientific Committee for the Deep-time Digital Earth (DDE), a flagship project of our close partner the International Union of Geological Sciences ([IUGS](#)). More details are available [here](#). In very brief summary, it is intended to allow easier and better access to FAIR (Findable, Accessible, Interoperable, and Re-usable) geo-data. We had an intense meeting concentrating on the draft White Paper, under the excellent leadership of Roland Oberhänsli, then immediate past-President of IUGS. The DDE was set to be launched at the 36th IGC in Delhi, India in 2020. There should be good opportunities for cooperation between scientists of IUGG and IUGS through this programme as it gets underway, including through a proposal for a joint project of the [GeoUnions](#) of the International Science Council ([ISC](#)), since it fits in well with the four [Strategic Challenge Domains](#) of the ISC. The first appearance of covid-19 in the Republic of Korea was announced as I changed airports in Seoul on the way home.



Since then, international travel and in-person meetings have all but ceased. The 36th IGC was one of the first major geosciences meetings to be cancelled or moved online; let us hope that with the introduction of vaccines the situation starts to change soon. I'm sure most of us have done more online meetings, seminars, workshops, and teaching where appropriate, than is healthy, and the situation is taking its toll on the mental and physical well-being of many people. If my own experience is anything to go by, it is much harder to retain concentration levels when working alone and online. I am lucky being based in Europe that most events I attend are at close to or during the normal working day; it must be even harder for those in parts of the world where scheduling means they are asked to participate at unsociable hours. I am particularly concerned about the impact of the pandemic on early career researchers for whom the loss of opportunities for fully engaged involvement in their conference and workshop presentations, and lack of formal and informal in-person interaction, is especially damaging. I applaud the significant efforts many communities have taken to mitigate the worst of the problems.

A second event that fell victim to the pandemic of particular significance to IUGG was the celebration of 40 years of the International Lithosphere Program ([ILP](#)), a joint initiative of IUGG and IUGS, planned for the 2020 European Geophysical Union General Assembly, which I had intended to attend. ILP continues to be an extremely successful and relevant venture. At this 40th year mark, its leadership is undergoing significant change as the Secretary-General Magdalena Scheck-Wenderoth has just completed two 4-year terms, and we need to find a successor for Harsh Gupta (IUGG President 2011-2015) who has served as the IUGG representative at the ILP Bureau since 2001. I know the new IUGS President, John Ludden, well as he was formerly the Chief Executive Officer of the British Geological Survey and is Edinburgh-based, facilitating our cooperation over matters such as DDE, ILP and the ISC GeoUnions. We have agreed to meet regularly.

The IUGG became a partner in the Kyoto Landslide Commitment 2020 ([KLC2020](#)). Again, plans for the launch were disrupted by covid-19, which was initially scheduled to take place during the 5th World Landslide Forum. Instead, I spoke at the online launching session on 5 November 2020 chaired by Kyoji Sassa (Secretary General of KLC2020), where I confirmed IUGG's continued commitment to the initiative, and our signed agreement was incorporated. Our Geophysical Risk and Sustainability Commission (GRC) Chair, John LaBrecque, also spoke at the event to outline possible collaboration to address some of the aims of the Commitment, within the framework of an IUGG-funded multi-

disciplinary meeting to form a consortium of principal contributors to the GNSS Early Warning of Tsunami and Landslides within the Indo-Pacific region. He is the IUGG representative on the International Consortium on Landslides Advisory Board, which will participate in the meeting.

In December 2020, I attended a second meeting of the Founding Unions and Partnering Organization Steering Committee for the proclamation of an International Year of Basic Science for Sustainable Development ([IYBSSD](#)). The IUGG now has a Memorandum of Understanding with the International Union for Pure and Applied Physics ([IUPAP](#); the Union leading the initiative) as a Founding Member, which was incorporated at the meeting. The next substantial stage in proclaiming the International Year in 2022 is for a resolution to be presented to a United Nations General Assembly by a member country.

I, together with past President, Harsh Gupta, participated in an ISC GeoUnions meeting on 14 December 2020. A major item of business at that meeting was the GeoUnions ad hoc Committee on Risk and Disaster Management. Several attendees at the meeting, myself included, stressed the importance of cooperation between physical and social scientists to tackle risk and disaster management, for both influencing policy and addressing practical aspects. The Secretary General and I joined a meeting of the American Geophysical Union leadership with International Societies on 15 December 2020, during the Fall online meeting. Understandably, much of the meeting was devoted to a wide-ranging discussion of the covid-19 pandemic and its implications for the geophysical community.

In January 2020, the ISC invited feedback from its members on possible changes to its Council's Statutes and Rules of Procedure – it had been in existence for 2 years, so a review was timely. After discussions with the ISC Secretary, I wrote on behalf of IUGG proposing amendments to ISC Statutes and Rules of Procedure, based partly on our experience of changing Statutes and Byelaws to improve governance. These included suggestions to define a full set of procedures for electronic voting, and to allow ISC Officers or Governing Board members to propose changes to the Statutes and Rules of Procedure, as well as ISC members. The new ISC Statutes and Rules of Procedure are available [here](#).

In June 2020, I added IUGG's signature endorsing "[EGU's Declaration of the Significance of Geoscience Expertise to Meet Global Societal Challenges](#)".

I have written a number of letters of support, including for a proposal "Data integration for global geophysical-studies and earth-interior research" in response to a Horizon 2020 Data Exploitation call, and for an [African Light Source](#), an underpinning facility for analyses and experiments for much geophysical research (e.g. at high temperatures and pressures appropriate for Earth's interior). I also wrote to the (adhering organization) Hungarian Academy of Sciences commenting on a proposal to create a new Earth Physics Institute.

We held several virtual Bureau and senior management team meetings over the year by telecon. Such meetings enabled us to deal with routine business and discuss the on-going impact of and our response to the pandemic. Much of the planned activity of the Union, its Associations and Commissions was postponed or cancelled, and we did not sense an appetite for or feel we had the ability to undertake any new initiatives in these uncertain times. Owing to undergoing hospital treatment for a serious finger injury, I was unable to attend and Chair one Bureau meeting in July, and I would like to thank President-elect Chris Rizos for taking the Chair at short notice.

Kathryn Whaler

MESSAGE FROM THE SECRETARY GENERAL



2020 was definitely a very special year!

I simply recall the pre-final paragraph of my last year's report: "Further plans foresee my participation at several meetings and conferences throughout 2020, which will start with a trip to Ljubljana/Slovenia on 29th/30th January 2020, on the occasion of the 25th Anniversary of the membership of the Slovenian National Committee in the IUGG."

I never dreamed that this business trip would be the last for a period of more than 15 months so far – and the travel break is not over yet. Still unaffected by this, I truly enjoyed my first trip to Ljubljana, the exchange with many Slovenian colleagues and of course the celebration.

We have learned a lot in the meantime, Zoom, Webex, Skype, Facetime, (you name it). The sessions have not always become shorter or more effective. In any case, I miss the break-out conversations over coffee, tea or water and the accidental meetings in the corridors, the canteen, or the cloakroom. In short, the social moments are somewhat atrophied at the moment.

I am aware that possibly some of you may have gone through an infection or have experienced infections in your environment. Some will have lost loved ones, friends and acquaintances who passed with or from the Covid19 virus or its mutants. My deepest sympathy goes out to these colleagues.

It is my hope that the global community will recognize the signs of this pandemic, come to its senses and be much better prepared for such challenges in the future.

In days like these, our monthly eJournal is a flagship of our communication. Here we can share news from the associations and academia – alongside the conference calendar, full of postponements and cancellations. We hope you still enjoy the portraits of the IUGG leadership we serve up as an appetizer, so to speak.

In July I was nominated as IUGG delegate to the newly established ISC GeoUnions Standing Committee on Disaster Risk Reduction (DRR). I am glad to share this task with John LaBrecque for IUGG.

October 19th, I had a domestic day trip to the Federal Agency for Cartography and Geodesy (BKG) in Frankfurt/Main. BKG is Germany's federal state agency for surveying. Here, I met with the President of BKG, Paul Becker, and the National Delegate, Johannes Bouman.

Other joint activities with our President have already been mentioned in her report.

I thank my colleagues in the IUGG secretariat at the GFZ, Franz G. Kuglitsch and Katrin Gundrum, for their persistent support, humorous reminders and professional management in the background.

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 [IUGG website](#) was maintained and regularly updated by the IUGG webmaster Dmitry Krupsky. 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.

MEMBER COUNTRIES

Slovenian IUGG National Committee celebrates 25th Anniversary

The [Slovenian Association of Geodesy and Geophysics](#) (SZGG) was founded in 1993 and was formally accepted by the IUGG in 1995 at the General Assembly in Boulder CO, USA. The SZGG organises regular annual meetings which are held at the Faculty of Civil and Geodetic Engineering of the University of Ljubljana. In addition to the regular annual meeting of the SZGG on 30 January 2020 the Slovenian National Committee of IUGG organised a 25th Anniversary celebration of their membership in IUGG.

We are pleased that the event was attended also by the directors of the Slovenian Environment Agency, Lilijana Kozlovič and the Geodetic Institute of Slovenia, Milan Brajnik, representatives from institutions where SZGG members work and promote IUGG activities as well as by the special guest, the Secretary General of the IUGG, Alexander Rudloff. During the anniversary meeting IUGG activities were presented (Alexander Rudloff), followed by an overview of more than 25 years of history of the SZGG (Jože Rakovec), and concluded with short presentations of the IACS, IAG, IAGA, IAHS, IAMAS, IAPSO, and IASPEI activities in Slovenia. On this occasion, the [25th issue of the SZGG proceedings](#) (in Slovene) was published, including contributions on the research performed in 2019 in the field of geodesy and geophysics, and the history of SZGG activities.



Participants of the 25th Anniversary of the membership of the Slovenian National Committee in the IUGG (photo: Igor Karničnik)

Prior to the Anniversary meeting, on 29 January 2020, Alexander Rudloff visited several institutions where the SZGG members work, namely the Geodetic Institute of Slovenia, the Slovenian Environment Agency and the Jožef Stefan Institute. The day finished with a meeting hosted by the dean of the Faculty of Civil and Geodetic Engineering, Matjaž Mikoš. The meetings were a great opportunity to present more detail of the Slovenian activities in the field of geodesy and geophysics, and to exchange valuable information between SZGG members and the Secretary General of the IUGG.

Polona Vreča, President of the Slovenian National Committee for IUGG

Reports by IUGG National Committees

Several IUGG National Committees have published Quadrennial Reports on their activities from 2015 to 2019. The reports from Argentina, Canada, China, Croatia, Greece, India, Russia, Serbia, and the Slovak Republic are now available [here](#).

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

GRANTS PROGRAM

IUGG Grants Program 2020-2021 – Awardees

The [IUGG Grants Program](#) aims to support projects, of importance to the international geophysical and geodetic community, which explore new scientific ideas, develop future international initiatives, and promote geoscience education. For 2020-2021, IUGG awarded grants to the following projects:

- Data Assimilation and Inverse Problems in Geophysical Sciences (a joint project between CMG, IAGA, IASPEI, and IAVCEI);
- Implementing IUGG 2015 Resolution #4: Organization of the GNSS Tsunami Early Warning (GTEWS) Consortium (a joint project between GRC and IAG);

- A Unified Height Reference System for Africa (AFRUHRS) (a joint project between IAG and IASPEI);
- Paper volcanoes Lab: a way to engage early childhood and primary school children on Earth Science (a joint project between IAVCEI and IASPEI).

The total amount of funds allocated to the projects is USD 50,000.

The deadline for project proposal submission for the funding period 2022-2023 is on **1 April 2022**. More information can be found [here](#).

IUGG BUSINESS MEETINGS 2020 AND 2021

Due to the COVID-19 pandemic there will be no physical meeting of the IUGG Bureau in 2020. Instead, the Bureau is meeting regularly via teleconference to discuss pending items and the daily business of the Union. On this occasion, the IUGG Bureau would like to thank Prof. Sang-Mook Lee, the IUGG National Committee for the Republic of Korea, and Seoul National University, for their generous offer to host the Bureau Meeting 2020 in Seoul, and for their understanding to instead meet in Korea in one of the following years. The next physical IUGG Business Meetings including the Bureau, Executive Committee, Finance Committee, and others, are planned to take place from 13 to 17 September 2021 in Berlin and Potsdam, Germany, in preparation for the IUGG General Assembly 2023 in Berlin.

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 in 2020

IUGG awarded six grants (US\$15,000 in total) to support workshops and training schools organized by the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste, Italy) in 2019 as recommended by the IUGG Committee on Capacity Building and Education and in accordance with the Memorandum of Understanding between IUGG and ICTP signed in 2019. Due to the COVID-19 pandemic, most ICTP scientific meetings were cancelled or postponed. Therefore, none of the 2020 IUGG contributions were claimed. Instead, the 2020 contributions will be used to support an ICTP/IUGG event to be scheduled between 2021 and 2023.

In 2019, IUGG co-sponsored several workshops and schools organized by ICTP, and below are brief reports on the events.

ICTP-Rwanda Joint School on Subseasonal to Seasonal Weather and Climate Prediction

The school was organised at the University of Rwanda, Kigali, Rwanda, from 29 April to 3 May 2019.

The school introduced the Copernicus platform which provides open access to climate services. Lectures held on the following topics were followed by hands-on exercises using the reanalysis, real-time seasonal forecast and climate model products.

Topics: (i) Analysis and Reanalysis Products, (ii) Subseasonal to Seasonal Forecasting, (iii) Predictability, ENSO and Teleconnections, and (iv) Copernicus Climate Services and the Data Store.

Cosponsors: International Union of Geodesy and Geophysics (IUGG), University of Rwanda (UR), East African Institute for Fundamental Research (EAIFR)

Organisers: A. Tompkins (ICTP), O. Akin-Ojo (EAIFR), F. Kucharski (ICTP), S. Bonfils (UR)

[More information.](#)

International Space Weather Initiative Workshop

The workshop was organised at the Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy, from 20 to 24 May 2019.

The International Space Weather Initiative (ISWI) is a programme of international cooperation to advance space weather science by a combination of instrument deployment, analysis of space weather data from these instruments in conjunction with other data, and the communication of such results. The ISWI activities are coordinated by a Steering Committee, supported by its Secretariat.

A total of 115 scientists from 47 countries attended the workshop and 60 of them presented their research results during the event. IUGG funds supported the participation of 4 female and 4 male young scientists (from Bulgaria, P.R. of China, India, Kazakhstan, Peru, Republic of Sudan, Turkey) offering them accommodation, meal coupons and a fixed living allowance.

Topics: (i) Instrumentation, (ii) Solar Physics, (iii) Magnetosphere, Ionosphere, and Thermosphere Solar-Terrestrial Coupling and Space Weather, (iv) Space Weather Effects on Global Navigation Satellite Systems (GNSS), (v) New Space Weather Scientific Results, and (vi) Capacity Building, Education and Outreach.

Cosponsors: International Union of Geodesy and Geophysics (IUGG), ISWI, ICTP, Boston College, the International Committee on Global Navigation Satellite Systems (ICG), ESA, SCOSTEP, National Space Research and Development Agency of Nigeria.



Participants of the International Space Weather Initiative Workshop (photo: ICTP)

Organisers: P. Doherty (Institute for Scientific Research, Boston College, USA), S. Gadimova (International Committee on GNSS, UNOOSA), N. Gopalswamy (NASA, USA), S. M. Radicella (ICTP)

[More information.](#)

Fifth Workshop on Water Resources in Developing Countries: Hydroclimate Modelling and Analysis Tools

The workshop was organised at the ICTP Adriatico Guest House (Kastler Lecture Hall) and Informatics Laboratory, Trieste, Italy, from 27 May to 7 June 2019.

GEWEX is the lead project for WCRP's Grand Challenge on Water Availability, which focuses on how fresh-water availability will shift due to climate change in many food producing regions of the world. Fresh-water availability can vary in time due to reductions or increases in precipitation, evapotranspiration, runoff, ground water recharge or discharge, and snow melt.

Climate extremes are one factor that can influence the intensity of precipitation in time, the snow melt timing and the exchange of water with land and, therefore, the storage of a region. All these make it imperative to better understand and predict precipitation variability and change.

To this aim, the climate model community and, in particular, the regional climate community at one end is moving toward very high resolution simulation ensemble efforts down to convection permitting resolution (1-3 km); and at the other end is working to implement fully coupled Earth System models to be able to understand the role of coupled water cycle and land atmosphere interactions in understanding local climate response.

This will open new frontiers for the hydrological modelling community by bridging the spatial scale gap between regional climate models and impact models (hydrological models, ecosystem models, etc.); which will, in turn, affect the quality of the prediction of the hydrological cycle across several scales, from catchments to regional to global.



Participants of the Fifth Workshop on Water Resources in Developing Countries: Hydroclimate Modelling and Analysis Tools (photo: ICTP)

Topics: (i) Precipitation measurements: what we can use to validate precipitation coming from the model output?, (ii) Ensemble of high resolution regional climate model outputs: how can those be used as input of a hydrological model?, (iii) Regional Earth System models: which is the role of the coupled

water cycle?, and (iv) Uncertainty in global and regional climate projections: how can this uncertainty be taken into account for hydro-climate simulation?

Cosponsors: International Union of Geodesy and Geophysics (IUGG)

Organizers: S. Sorooshian (University of California, USA), M. Verdecchia (University of L'Aquila, Italy)

[More information.](#)

Advanced School and Workshop on American Monsoons: Progress and Future Plans

The school and workshop were organised at the ICTP-SAIFR, São Paulo, Brazil, from 19 to 24 August 2019.

The Advanced School and Workshop brought together scientists and students for presenting and discussing the progress in research on the American monsoons and their role in the global monsoon system, and for planning future activities.

The American monsoons are important components of the global monsoon system. A very high percentage of the annual precipitation over most of South America occurs during the summer monsoon, including subtropical regions. The economy, agriculture, water and energy resources and, consequently, the livelihoods of the great majority of South America populations are heavily dependent on the summer monsoon. Also, the North American monsoon provides crucial water resources for Mexico, Central American countries, several island nations in the Caribbean and parts of the southwest USA. Predicting the intensity of American monsoon rainfall is not only a regional challenge, but is also relevant in the framework of a global subseasonal to seasonal forecasting system.

The Advanced School and Workshop were fostered by the Working Group on American Monsoons, one of the regional monsoons working groups established under the coordination of the CLIVAR/GEWEX Monsoons Panel.

Topics: (i) Global context, main features, life cycle of the American monsoons, (ii) Variability on diurnal, mesoscale and synoptic time scales; subseasonal to seasonal variability, (iii) Variability on interannual and decadal/interdecadal time scales; modulation of extreme events by climate variability; longer term variability and climate change, (iv) Predictability and prediction (weather, subseasonal, seasonal and longer lead times); modelling studies, and (v) Impacts on society; future challenges; plans for observational studies, diagnostic analyses, and modelling activities. Discussions on future collaboration.



Participants of the Advanced School and Workshop on American Monsoons: Progress and Future Plans (photo: ICTP)

Cosponsors: International Union of Geodesy and Geophysics (IUGG)

Organisers: A. M. Grimm (Universidade Federal do Paraná, Brazil), I. F. A. Cavalcanti (Centro de Previsão de Tempo e Estudos Climáticos – Instituto Nacional de Pesquisas Espaciais, Brazil), M. A. Gan (Centro de Previsão de Tempo e Estudos Climáticos – Instituto Nacional de Pesquisas Espaciais, Brazil), Fred Kucharski (International Centre for Theoretical Physics, Italy)

[More information.](#)

Advanced Workshop on Earthquake Fault Mechanics: Theory, Simulation and Observations

The workshop was organised at ICTP Adriatico Guesthouse, Trieste, Italy, from 2 to 14 September 2019.

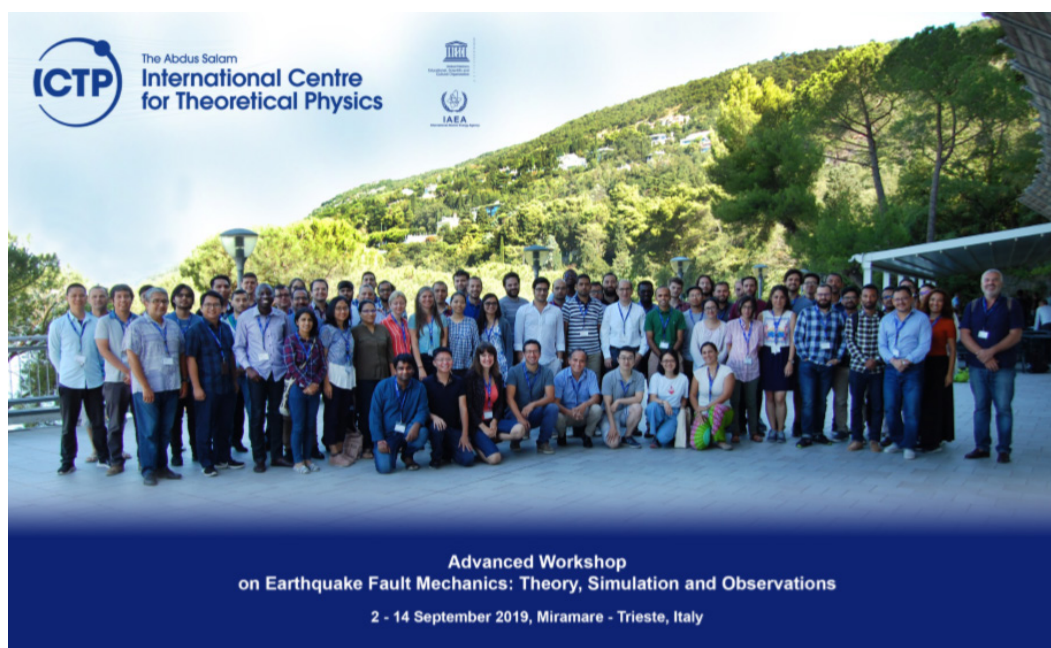
The main focus of the workshop was on theory, simulations and observations of earthquake dynamics.

Topics: (i) Theoretical Earthquake Dynamics, (ii) Computational Earthquake Dynamics, (iii) Connecting Earthquake Models to Observations, (iv) Kinematic Earthquake Source Inversion, (v) Dynamic Source Inversion and Strong Motion, (vi) Earthquake Cycle Modelling, (vii) Rupture Imaging, and (viii) Machine Learning in Seismology.

Cosponsors: International Union of Geodesy and Geophysics (IUGG), GENERALI - Assicurazioni Generali, Regione Autonoma Friuli Venezia Giulia

Organisers: A. Aoudia (ICTP), J.P. Ampuero (IRD)

[More information.](#)



Participants of the Advanced Workshop on Earthquake Fault Mechanics: Theory, Simulation and Observations (photo: ICTP)

Workshop on Distilling Climate Information for Sectoral Applications

The workshop was organised at Ateneo de Manila University, Manila, Philippines, from 9 to 14 December 2019.

There is an urgent need to enhance the resilience of developing countries to climate and weather shocks in order to foster sustainable development. Better management of current climate variability can help societies better adapt to future climate change. For example, effective use of subseasonal to seasonal forecasts of rainfall hold the promise of effective early warning systems for floods and droughts, and actionable information for decision makers in agriculture, water management, and

public health. Meanwhile, robust use of climate change scenarios can inform longer term policy decisions on time-scales of decades. For these applications, it is essential to build capacities for researchers, policy-makers and practitioners in developing countries to appropriately use climate information for evidence-based planning, and to apply a systems thinking lens towards discerning how climate considerations weave into interconnected sectoral issues. This one-week workshop therefore highlighted the need for mainstreaming the integration of climate information into systems across sectors. Researchers and policy-makers need to understand the basics of climate data and their sources and uncertainties, and to become familiar with simple techniques for processing and distilling these into useful information for different scenarios or contexts. To achieve this, lectures combined with hands-on exercises have been implemented. Participating researchers and practitioners have been guided towards the application of concepts and techniques learned towards specific applications in their respective sectors, which will serve as the culminating activity of the workshop.

Topics: (i) Sources of Climate Data (e.g. IPCC Climate Atlas, Copernicus C3S, ERA5, CMIP, CORDEX, hydro-met agencies), (ii) Basic Linux-based Techniques for Processing Climate Data, (iii) Use of RS-GIS for Climate-related Applications, and (iv) Systems Approach to the Climate-Land-Energy-Water Nexus.

Cosponsors: International Union of Geodesy and Geophysics (IUGG)

Organisers: C. Kendra Gotangco (Ateneo de Manila University, Philippines), A. Tompkins (International Centre for Theoretical Physics, Italy)

[More information.](#)



Participants of the Workshop on Distilling Climate Information for Sectoral Applications (photo: ICTP)

COOPERATION WITH INTERNATIONAL AND INTERGOVERNMENTAL ORGANIZATIONS

IUGG's endorsement of the Declaration of the Significance of Geoscience Expertise to Meet Global Societal Challenges

In solidarity with the European Geosciences Union (EGU), the American Geophysical Union (AGU), the Asia Oceania Geosciences Society (AOGS), and other partners, IUGG is pleased to sign the following [Declaration of the Significance of Geoscience Expertise to Meet Global Societal Challenges](#):

Preamble

Humanity today faces many societal challenges whose escalating scope, interconnection and urgency could jeopardize achieving the United Nations' Sustainable Development Goals. Our ability to anticipate and meet both current challenges and future issues depends in large part upon facilitating innovative science and technology as the most effective means to comprehend the origins of these challenges and to establish successful strategies for mitigating and addressing them.

The international geoscience community possesses much of the specialised knowledge, skills and expertise necessary to provide the essential resources and healthy environments that humanity needs to thrive. The world's geoscience expertise helps to ensure reliable supplies of mineral, energy and ecological resources; satisfy human and environmental requirements for clean water, clean air and fertile soils; manage wastes to protect the environment; bolster public health; and build societal resilience to the short- and long-term effects of a range of natural and anthropogenic hazards.

Proclamation

In recognition of the significance of international cooperation in science, technology and innovation, and particularly within the Earth, planetary and space science community, the European Geosciences Union, the American Geophysical Union, the Asia Oceania Geosciences Society, the Geological Society of America, the Japan Geoscience Union and The Geological Society of London declare our commitment to work together to support and promote all forms of geoscience research.

As signatory societies, we recognise our shared responsibility to:

1. Devise strategies to protect and sustainably develop vital resources for present and future generations;
2. Utilise scientific research results to increase societal resilience to single, multiple and potentially interrelated threats, support global wellbeing, and help humanity prevent, better prepare for, and recover from local, regional and global crises;
3. Impartially analyse risks associated with natural and anthropogenic hazards, including individual and cascading perils, and support comprehensive, forward-thinking solutions that directly address these issues;
4. Promote widespread access to scientific methods, research and associated outputs;
5. Encourage ethical conduct by adopting high standards, fostering ethically responsible attitudes and supporting equitable, diverse, inclusive and transparent funding mechanisms;
6. Advocate for scientific freedom and develop best practices for promoting scientific integrity;
7. Diversify science and recognise the voices and perspectives of researchers from underrepresented groups, including the global south and early career researchers;
8. Recognise and develop the professional and educational skills required to engage various audiences with geoscience concepts, both in public and political spheres;

9. Effectively communicate scientific methods and research results to improve public trust in science, engage policymakers, and effect policies that implement and advance the science that supports global wellbeing; and
10. Promote the multi-disciplinary dimensions of geoscience, knowing its impact is strengthened by the intersections between subdisciplines and plays an active role in addressing key societal issues.

IUGG signs Kyoto Landslide Commitment 2020

On 18 August 2020, the IUGG President, Prof. Kathy Whaler, signed the Kyoto 2020 Landslide Commitment 2020 (KLC2020) - a framework aimed at providing key actors and stakeholders concerned with landslide risk at all levels and sectors with the tools, information, platforms, technical expertise and incentives to promote landslide risk reduction on a global scale. It supports the implementation, follow-up and review of the Sendai Framework, the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Climate Agreement as it addresses the adverse effects of climate change. Kathy Whaler and John LaBreque (Chair, Union Commission on Geophysical Risk and Sustainability - GRC) will attend an online signatory and launching session for KLC2020 on 5 November 2020.



2020 Kyoto Japan

The signed commitment can be found [here](#).

IUGG Supports African Light Source Project

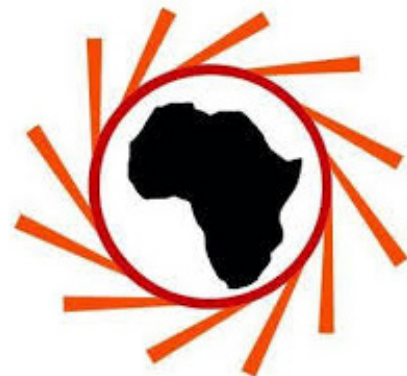
On 10 November 2020, the IUGG President signed a letter of support for the [African Light Source \(AfLS\) Project](#).

AfLS is engaged in developing the case for an advanced light source to be designed, constructed and operated on the African continent, driven by science and technologies of interest to Africa.

Central to the science case for an African advanced light source is concomitant investment in all the sciences that present users to advanced light sources, prominent amongst them being the geosciences. The AfLS has consistently called for governments and universities to invest in local infrastructure for teaching and research in geochemistry, geophysics, soil science, petrology, etc., including major equipment for spectroscopy, light scattering, imaging, crystallography and microscopy.

AfLS is supported by The Abdus Salam International Centre for Theoretical Physics (ICTP), the International Union of Pure and Applied Physics (IUPAP), the International Atomic Energy Agency (IAEA), and other partners.

More information about the history of AfLS can be found [here](#).



IUGG co-organises the International Year of Basic Sciences for Sustainable Development

On 15 December 2020, the IUGG signed a Memorandum of Understanding with the International Union of Pure and Applied Physics (IUPAP) to co-organise the International Year of Basic Sciences for Sustainable Development (IYBSSD) as a Founding Union.



It is intended that IYBSSD will be organised in 2022, under the aegis of UNESCO and with the collaboration of UNESCO International Basic Sciences Programme (IBSP). Multiple scientific organisations support this initiative as Founding Unions or Partners.

During IYBSSD, there will be several international events organised by Founding Unions and Founding Partners, with the aim to promote the role of basic sciences in the achievement of the United Nations 'Sustainable Development Goals'. We encourage anyone with an idea (or already ongoing project) that could fit within the scope of IYBSSD to apply for a grant. There will also be communication actions at various scales, and incentives for local, regional and national organizations to set up their own events with the same aim.

More information about IYBSSD can be found [here](#).

ACTIVITIES OF THE UNION ASSOCIATIONS

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

International Association of Cryospheric Sciences (IACS)

International Association of Geodesy (IAG)

International Association of Geomagnetism & Agronomy (IAGA)

International Association of Hydrological Sciences (IAHS)

International Association of Meteorology & Atmospheric Sciences (IAMAS)

International Association 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.cryosphericciences.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

The current IACS Bureau was elected at the IACS Plenary Administrative Meeting during the 27th IUGG General Assembly in Montreal. It consists of Regine Hock (President), Liss Andreassen (President Elect), Richard Essery (Secretary General), Minghu Ding (Vice President), Stanislav Kutuzov (Vice President), Andrew Mackintosh (Vice President), Charles Fierz (Head, Snow and Avalanches Division), Gwenn Flowers (Head, Glaciers Division), Sophie Nowicki (Head, Ice Sheets Division), Anaïs Orsi (Head, Cryosphere, Atmosphere and Climate Division), Christine Schøtt Hvidberg (Head, Planetary and Other Ices of the Solar System Division) and Takenobu Toyota (Head, Sea Ice, Lake and River Ice Division). To run the day to day business of IACS, an Executive Committee (EC) consisting of the President, Secretary General and President Elect holds regular teleconferences, in which all Bureau members are welcome to join.

IACS Division Deputy Heads

The IACS by-laws have a provision that the Bureau may appoint deputy heads for IACS divisions on request from the Division Head. The Division Head can temporarily delegate the right to vote on Bureau matters to the Deputy, but no Division can have more than one vote. Although there is no assumption that the Deputy Head will succeed the Head when they reach the end of their term, this is seen as a way to introduce early and mid-career researchers to the workings of IACS. Following the November 2020 Bureau meeting, the following Deputy Heads were nominated and approved by Bureau votes:

- Marie Dumont, Deputy Head of Snow and Avalanches Division
- Lauren Vargo, Deputy Head of Glaciers Divisions
- Alex Fraser, Deputy Head of Sea Ice Division



The IACS Bureau.

Back row, l-r: Minghu Ding, Andrew Mackintosh, Anaïs Orsi, Takenobu Toyota.

Front row, l-r: Charles Fierz, Christine Schøtt Hvidberg, Regine Hock, Gwenn Flowers (on screen), Liss Andreassen, Richard Essery.

Inset, l-r: Stanislav Kutuzov, Sophie Nowicki

Right, top to bottom: newly-appointed Division Deputy Heads Marie Dumont, Lauren Vargo, Alex Fraser.

ACTIVITIES

IACS Bureau Meeting

The annual meeting of the IACS Bureau for 2020 was held online on 16 and 17 November, with different times each day to facilitate the participation of Bureau members in different time zones. Although an online meeting was required by travel restrictions, the format was judged to be a success and will be used in future years that do not have a General or Joint Assembly that the majority of Bureau members will be attending. This is intended to better accommodate busy work schedules and home responsibilities, and to minimise greenhouse gas impacts associated with air travel.

Carbon Footprint resolution

In support of IUGG “Resolution 1: Reducing the Carbon Footprint by the Research Community”, IACS has resolved to reduce travel (particularly by air) related to symposia organization and other IACS business. IACS acknowledges the importance of close ties and communication with the local organizers of IUGG/IACS Assemblies, and will strive to provide input via video-, tele-conferencing or other suitable means, rather than participating in site visits that require carbon-intensive travel. Video-conferencing will also be used to conduct annual bureau meetings between IACS Assemblies and to allow remote participation in bureau meetings at the Assemblies.

Survey of National Correspondents

An online survey sent to all IACS National Correspondents in May 2020 included a question regarding the length of IUGG General Assemblies. Results showed that a large majority favour a reduction to 7 (70%) or 8 days (90%). Results were detailed in a report in the IACS and IUGG Newsletters.

IACS communications

The IACS homepage (<https://cryosphericciences.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://cryosphericciences.org/newsletter/>). Three newsletters were published in 2020.

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.
- Regional Assessments of Glacier Mass Change (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.
- 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.

Two more papers have been published following the end of the working group on Glacier Ice Thickness (2014-2019):

- Welty et al. Worldwide version-controlled database of glacier thickness observations. *Earth System Science Data*, **12**, 3039–3055
- Farinotti et al. Results from the Ice Thickness Models Intercomparison eXperiment Phase 2 (ITMIX2). *Frontiers in Earth Science*, **8**.

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 established two joint commissions in 2020: the IACS-IAG Joint Commission on Cryospheric Deformation and the IACS-IAPSO Joint Commission on Ice-Ocean Interactions. IACS and IAVCEI had agreed to wind up the Joint Commission on Volcano-Ice Interactions after a period of inactivity, but new leadership has now emerged on the IAVCEI side. Discussion between IACS and IAVCEI will now decide the best way to transition to the new Joint Commission structure.

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. The events supported in early 2020 before the imposition of travel restrictions were:

- 7th International Conference on Mars Polar Science and Exploration, Ushuaia, Argentina, 13-17 January
- 6th Snow Science Winter School, Col du Lautaret, France, 16-22 February

Obituaries

We were saddened in 2020 to hear of the passing of two staunch supporters of IACS: Koni Steffen (<https://koni-steffen.wsl.ch/en/obituary.html>) and Pierre Hubert (<https://cryosphericciences.org/members/obituaries/pierre-hubert-obituary/>)

FUTURE ACTIVITIES

IACS sponsorship for events that had to be postponed in 2020 will be carried over until they can be rescheduled. These events are:

- Third Annual Meeting of the Chilean Cryosphere Society (SOChiCri), online, 18-19 March 2021
- Juneau Icefield Research Program, Alaska, 14 June - 5 August 2020 (postponed to 2021)
- International Summer School in Glaciology, McCarthy, Alaska, 6-16 June 2020 (postponed to 2021)

IACS, IAMAS, IAPSO and the BACO-21 local organizing committee had to take the decision to cancel the 2021 joint assembly scheduled for Busan, Republic of Korea, but agreed to hold a joint assembly there in 2025. To replace BACO-21, an online IACS-IAMAS-IAPSO seminar series with invited speakers and Association early career award winners is being planned for the same period (19-23 July 2021). Details of the programme and registration will be announced in Association and IUGG newsletters and web sites.

Richard Essery, IACS Secretary General

International Association of Geodesy (IAG)



IAG website: www.iag-aig.org

INTRODUCTION

The structure of IAG comprises a number of components: four Commissions, the Inter-Commission Committees on Theory (ICCT), Climate Research (ICCC), and Marine Geodesy (ICCM), 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 by means of Operation, Data and Analysis Centres.

The Global Geodetic Observing System GGOS is a component of IAG which 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 by the delegates appointed by the national adhering bodies; the Bureau comprises the IAG President, Vice-President and Secretary General; the Executive Committee consists of 17 elected members; and 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. The detailed programme of the IAG is published in the quadrennial Geodesist's Handbook the latest one published in the November 2020 issue of Journal of Geodesy. Further reports are published in the bi-annual IAG Reports (Travaux de l'AIG), next one to be appear in 2021, in connection of the IAG Scientific Assembly.

ADMINISTRATION

IAG Council

The IAG Council meets bi-annually at the IUGG General Assemblies and at the IAG Scientific Assemblies. Previous Council meeting took place during the IUGG General Assembly in Montreal, 2019. Next one

is planned during the IAG Scientific Assembly in Beijing, China, June 28 – July 2, 2021. However, due to the COVID-19 pandemic, a physical meeting cannot be organized.

IAG Executive Committee (EC)

The EC 2019-2023 held one meeting in 2020. Due to the pandemic, it was organized as a virtual meeting on October 8-9, 2020. In addition to the regular reports of components and sub-entities, the main topic to discuss was the Scientific Assembly in Beijing on June-July 2021. Different alternatives were considered, but the final decision was made by the EC in December via an electronic voting to organize the meeting but as a hybrid meeting.



Group photo of IAG Executive Committee virtual meeting on October 8-9, 2020

IAG Bureau

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

IAG Office

The IAG Office (Secretary General, with the Treasurer and the “IAG Secretariat” registered Society concerning financial matters) managed the Association 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 are lower than normal. Most meetings, symposia and workshops were either cancelled, postponed or arranged as web meetings.

Commissions, Inter-Commission Committees, and Services

The four IAG Commissions (Reference Frames, Gravity Field, Earth Rotation and Geodynamics, Positioning and Applications), the Inter-Commission Committees, and the twelve Services maintain their individual Webpages (all accessible via the IAG Homepage). The main activities in 2020 consisted a series of virtual meetings.

Commission 1 and its sub-commission activities include on

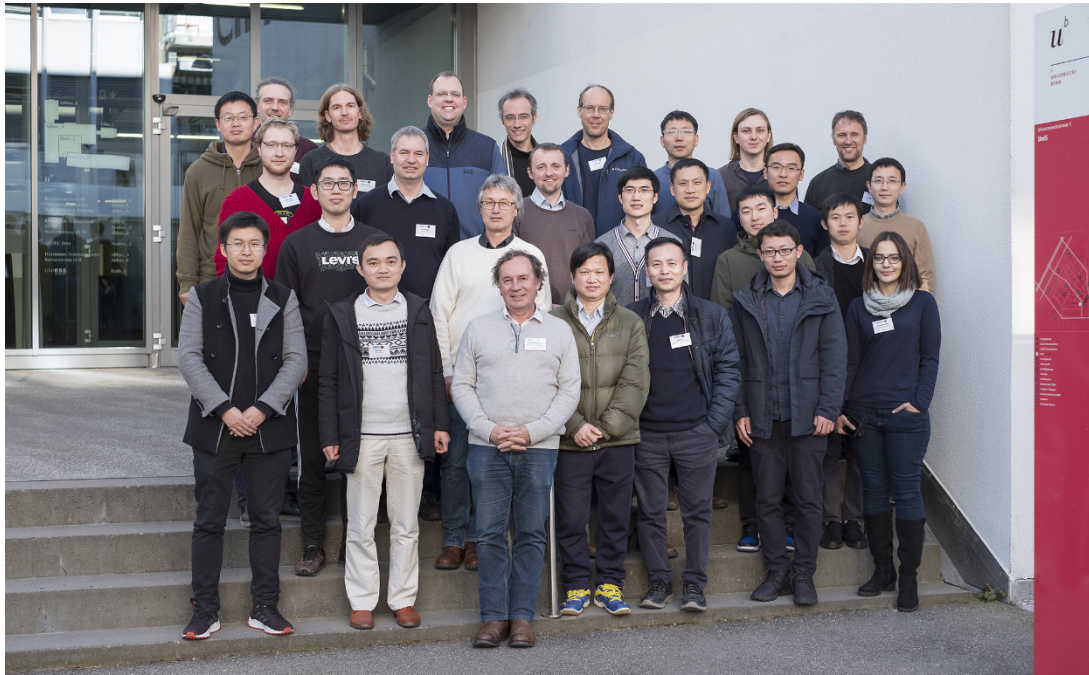
- 6 May 2020, EGU-2020 Session G2.4: New strategies for consistent geodetic products and improved Earth system parameters, 18 contributions.
- 9 June 2020, kick-off meeting of the IAG SC 1.4/IAU/IERS joint working group on the "Consistent realization of TRF, CRF and EOP", 20 participants.
- 3 November 2020, virtual meeting of IAG SC 1.3e/UN-GGIM-AP (Geodetic reference frame of the Asia-Pacific region), 86 participants.
- Working Group on "Time-dependent transformations between reference frames in deforming regions" of IAG SC 1.3 was actively involved in bi-weekly virtual meetings hosted by OGC.
- In February 2020 SC 1.3a (EUREF) held one physical meeting of its Governing Board (GB) in Munich, however with reduced number of participants due to last minute absence due to Covid-19. After that, the EUREF GB met 5 times virtually. The annual EUREF Symposium 2020 had to be cancelled due to the pandemic. First EUREF newsletter was released on December 18, 2020, in order to keep up the contact to the EUREF community.
- IAG SC 1.3b (SIRGAS) held several webinars from May to September 2020, with subjects related to the geodetic activities in the Latin and South America regions. The records and presentations from all these webinars are available at SIRGAS homepage (www.sirgas.org). In October 2020 SIRGAS organized a series of 4 weekly webinars in place of the annual SIRGAS Symposium. The SIRGAS Directing Council and Working Groups meeting was organized on 16 – 19 November 2020. The new SIRGAS Statute was approved during the Directing Council meeting, with the approval of all SIRGAS members, including all countries in North America. During the Working Groups meetings were presented the new structures and coordinators of GT II and GT III, as well as future work plans for 2021.

Commission 2 and its sub-commission related activities include

- COST-G meeting, taking place from 13 to 17 January in Bern, Switzerland, with participants from six Chinese institutions involved in GRACE/GRACE-FO data processing participated to discuss future co-operations. The meeting took place just a few days before the first corona virus lockdown came into force in Wuhan, China.
- SC 2.1 and JWG 2.1.1 organized a virtual meeting to discuss on the IGRS paper on the International Gravity Reference System for the Journal of Geodesy. Paper was published in the beginning of 2021. The open access paper has in one month already accessed 729 times!
- The Consultative Committee for Mass has selected Table Mountain Geophysical Observatory, Boulder, Colorado, USA as the site of the next International Comparison of Absolute Gravimeters, 2023.
- SC 2.3 with the GRACE/GRACE-FO Science Team Meeting (GSTM) 2020 took place as an online meeting from 26 to 29 October 2020 organized by the Helmholtz Centre Potsdam - GFZ German Research Centre for Geosciences. More than 180 scientists from 17 countries participated in the meeting.
- SC 2.4 related First Asia Pacific geoid workshop took place as a virtual meeting on 29 October.

Commission 3 and its sub-commission related activities include

- SC 3.1 symposium Geodynamics and Earth Tides Symposium organized was shifted to 22–26 June, 2021 (Wuhan), one week before the IAG Scientific Assembly and to be held in a hybrid mode.
- SC3.2 organized a volcano-geodesy virtual meeting on December 15 and 16 at two different times to meet colleagues participating from different time zones.



Participants of COST-G meeting, taking place from 13 to 17 January in Bern, Switzerland (University of Bern, picture by Vera Knöpfel)

- SC3.3 actively collaborated with the IAG joint working group JWG C.1 (“Climate Signals in Earth Orientation Parameters”) to organize the bi-monthly virtual meetings, with about 20 participants each time.
- SC3.4 was involved in oral and poster sessions related at Geological Society of America (GSA) meeting 2020 Connects Online meeting. Session title: “T138. Sea Level and Ice-Sheet Changes, Glacial Isostatic Adjustment, and Landscape Evolution”.
- The new joint IAG-IASPEI “Seismogeodesy” SC3.5 started beginning of 2020. A virtual session at EGU 2020 was organized with about 30 participants.
- JSG3.1 and SC3.4 organized a session at the AGU Fall Meeting 2020 (“Linking Cryosphere and the Solid Earth: From Sea Level Changes and Geodetic Time Series to Earth Rheology”). 31 contributions and more than 60 participants during the oral live session were active.

Commission 4 and its sub-commission related activities include

- SC 4.1 Emerging Positioning Technologies and GNSS Augmentations contains 5 Working Groups and one Special Study Group. Collaboration inside the SC during 2020 resulted in 14 joint publications, large data collection campaigns in Italy, Tokyo and Hong Kong, 8 research visits, 1 joint project, 1 project application submitted, and active cooperation with other WGs and key organizations (ION, ISPRS, FIG).
- SC 4.3 activities planned at EGU 2020 was not realized and much of the activities were postponed to the upcoming vEGU 2021. As a positive aspect in 2020, many papers have been written - also related the Study and Working Groups. Some progress has been made in third-party funded national and international projects; the work within these projects is often coupled with the objectives of individual SC 4.3 Working Groups.
- WG 4.4.1 had a Virtual meeting on 28 September 2020, participants from Europe, Australia, and Japan, and a Virtual meeting on 1 October, 2020, with participants from Australia and North America.
- WG 4.4.3 published a joint paper on GNSS observations of Android smartphones, and a joint presentation at the IMEKO TC-19 International Workshop on Metrology for the Sea conference, Parthenope University of Naples, 5 – 7 October 2020.
- WG 4.4.5 had several virtual meetings where group members shared their results.

There are also a number of Joint Working group and Services related activities

- The official approval of the JWG ITMER by IAU Commission A2, Rotation of the earth, happened in February 2020. Afterwards, the pandemic situation affected its activity. Also contributions in EGU2020 and AGU2020 virtual sessions.
- IAG JWG 1.1.1 'Intra- and Inter-Technique Atmospheric Ties', had two meetings virtually on May 8th, 2020 and October 10th, 2020 featuring 14 and 16 participants, respectively.
- ICCG-JWG C.2 'Quality control methods for climate applications of geodetic tropospheric parameters' had two virtual meetings on Sep 17th, 2020 and Dec 18th, 2020
- IAG/IAU/IERS 'Joint Working Group on the Consistent Realization of TRF, CRF, and EOP', had the virtual kick-off meeting on June 9th, 2020, 20 participants
- In the frame of IAG Sub-Commission 2.3 'Satellite Gravity Missions GRACE/GRACE-FO Science Team Meeting (GSTM) 2020 took place as an online meeting from 26 to 29 October 2020. More than 180 scientists from 17 countries participated in the meeting.
- Within the ICCG, JWG C.1 'Climate Signatures in Earth Orientation Parameters', organized four online meetings during May and November 2020 on topics related to the observation/combination of EOP and the numerical modeling of surface geophysical fluids and solid Earth dynamics responsible for the observed observations.
- Members of ICCT study groups participated at the on-line General Assembly of the EGU (session on recent developments in geodetic theory).
- The IAG Project – Novel Sensors and Quantum Technology for Geodesy (QuGe) held its kick-off meeting virtually. After recalling the various goals of the QuGe project (see also <https://quge.iag-aig.org>), the early initiatives have been presented.
- Also, the 3 QuGe WGs, WG Q.1: Quantum gravimetry in space and on ground; WG Q.2: Laser interferometry for gravity field missions, and WG Q.3: Relativistic geodesy with clocks started their activities.
- The ILRS Virtual World Tour 2020, 2-6 November 2020 to five SLR observatories was very popular with 250 registered participants.

Global Geodetic Observing System (GGOS)

The meeting activity of was reduced due to the pandemic and physical meeting (GGOS days) was organized virtual on October 5-7 with 49 participants. Publication of "Inventory of Standards and Conventions used for the Generation of IAG Products" was released, as well the launch of new GGOS website, <https://ggos.org/> which focuses on geodetic observation, products and IAG Services.

Communication and Outreach Branch (COB)

Main activities of the COB included the publication of the monthly Newsletter, and the maintenance of the IAG Homepage (www.iag-aig.org). Renewal and development of the IAG web site continued. The IAG Newsletter is published monthly also in 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, presently with IAG presidency), Group on Earth Observation (GEO), ICSU Commission on Space Research (COSPAR, Sub-commission B2 and PSD), International Astronomical Union (IAU, Commission A2, with IAG presidency), 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).

IAG membership

By the end of 2020, there were a total of 189 members, of which 24 were student members and 39 retired members.

Publications

Based on the agreement with Springer Verlag, IAG Symposia Series will be open access, and free of charge to the Symposia participants. Volume 150 (Fiducial Reference Measurements for Altimetry) appeared in 2020, and next two are under preparation. The Geodesist's Handbook 2020 was published as the November issue of the Journal of Geodesy.

Awards, Anniversaries, Obituaries

No young scientist travel awards were given in 2020. This is due to the COVID-19 pandemic, because the physical meetings were cancelled or held virtual. Other IAG Awards are given either at the General Assembly (next 2023) or the Scientific Assembly (next 2021).

IAG Congratulated and published a short presentation in the IAG Newsletter for Anniversaries of

- Former IAG President, Professor Ivan I. Mueller on his 90th Birthday
- Academician, Professor Fakhraddin A. Kadirov on his 70th Birthday

The following obituaries were published in the IAG Newsletter

- Joseph David Zund (1939-2014)
- Günter Stangl (1952-2020)
- Richard Henry Rapp (1937-2020)
- Erik Wilhelm Grafarend (1939-2020)

The IAG President and Secretary General represented IAG in various symposia, meetings and anniversaries.

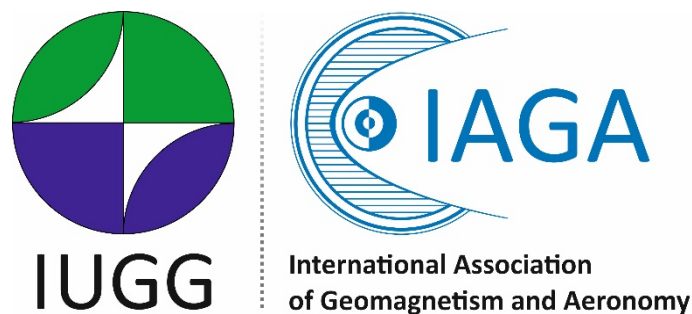
FUTURE ACTIVITIES

Main activities in 2021 concern the preparation of the IAG Scientific Assembly in Beijing, China, June-July 2021. Due to COVID-19 pandemic, the meeting will be organised as a hybrid meeting, which will cause a lot of extra work. More information will be found on the Assembly web page www.iag2021.com.

Cooperation in the Subcommittee on Geodesy of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) will continue. IAG is represented in the UN-GGIM permanent Subcommittee on Geodesy where the main activity is establishment of the Centre of Excellence. Further plans of IAG sub-entities can be found in the Geodesist's Handbook 2020.

Markku Poutanen, IAG Secretary General

International Association of Geomagnetism and Aeronomy (IAGA)



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

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

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

More information on IAGA is provided on its websites: 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 given 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/>.

Three new working groups formed in 2020. Div. III re-established the WG on ULF waves and set up a new working group on Geospace Data Assimilation jointly with Div. II. The early career scientists who started IAGA social media activities in 2019 are currently establishing a WG on Social Media within the Interdivisional Commission of Education and Outreach.

IAGA is administered by an Executive Committee on behalf of IUGG Member Countries in accordance with the Association's Statutes and By-Laws. The 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 (ECS, Taiwan), Anna Kelbert (USA), Michael Kosch (South Africa), Huixin Liu (Japan), Klaus Spitzer (Germany), Ricardo Trindade (Brazil)

The executive committee had two virtual meetings in 2020 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

Preparation of IAGA-IASPEI Joint Assembly 2021



The preparations for the IAGA-IASPEI Joint Assembly, to be held from August 22 - 27, 2021 in Hyderabad, India were in full swing when the COVID-19 pandemic hit the world. IAGA and IASPEI Secretary Generals Monika Korte and Johannes Schweitzer had just visited the hosts and local organisers (LOC) of CSIR-NGRI from February 4 - 6, 2020. We inspected the modern conference centre and several of the foreseen hotels and accommodation options in the vicinity and found them all to be of very good international standard. We experienced the new, excellent metro line and discussed the plans of the LOC for shuttle bus transportation. Last but not least we identified beautiful locations for the association dinners. Not long after we returned from India with very positive impressions about the preparations for the Joint Assembly the first wave of the pandemic struck. Over the past months we kept up the hope for as long as possible to be able to conduct a normal meeting in summer 2021. When requirements to finalize contracts forced us to take a decision in November 2020 it unfortunately was clear that a large meeting with strong international attendance still seemed unlikely for August 2021. After several online meetings and many discussions within and among the two executive committees and the LOC the decision was taken to hold the meeting in fully virtual form on the originally foreseen dates. In foresight the LOC had already started to explore the options. Organising a virtual meeting is a new experience and a learning process for all of us. We are trying to learn from other meetings and we will all do our best to create an event to foster scientific exchange and networking as close as possible to a personal meeting.

The latest information on the Joint Assembly can be found on the meeting website, <http://iaga-iaspei-india2021.in/>, where also the second circular that was published in December 2020 can be found.

Preparation of IAGA School 2021

The 5th IAGA School is planned for August 16-20, 2021, just before the IAGA-IASPEI Joint Assembly. The School was normally planned to take place in Hyderabad, India, but due to the pandemic situation it also will be fully virtual this time. Lecturers for the IAGA School were recruited through recommendations of the division chairs. We thank the six lecturers who already agreed on serving at the IAGA school.

The application for the IAGA School participants has closed as usual by the end of October 2020. We have received more than 50 applications from all over the world. The virtual format would allow for a larger participation than the 20 that IAGA usually sponsored for personal attendance. However, we still consider the aspect of the students getting to know each other an important aspect of the IAGA School so that we still limit the number of participants. However, we consider making recordings of the lectures temporarily available to all (PhD) students participating in the IAGA-IASPEI Joint Assembly. The selection process is finished and the selected participants were informed in December 2020.

Sponsored Topical Meetings

Several IAGA sponsored topical meetings and workshops were planned for 2020. Due to the pandemic, all of them had to be postponed, turned into virtual meetings or cancelled. Below is a brief overview. More information, including a report from the 9th VERSIM workshop that was conducted virtually, can be found in the annual IAGA Newsletter at <http://www.iaga-aiga.org/publications>.

Workshop Title	Planned Dates	Location	Changed to
9 th VLF/ELF VERSIM	March 23-27	Kyoto, Japan	Virtual, Nov 16-20, 2020
VIII SBGEA & SimFAST	May 25-9	Sao Jose dos Campos, Brazil	Virtual, Mar 22-26, 2021
8 th HEPPA-SOLARIS	June 8-10	Bergan, Norway	June 2021
8 th IAGA/ICMA/SCOSTEP Vertical Coupling	July 6-10	Sopron, Hungary	cancelled
XIX Observatory Workshop	July 6-12	Kazan, Russia	postponed
43 rd COSPAR	August 15-24	Sydney, Australia	Hybrid, Jan 28 – Feb 4, 2021
17 th Castle meeting on Paleo, Rock and Environmental Magnetism	August 23-29	Zagreb, Croatia	Aug 28 – Sep 3, 2022
25 th EM Induction Workshop	Sep 13-19	Kuşadası, Turkey	2022

Further EC, Division, Commission and Working Group Activities

Further activities include the release of the 13th generation of the International Geomagnetic Reference Field (IGRF-13) and related publications in a special issue of Earth, Planets and Space by Working Group V-MOD. Four IAGA EC members participated in a virtual meeting of the International Association of Physics Students (IAPS) on August 28, and more future interactions between IAGA and IAPS are planned. More detailed information on IAGA activities can be found in the annual IAGA Newsletter at <http://www.iaga-aiga.org/publications>.

Publications

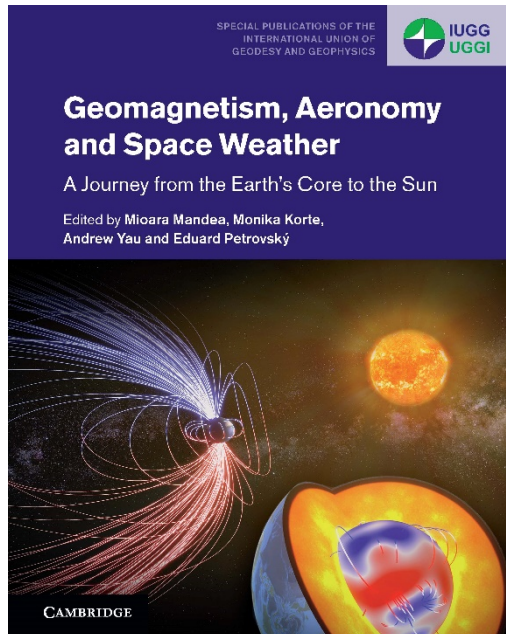
IAGA Newsletters

The latest issue of the annual IAGA Newsletter, nr. 57, was distributed in early January 2021. It can be downloaded from the IAGA website <http://www.iaga-aiga.org/publications> .

IAGA Flyer and Poster

Current versions of a IAGA Flyer and Poster are also available on the website.

IAGA Book



The IAGA contribution to the publication series on IUGG's 100th anniversary became available in early 2020. Its title is "Geomagnetism, Aeronomy and Space Weather – A journey from Earth's core to the sun". It was edited by members of the IAGA Executive committee and contains 19 chapters authored by experts in their fields. It summarises the advances in research over the past 100 years, and looks ahead to current and emerging studies on Earth's magnetic field. It provides a comprehensive overview of the generation of Earth's magnetic field, its history and its response to external forces. Starting at the centre of the Earth, the reader is taken on a journey from the interior core and mantle, through the upper atmosphere and magnetosphere, before reaching the Sun's atmosphere and corona. The applications of this research are also discussed, particularly the societal impact of solar activity on critical infrastructures in our increasingly technologically dependant society.

FUTURE ACTIVITIES

Main activities in 2021 will be the IAGA-IASPEI Joint Assembly and the attached IAGA School with the special challenge to organise both events in virtual format for the first time. Moreover, a GIFT (Geoscience Information For Teachers) Workshop is also planned attached to the 2021 IAGA-IASPEI Joint Assembly by the Interdivisional Commission of Education and Outreach.

To increase the interest and participation of early career scientists in IAGA a strengthening of social media activities by the formation of a dedicated working group and continued interactions with the IAPS are planned.

Monika Korte, IAGA Secretary General

International Association of Hydrological Sciences (IAHS)



IAHS website: <http://iahs.info>

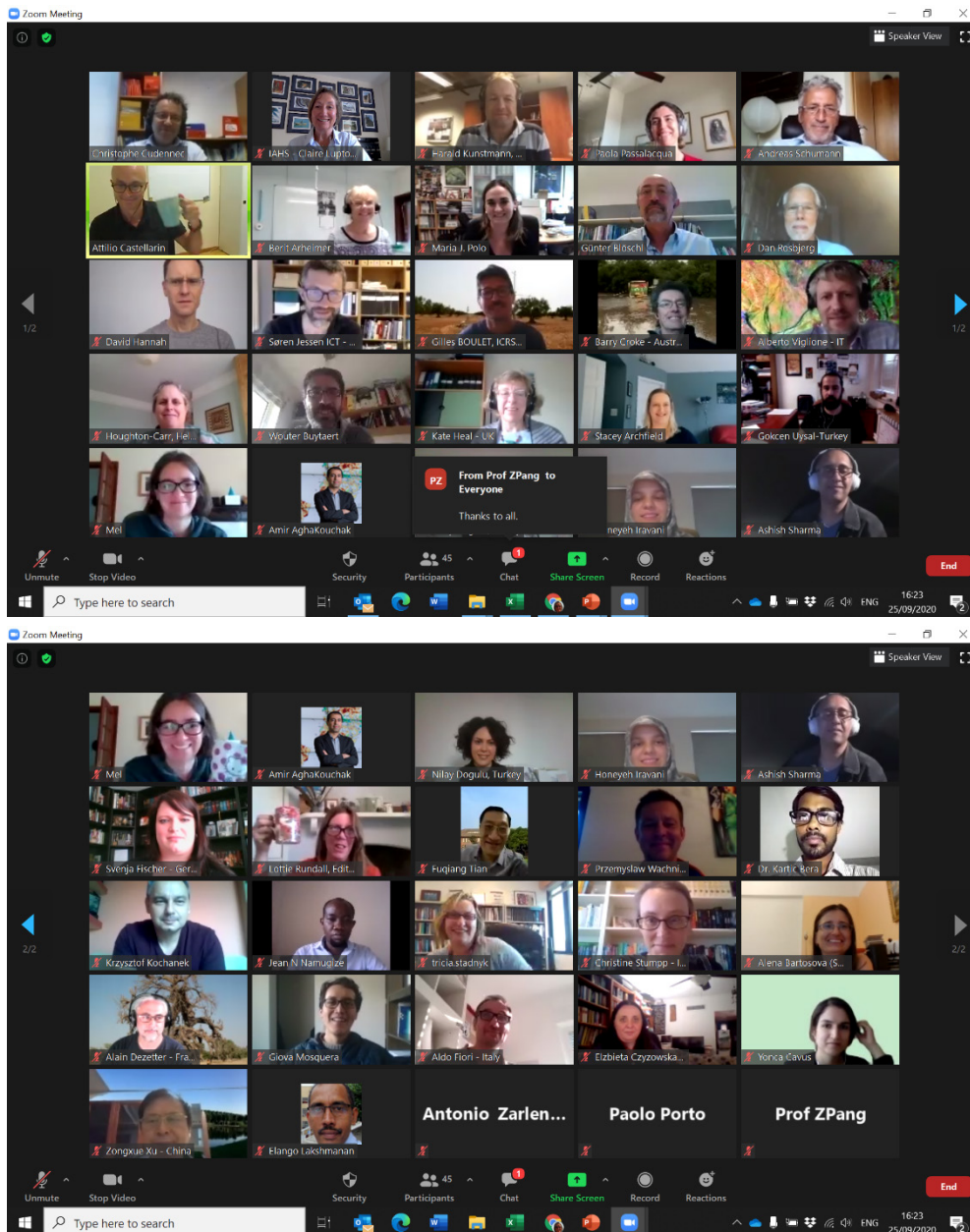
INTRODUCTION

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 Press publishes the Hydrological Sciences Journal, the Proceedings of IAHS (PIAHS, open access, successor of the Red Book Series), the Benchmark Paper series, and other specialised publications. IAHS maintains strong connections with the International Hydrological Programme of UNESCO and with the Hydrology and Water Resources Programme of the World Meteorological Organisation (WMO), and is partner of the UN Water coordination mechanism.

ADMINISTRATION

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

- 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
- Decadal Initiative Panta Rhei 2013-2022
- Unsolved Problems in Hydrology (UPH) initiative



IAHS bureau meeting online, 25 September 2020

ACTIVITIES

As in every year between an IUGG General Assembly and an IAHS Scientific Assembly, 2020 was due to have intense activities with thematic conferences organized by commissions and with partners. Because of the Covid-19 pandemic outbreak, all events have been canceled, postponed or reformatted, with much of managerial and eventually financial costs. In particular the ICWRS conference planned in July in Cairns, Australia was canceled; the ICCE conference in Bydgoszcz, Poland planned in June was canceled and partly replaced by an online event coordinated from Moscow, Russia; the ICSH conference on statistical hydrology (STAHY) planned in September in Valencia, Spain and the ICSW – UNESCO Friend of the Earth conference on Great Rivers in Africa planned in November in Cotonou, Benin were postponed to fall 2021; the IAHS co-convoked sessions on Panta Rhei and UPH at the EGU Assembly and the AGU Fall Meeting were held virtually.

The Tison Award for Young Hydrologists has been granted to Eleni Maria Michailidi and Sylvia Antoniadou (Greece). The IAHS-UNESCO-WMO International Hydrology Prize medals have been bestowed to Hubert

Savenije (Netherlands) – Dooge Medal, and Bruno Merz (Germany), Volker Medal. The ceremony was planned at the STAHY conference, Valencia and has been kept on hold.

The SYSTA (Sivapalan Young Scientists Travel Awards) travel award scheme set up in 2018 has been implemented for the second time in anticipation of the 2020 eligible conferences with 9 individuals selected for full support: 2 individuals (from Lebanon, Uganda) to attend the ICWRS conference, 4 individuals (from Nigeria, Iran, Iraq, India) to attend the STAHY conference, 3 individuals (from Côte d'Ivoire, Burkina Faso, Togo) to attend the Great River in Africa conference. Grantees kept the benefit of their travel awards for the similar conference if postponed, or the IAHS Scientific Assembly in Montpellier.

IAHS Ltd 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. IAHS also publishes the proceedings of some IAHS and other symposia and workshops in the online, open access Proceedings of the IAHS (PIAHS) series with Copernicus.

Performance indicators of *HSJ* are stable. 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 special issue co-organized by IAHS – WMO – UNESCO was included in *HSJ* vol. 65:5 (second batch is in press): *Hydrological data: Opportunities and barriers*, including a conceptual editorial linking to Open Science (Cudennec C. *et al.*, 2020. *Towards FAIR and SQUARE hydrological data*. *HSJ*, 65:5, 681-682, <https://doi.org/10.1080/02626667.2020.1739397>); two articles curating WMO initiatives (Pecora S., Lins H., 2020. *E-monitoring the nature of water*, *HSJ*, 65:5, 683-698, <http://doi.org/10.1080/02626667.2020.1724296> & Dixon H. *et al.*, in press. *Intergovernmental cooperation for hydrometry – what, why, how?* *HSJ*, <https://doi.org/10.1080/02626667.2020.1764569>); and a framing article on citizen science in hydrology produced by the CANDHY working group (Nardi F. *et al.*, in press. *Citizens AND HYdrology (CANDHY): conceptualizing a transdisciplinary framework for citizen science addressing hydrological challenges*. *HSJ*, <https://doi.org/10.1080/02626667.2020.1849707>).

One running special issue *Advancing socio-hydrology: A synthesis of coupled human-water systems across disciplines*, guest edited by S. Pande *et al.*, accommodated numerous articles along the year, <https://www.tandfonline.com/toc/thsj20/65/S3?nav=toCList>

Two volumes of the open access PIAHS have been published, both as proceedings of conferences of UNESCO – IHP programs: Volume 382: *Living with subsidence* (Land subsidence program), guest edited by Foffer P.A. and Erkens G., <https://piahs.copernicus.org/articles/382/index.html> and Volume 383: *Hydrological processes and water security in a changing world* (FRIEND program), guest edited by Yu Z. *et al.*, <https://piahs.copernicus.org/articles/383/index.html>.

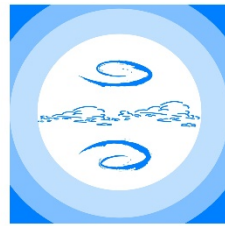
The close cooperation of IAHS with UNESCO, WMO and the UN Water mechanism has been continued. We have contributed to the World Water Development Reports WWDR 2020 (*Water and climate change*); and attended online meetings of the WMO Hydrological coordination panel, the WMO HydroHub Innovation committee, the UNESCO IHP drafting strategy, UN Water.

FUTURE ACTIVITIES

Short term perspectives are impacted by the Covid-19 pandemics and consequences. The 2021 scientific assembly to be held in Montpellier, France has been postponed to spring 2022 and much (re-) organization is under way.

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 the specialized association of the International Union of Geodesy and Geophysics (IUGG) that deals with all aspects of the gaseous envelope around the Earth and other planets. The main research work is carried out, coordinated and communicated 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)
- International Radiation Commission (IRC)

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

This year of 2020 has been like no other in recent history. The global pandemic has necessitated the cancellation or postponement of multiple conferences, workshops and field programs (<https://www.iamas.org/meetings/>). Reduced transportation and other industrial activities, resulted in an observable reduction in some greenhouse gases (e.g. CO₂, CH₄) as well as pollutant gases (e.g. CO and NO₂).

ADMINISTRATION

IAMAS Bureau Meetings

Regular administrative meetings have all been held virtually. The planned meeting at the University of Bremen in April 2020 was not feasible.

Improving the engagement of early career scientists in IAMAS

An IAMAS goal is to engage early career scientists in our activities. As discussed in Assembly meeting in Montreal in 2019, to help move this forward IAMAS decided to include an early-career scientist on the IAMAS Bureau, with same responsibilities as other IAMAS Bureau members (see <http://iamas.org/bureau/>). The term of appointment of two years. Nominations were submitted by IAMAS commissions and after consideration of a slate of excellent nominations, Dr. Jing Li of Peking University, China will be joining the Bureau of IAMAS as our Early Career Representative. Dr. Li will be involved in the day-to-day running of our association and 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, will collaborate and assist Dr. Li in IAMAS early career scientist activities.

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 taken into account. IAMAS has formed an early career scientist (ECS) coordinating group, which consists of ECS representing each commission. This coordinating group will be led by Drs. Li and Perkins-Kirkpatrick, who will report out at IAMAS Bureau meetings on progress and activities. Activities include Webinars on specific topics of interest for IAMAS ECS researchers, coordinating virtual/online ECS Event around and as part of the “BACO 21” online assembly 18-23 July 2021.

We have established an early career committee to advocate for and build a community among this critical science group.

Funding

Because of the pandemic, many meetings and conferences were forced into virtual formats or postponed to a later date. Funds approved for commission workshops and meetings, were approved for use next year.

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
Deputy Secretary General:		
Early Career Scientist:	Jing Li	CHINA
Assistant Secretary General	Leanne Avila	USA
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). http://www.icae-iamas.org		
President:	Xiushu Qie	CHINA
Secretary:	Weitao Lyu	JAPAN
Climate (ICCL). http://www.iccl-iamas.net/		
President:	Jianping Li	AUSTRALIA
Secretary:	Quizhen Yin	CHINA
Clouds and Precipitation (ICCP). www.iccp-iamas.org		
President:	Andrea Flossmann	FRANCE
Vice-President:	Greg McFarquhar	USA
Secretary:	Darrel Baumgardner	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). www.icma-iamas.org		
President:	Bernd Funke	SPAIN
Vice-President:	Natalia Calv	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). http://icpae.iaps.inaf.it/		
President:	Feng Tian	CHINA
Vice-President:	Ann Carine Vandaele	BELGIUM
Secretary:	Yeon Joo Lee	GERMANY
Polar Meteorology (ICPM). www.icpm-iamas.org		
President:	Matthew Lazzara	USA
Secretary:	Tracy Moffat-Griffin	UK
Radiation (IRC). www.irc-iamas.org		
President:	Peter Pilewskie	USA
Vice-President:	Manfred Wendisch	GERMANY
Secretary:	Hajime Okamoto	JAPAN

ACTIVITIES

In 2019, a new website design was developed for IAMAS to modernize the look and support user needs. The official website of IAMAS was migrated to a secure web server. We are now in the process of moving the web pages of our commissions to the same server, as noted below in commission summaries. We anticipate this will provide for better continuity in the websites moving forward as the commissions' leadership change.

Two e-newsletters were published (<https://www.iamas.org/newsletters/>).

Awards:

Prof. Joyce Penner, President of IAMAS, was the recipient of the AMS Syukuro Manabe Climate Research Award.

Professor John P. Burrows, Vice President of IAMAS, was elected to become a member of the German Academy of Science, the Leopoldina

Highlights from the IAMAS International Commissions

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

iCACGP convened several sessions at the 27th IUGG Assembly in Montreal in July 2019. These included M08 - Air Quality in the Changing Anthropocene, M09 - The Arctic in the 21st Century: A Hotbed of Global Change and the joint session, JM02 - Anthropogenic changes in Chemistry and Physics of the Atmosphere: Evidence and Attribution Studies (IAMAS, IAVCEI, IAG). All sessions were well attended, with the M08 session extending to 9 time slots. The commission also held its annual meeting in Montreal, which was attended by 23 commissioners who developed the strategic direction for iCACGP over the 2019-2021 period. iCACGP working with IGAC, SOLAS, and GAW have been successful in the submission of several proposals for sessions at the Sustainable Research and Innovation 2020 conference focusing on atmospheric chemistry and the Sustainability Development Goals <https://sri2020.org/>.

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

1. The new website for ICAE (<http://www.icae-iamas.org>) has been online from June 2020. The content of the former ICAE website, www.icae.jp, was transferred to the new website.
2. ICAE published two issues of newsletters in 2020. All the two ICAE newsletters were distributed to the ICAE mailing list.
3. The ICAE 2020 Executive Committee virtual meeting was held on November 19, 2020. The issues on 17th General Assembly of ICAE was discussed, and it will be held on 18-24 June 2022 at Tel Aviv, Israel. Two young researchers were nominated for the Candidate of IAMAS early career scientists (ECS) coordinating group. The ICAE topics for Busan IAMAS-IACS-IAPSO Joint Assembly were discussed.
4. The complete issues of ICAE newsletters back from 1990 were collected in 2020, and all issues can be accessed through <http://www.icae-iamas.org/Newsletter.html>.
5. The ICAE mailing list has been updated.

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

1. Organization at EGU 2020 (May 3-8, 2020) of the session AS1.16: "The global monsoons in current, future and palaeoclimates and their role in extreme weather and climate events". The session was presented online on Tuesday 5th May 2020, and some ICCL members participated and discussed on the research of monsoon in the past and future.
2. Nomination of a candidate for the IAMAS Early Career Medal.
3. Preparation for the IAMAS-IACS-IAPSO Joint Assembly 2021 (BACO-21) from 18th-23rd June 2021 at Busan in Korea. ICCL prepared ten sessions for the BACO21, but all of them had to be cancelled due to the pandemic situation.

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

The International Conference on Clouds and Precipitation originally scheduled for August 2020 in Pune, India, was postponed and has been rescheduled for 2-6 August 2021. The meeting will take a hybrid format, with some in-person attendance possible in Pune and all oral and poster sessions to also be presented virtually. The International Cloud Modeling Workshop will take place the week before the conference from 26 to 30 July 2021, and a Short Course on Cloud Physics Data: In-Situ Measurements, Data Processing and Analysis Methodology will take place the weekend before the ICCP Conference, 31 July to 1 August 2021. One main activity of the ICCP in 2020 was updating its web site. As part of this activity, all available preprint volumes from past ICCP conferences were scanned and are now available on the ICCP web site. In addition to planning the 2021 conference, the site for the 2024 ICCP Conference has been determined: Jeju, South Korea.

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

At the end of 2019, the new leadership of ICDM conducted an online election to fill the vacant positions due to several members leaving the commission after the 26th IUGG Assembly in Montreal, Canada. The following members were elected as new members:

Frederic Vitart (UK), Hannah Christensen (UK), Daniel Kirshbaum (Canada), Jim Doyle (USA), Leila Carvalho (USA)

In 2020, ICDM developed nine symposia descriptions for the joint IAMAS-IACS-IAPSO assembly 2021-BACO in Busan. Unfortunately, the assembly had to be significantly altered due to the COVID-19 pandemic and none of the proposed symposia will be conducted.

ICDM also used the opportunity in 2020 to move its webpage (<https://www.iamas.org/icdm/>) to the new IAMAS webpage (<https://www.iamas.org/>). The new consistent layout for IAMAS and its commissions is highly appreciated.

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

Assembly symposia. ICMA provided suggestions for invited speakers at the IAMAS-IACS-IAPSO virtual assembly to be held in July 2021.

Business meetings / Internal affairs. ICMA elected two nominees for IAMAS Early Career Scientist Coordinating Group. Gabriel Chiodo (Switzerland) was finally selected as ICMA representative.

ICMA sponsored Workshops. The ICMA sponsored 8th IAGA/ICMA/SCOSTEP Workshop on Vertical Coupling in the Atmosphere-Ionosphere System, planned to be held in Sopron/Hungary in July 2020, has been cancelled. The ICMA sponsored 1st VolMIP workshop, planned to be held in fall 2020 in Venice, has been postponed to 2021. Similarly, the 11th International Workshop on Long-Term Changes and Trends in the Atmosphere has been postponed to May 2021.

IO3C (www.io3c.org)

1. Due to the Covid-19 crisis, the Quadrennial Ozone Symposium QOS2020 has been postponed to 3 - 9 October 2021. It will be held online, <http://qos2021.yonsei.ac.kr/>.
2. The re-election of the IO3C officers and election of new members. Half of the Commission has been renewed: <http://www.io3c.org/members-international-ozone-commission>
3. Press Release: The International Ozone Commission, on the 33th anniversary of the Montreal Protocol, reports successes and remaining challenges for understanding ozone layer recovery, see <http://www.io3c.org/press-release-international-ozone-commission-33th-anniversary-montreal-protocol-reports-successes>
4. IO3C has co-sponsored the ASOPOS 2.0 report on the Assessment of Standard Operating Procedures for Ozonesondes, to be published by WMO soon in 2021.
5. Election of one of the IO3C members, Ayman Badaway, to the IAMAS Early Career Committee
6. Participation in the WMO GAW meetings to discuss the modernization of the ways WMO runs its activities and "more effectively deliver to the global ozone agenda and respond to the increasing societal needs for broader integration of science and services." (Greg Carmichael, Chair, SSC, GAW)
7. Participation in the ORM11 technical meeting to discuss approaches to identification of gaps in the global coverage of atmospheric monitoring of controlled substances under the Montreal Protocol and options to enhance such monitoring.
8. Participation in the Ozone/UV SAG session and reporting on IO3C activities. discussion of enhancing collaborations between IO3C and WMO GAW.

9. Leading 2 SPARC activities, LOTUS and OCTAV-UTLS, that are focused on ozone trends and will be contributing to the next WMO Ozone Assessment.

ICPAE ([website under construction within the IAMAS website framework](#))

ICPAE did not organize meetings or workshops in 2020 but increased its active members by 70% in 2020. A workshop previously scheduled in 2021 was cancelled because of the COVID-19 situation.

ICPM (<http://www.icpm-iamas.aq/>)

The International Commission on Polar Meteorology (ICPM) had plans for an active year in 2020, however, the pandemic has impacted those activities. The ICPM-endorsed 15th Workshop on Antarctic Meteorology and Climate (WAMC) scheduled in association with the SCAR2020 conference in Hobart, Tasmania, Australia was canceled due to the pandemic. Only a few reports regarding the Antarctic Automatic Weather Station networks and the new Antarctic Meteorological Research and Data Center were made available in lieu of the meeting (found here: <http://amrc.ssec.wisc.edu/meetings/meeting2020/program.shtml>). The largest effort of this past year was fully establishing the ICPM's new website, <https://www.iamas.org/icpm/> that is now integrated with the IAMAS new website. In a positive development of 2020, ICPM members have joined in the new IAMAS Early Career Scientist committee.

IRC (<http://www.irc-iamas.org/>)

The IRC, like every other organization, had its plans interrupted by the COVID-19 global pandemic. In March 2020 the quadrennial symposium of the IRC, scheduled for July 6-10, 2020 at the Thessaloniki Concert Hall Convention and Cultural Center, in Thessaloniki, Greece, was rescheduled at the same venue for 14–18 June 2021. In January 2021 it was determined that an additional year delay was necessary to hold an in-person symposium. The new date for what will now be called IRS 2022 is 4-8 July 2022, again at the same site in Thessaloniki. Please see <https://www.irs2020.org/> for updates.

The IRC annual business meeting that would have been held during IRS2020 was conducted on 10 August 2020, and held remotely via Zoom. The highlights of the meeting include the election of the new IRC Officers: Peter Pilewskie, President; Manfred Wendisch, Vice President; and Hajime Okamoto, Secretary. The officers will serve four-year terms that commence in January, 2021. Another major activity at the business meeting was the "sunsetting" of two IRC working groups: Continuous Intercomparison of Radiation Codes (CIRC) and GEWEX Radiation Panel (GDAP).

In October 2020 a call for nominations for new commissioners was conducted. A vote was held and 11 new commissioners were selected to replace the 11 commissioners who completed their second four-year term. The IRC continues its tradition of full global coverage, with the 11 new commissioners representing seven nations.

FUTURE ACTIVITIES

An IAMAS-IACS-IAPSO virtual assembly will be held the week of 19-23 July 2021. The program and technical details of the online assembly will be finalized and announced by the organizers in the first three months of 2021. The virtual assembly will comprise invited speakers selected to speak for a limited period each day to enable all members of IAMAS around the world to hear simultaneously the selected talks.

While vaccines are sure to help make 2021 more sociable, the new approaches to virtual formats of meeting will continue.

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

1. Prepare the 17th ICAE General Assembly (ICAE2022).
2. Participate in the virtual IAMAS-IACS-IAPSO Joint Scientific Assembly 2021 (BACO-21)
3. Issue two newsletters, one in spring and one in the fall.
4. Maintain the website for ICAE.
5. Update the ICAE colleague mailing list as needed.

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

1. Organize and participate at EGU 2021 (April 19-30, 2021) session “The global monsoons in current, future and palaeoclimates and their role in extreme weather and climate events”.
2. Organize and participate in virtual international workshop on “Asian Monsoon variability and dynamics from astronomical time scale to decadal time scale” in the second half year (say September) of 2021.
3. Organize and participate of the biennial meeting (virtual) of the ICCL member in June or July 2021.

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

The main plan for 2021 is the conduct of the hybrid conference in Pune. Abstract submission has already closed and evaluation of abstracts has begun. The meeting program will be announced in the near future and will include both oral and poster presentations.

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

The next business meeting is planned for June/July 2021 and will be held online.

As stated above, the ICMA sponsored 1st VolMIP workshop, planned to be held in fall 2020 in Venice, has been postponed to 2021. Similarly, the 11th International Workshop on Long-Term Changes and Trends in the Atmosphere has been postponed to May 2021.

IO3C (www.io3c.org)

As stated above, the Quadrennial Ozone Symposium QOS2020 has been postponed to 3 - 9 October 2021. It will be held online, <http://qos2021.yonsei.ac.kr/>.

ICPM (<http://www.icpm-iamas.aq/>)

ICPM planning for sessions at the BACO-21 meeting will be re-focused and re-tooled for the IUGG meeting planned in Berlin in 2023, post-pandemic. The ICPM-endorsed 16th WAMC will be a virtual meeting hosted by The Ohio State University, Byrd Polar Climate and Research Center, with dates to be revised and finalized in the coming weeks. Efforts for ICPM in 2021 will be to engage more directly with early career scientists along with the ICPM’s first virtual business meeting.

IRC (<http://www.irc-iamas.org/>)

As indicated in our 2020 highlights, the International Radiation Symposium originally scheduled for 2020 was postponed until 2021 and then further delayed to what we now hope will be a firm commitment in July, 2022. Over 550 authors submitted abstracts to the original IRS2020. We will re-open the abstract submission process for 2022 to allow authors to change their abstracts. The 2021 IRC Business Meeting will be held remotely at a date yet to be decided. One of the main agenda items will be the presentation of new Working Group proposals. Finally, with the change of Busan IAMAS-IACS-IAPSO Joint Assembly 2021 (BACO-21) to a virtual meeting with only select invited presentations, the IRC will not be convening special sessions as originally planned.

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: <http://iapso.iugg.org>

INTRODUCTION

IAPSO has the prime goal of 'promoting the study of scientific problems relating to the oceans and the interactions taking 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 <http://iapso.iugg.org/>.

ADMINISTRATION

The IAPSO Bureau was renewed in July 2019 during the IUGG General Assembly in Montreal. 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)
	Yukio Masumoto (Japan)
	Jae-Hun Park (Republic of Korea)
	Alejandra Sanchez-Franks (UK)

Christa von Hildebrandt-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. 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.

No formal business meetings have been arranged for 2020 and any business was conducted by email and Zoom where appropriate.

Change of Statutes and By-Laws

In recent years the IAPSO EC has felt constrained by the number of its members in relation to the ability to include representatives from all areas of the world and also younger scientists. So a change of the IAPSO Statute 8 and By-Law 8 was proposed to the Member delegates to increase the number of the Members at Large of the EC from six to eight, including an early career scientist, whose formal role will be to chair the IAPSO Early Career Scientists Working Group. Change has been voted electronically between 31 August 2020 and 30 November 2020 and approved. In the first instance the two new places have been filled by co-option, approved by the vote of delegates, and Dr. Rick Lumpkin and Dr. Alejandra Sanchez-Franks were appointed as members of the IAPSO Executive Committee until 2023.

Setting up of the new Joint Commission on Ice-Ocean Interactions (JCIOI) with IACS

Following a meeting in Montreal in July 2019, IAPSO and IACS decided to set up this joint commission and work has been done to establish it during 2020. The Commission was formally established in January 2021.

JCIOI aims to address knowledge gaps, by globally coordinating and engaging in research and development related to understanding, observing and modeling ice-ocean interactions. This will include research under ice shelves, at the ice-ocean front in tidewater glaciers, and at the sea surface in the marginal ice zone. JCIOI will develop ties with international working groups to exchange knowledge and engage with the wider ice-ocean research community. Key activities will include development of a framework to reconcile numerical model estimates of ocean-driven ice mass loss with observations, to engage with groups developing broad-scale observational networks in Antarctica and Greenland, and to facilitate improvement of the representation of ice-ocean interactions in numerical models.

The Joint Commission is co-chaired by Dr Felicity McCormack (IAPSO) and Dr Isabel Nias (IACS).

ACTIVITIES

2021 Assembly/IACS, IAMAS, IAPSO, Online Seminar Series

IAPSO has been actively organizing the IACS-IAMAS-IAPSO Joint Assembly in Busan, South Korea, 18-23, July 2021, but in early June 2020, in a Zoom meeting held between the Local Organizing Committee and the Presidents and Secretary Generals of IAPSO, IAMAS and IACS, we decided to cancel this in-person joint assembly, due to the COVID-induced uncertainty surrounding international travel. The Assembly will be replaced by a joint Online Seminar Series to be held from 19-23 July 2021. SGs of the

three Associations worked during 2020 to organize this event, whose scientific program will be announced in the first quarter of 2021.

IAPSO Best Practice Study Groups

IAPSO has begun to fund IAPSO Best Practice Study Groups to address an issue whose resolution will assist in the conduct of oceanographic research. In January 2020 we chose the first two such IAPSO Best Practise Study Groups (out of nine quality applications). The groups activities had to pace with the pandemic, but some progress are described below.

- ***IAPSO Best Practice Study Group to identify approaches to be recommended for seawater pH measurement.*** A small number of members met at San Diego Ocean Sciences meeting in February and discussed the proposal and how to proceed.

IAPSO Medals

Despite the cancellation of the Joint Assembly in 2021, IAPSO has decided to continue the activity of awarding its medals. Calls for the Albert I medal and ECS medals for 2021 were issued in 2020. The results of the respective evaluation processes, currently underway, will be announced in the first quarter of 2021.

SCOR Administration

IAPSO has maintained its formal relations with SCOR during the year. The EC members were involved in the evaluation of the 2020 Working Group proposals and the President, Trevor McDougall attended the 2020 SCOR Annual Meeting. Arising out of the October 2020 Annual SCOR meeting, three new SCOR Working Groups are to be funded: ATOMIX, REMO and OASIS, each of which has substantial physical oceanographic emphases, and in the case of REMO, substantial chemical oceanography emphasis.

IUGG/IAPSO support to scientific meetings

IAPSO endorsed three scientific meetings that were supported by IUGG in 2020:

The ***Workshop on Sea Level Data Archaeology*** was held from 10 to 12 March 2020 in Paris, France. The workshop was convened under the auspices of the Intergovernmental Oceanographic Commission of UNESCO and its Global Sea Level Observing System (GLOSS), and co-sponsored by the IHO Tides, Water Level and Currents Working Group (TWCWG) and the IUGG/IAPSO. The main objective was to bring together experts concerned with sea level data rescue activities to explore the potential for a more sustained programmatic approach to cooperation at the international level. Sessional topics included: Historical sea level data inventories and data at risk; Methodology for transfer of paper records to digital data; Auxiliary historical archives relative to sea level; Applications and knowledge products from recovered data; Cooperation perspectives. More than fifty participants attended the workshop at UNESCO headquarter in Paris between 10 - 12 March 2020. One scientist from Senegal benefited from IUGG funds to attend the workshop.

A full workshop report can be downloaded here (http://legacy.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26751).

The ***Symposium on Tsunamis in Latin America and the Caribbean: Recent Developments and Plans for the Future***, Quito, Ecuador. Originally scheduled for 3-5 August 2020, it is postponed to a date to be defined.

ACTIVITIES OF ASSOCIATION COMMISSIONS, WORKING GROUPS

IAPSO Early Career Scientist Working Group

The IAPSO Early Career Scientist (ECS) Working Group is a group that was established in 2018 with the aims of representing and building a network for all those that identify as early career scientists in physical or chemical sciences of the oceans. The aims of the group are to advocate diversity, equity and inclusion through promoting the use of gender pronouns at major conferences and active participation in programs that support these values; connect with other early career scientist networks; provide a point of contact between the ECS network and the IAPSO executive committee; organise ECS events at biannual IAPSO assemblies. The group is chaired by Alejandra Sanchez-Franks (United Kingdom), co-chaired by Malin Ödalen (Sweden), and includes 7 members from diverse international background (<https://www.iapsoecs.org/aboutus/>).

In 2020, the IAPSO ECS Working Group organized and submitted a review of the Second Order Draft of the Working Group I (WG1) contribution to the sixth IPCC Assessment Report, provided a review for the UN Decade of the Ocean Implementation Plan Zero draft, and participated in the planning of the upcoming IAPSO 2021 virtual assembly. The IAPSO ECS website (<https://www.iapsoecs.org>) continues to provide weekly updates on job opportunities, fieldwork, ECS-related events, as well as quarterly newsletters. The IAPSO ECS network has now over 160 Members signed up to the mailing list, and over 300 followers on social media.

Permanent Service for Mean Sea Level (PSMSL)

The Permanent Service for Mean Sea Level (PSMSL) is the internationally recognised global data bank for long-term sea level data and also provides a wider Service to the sea level community. The PSMSL was established in 1933 by Joseph Proudman who became its first Secretary. Since then, the PSMSL continues to be responsible for the collection, publication, analysis and interpretation of sea level data. It is hosted by the National Oceanography Centre (NOC) with funding provided by the UK Natural Environment Research Council. PSMSL reports to several bodies which operate under the auspices of the International Science Council (ISC).

In 2020 the PSMSL maintained its general activities of adding data to our databank (790 stations updated), responding to requests from the public, tide gauge operators and policy makers) and updating and improving our website.

We helped organise the GLOSS/IHO/IUGG/IAPSO Sea Level Data Archaeology Workshop, held in March 2020 (meeting report - <https://unesdoc.unesco.org/ark:/48223/pf0000373327>). Following a recommendation to explore a pilot project using the Zooniverse Citizen Science platform, we developed the UK Tides project (<https://www.zooniverse.org/projects/psmsl/uk-tides>).

PSMSL contributed to the Intergovernmental Oceanographic Commission Manual “Quality Control of in situ Sea Level Observations: a Review and Progress towards Automated Quality Control, Vol. 1.”, published in June 2020.

PSMSL data were used in the nature article “The causes of sea-level rise since 1900”, (Frederikse et al, 2020). Peter Hogarth (National Oceanography Centre) rescued historical data to increase the data available to help identify key processes driving sea level change.

IAPSO Standard Seawater Service

The IAPSO Standard Sea-Water Service is the only internationally recognized standard for the calibration of salinity measurement devices. Its widespread use over 100 years of IAPSO history has been of great importance to the quality and comparability of salinity data worldwide. Since 1989 IAPSO has established an agreement with the Ocean Scientific International Limited (OSIL) for the production and supply of ampoules of standard sea-water to the oceanographic community through this IAPSO service.

The demand for IAPSO standard sea water remains strong and OSIL have continued to invest heavily in the upkeep and replacement of the equipment necessary to operate and produce the standards. The Service is currently contributing to groups globally involved with the S.I. traceability relating to density. Significant steps have been made towards producing a density standard in terms of the stability of the sea water inside a unique coated bottle.

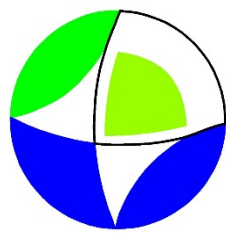
FUTURE ACTIVITIES

The following activities are scheduled for 2021 and beyond:

- IACS, IAMAS, IAPSO, Online Seminar Series, 19-23 July 2021.
- Symposium on Tsunamis in Latin America and the Caribbean: Recent Developments and Plans for the Future, Quito, Ecuador, rescheduled (date to be defined)

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 2020 were directed towards the Assemblies of IASPEI's four Regional Commissions planned for 2020 and preparations for the 3rd Joint IAGA-IASPEI Scientific Assembly planned for Hyderabad, India in 2021. However, almost all IASPEI activities planned for 2020 were canceled or postponed due to the outbreak of the COVID-19 pandemic and the related world-wide restrictions on traveling.

ADMINISTRATION

EC & Bureau meetings

There were no meetings of neither the Bureau nor the Executive Committee (EC) in 2020. There were however regular e-mail exchanges regarding questions on financial support or business to be attended to with the members of the IASPEI Bureau and EC throughout the year.

Other matters

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

Statutes. The IASPEI statutes and by-laws were not changed in 2020. IASPEI is registered as a Norwegian organization (Norwegian Org. Number 916 047 495).

Newsletters. IASPEI Newsletters have been regularly sent as PDF-file attachments to more than 3000 e-mail addresses. The Newsletters are also available for download from the IASPEI website. Three Newsletter issues as well as two circulars for the forthcoming 3rd Joint IAGA-IASPEI Scientific Assembly were distributed in 2020.

ACTIVITIES

Scientific Assemblies, Workshops/Symposia etc.

The 3rd General Assembly of the African Seismological Commission (AfSC) was originally planned to be held in Kasane (Botswana) for June/July 2020. The Assembly was first postponed to December 2020, and then had to be postponed again to September 2021.

The 13th General Assembly of the Asian Seismological Commission (ASC) was originally planned to be held in Sharm el-Sheikh (Egypt), in June 2020. The Assembly was postponed to 2021 and will now be part of the 3rd Joint IAGA-IASPEI Scientific Assembly in Hyderabad, India, in August 2021.

The 4th General Assembly of the Latin American and Caribbean Seismological Commission (LACSC) was originally planned to be held in Quito (Ecuador), in August 2020. The Assembly had to be cancelled. A new date and location will be decided in early 2021.

The 37th General Assembly of the European Seismological Commission (ESC) was originally planned to be held in Corfu (Greece), in September 2020. The Assembly was postponed and will be held as a fully virtual conference in September 2021.

Several IASPEI related or supported Workshops and Summer Schools planned for 2020 were cancelled or postponed to a later date.

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

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 web-site of the GFZ Library (<http://bib.telegrafenberg.de/publizieren/vertrieb/nmsop/>).

In 2019, the IASPEI Commission on Education and Outreach (CoEO) signed a Letter of Intent (LoI) with the Commission and the National Science and Technology Center for Disaster Reduction (NCDR) in Chinese Taipei to formalize a collaborative and academic relationship in disaster risk reduction between CoEO-IASPEI and NCDR. As part of this cooperation a P-alert system had been installed in Bhutan after a training course “Earthquake Early Warning Systems and Rain-gauges for Bhutan” in New Delhi, India at the end of 2019 and is now operative since January 2020.

The IASPEI Working Group “Historical Seismology” under the IASPEI Commission on Seismological Observation and Interpretation (CoSOI) planned and published a Focus Section “Past and Present of Historical Earthquake Data and Research” in the Seismological Research Letters in August 2020. It consists of 21 articles on studies of earthquakes from medieval times to the 20th century in more than 10 countries distributed in South, Central, and North America, Far and Southeast Asia, Europe and the Mediterranean.

Scientific Programs, Projects, Publications

In 2020, IASPEI continued to financially support the work of the Inter-Association Working Group on Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV).

Awards/Anniversaries/Obituaries

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 award is planned for 2021.

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. Since none of the Regional Commissions had its planned Assembly in 2020, no new **IASPEI Early Career Scientist Award** was distributed.

Obituaries

Obituaries for prominent scientists of the IASPEI community were regularly published in the IASPEI Newsletters and on the IASPEI webpage.

FUTURE ACTIVITIES

2021 will become a quite busy year for IASPEI:

- In 2021, the IASPEI main activity will concentrate on the 3rd Joint IAGA-IASPEI Scientific Assembly planned for 21 – 27 August 2021 in Hyderabad, India (<http://www.iaga-iaspei-india2021.in/>). Due to the ongoing COVID-19 pandemic, the Assembly is now organized a virtual meeting.
- Three of the Regional Commissions of IASPEI (AfSC, ASC, ESC) are planning to hold in 2021 their Assemblies, originally planned for 2020:
 - ASC plans its 13th General Assembly as a virtual meeting together with the 3rd Joint IAGA-IASPEI Scientific Assembly in August 2021.
 - AfSC plans its 3rd General Assembly in Kasane (Botswana), in September.
 - ESC plans its 37th General Assembly as a virtual meeting in Greece, in September.

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

At the First General Assembly of IUGG (Rome, 1922), the *Section de Vulcanologie* became one of the constituent sections of the Union. This name was changed into *Association Internationale de Vulcanologie* at the Fourth General Assembly (Stockholm, 1930) and then extended as *International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)* at the Moscow General Assembly (1971).

The IAVCEI is the primary international focus for research in volcanology and for efforts to mitigate volcanic disasters. Researches conducted by IAVCEI scientists involve various disciplines, such as igneous geochemistry and petrology, geochronology, volcanogenic mineral deposits, remote sensing, modeling, and the physics of magma genesis and ascent from the upper mantle to the surface. Work is carried out in the following special Commissions:

- Chemistry of Volcanic Gases
- Collapse Calderas
- Explosive Volcanism
- Large Igneous Provinces
- Monogenetic Volcanism
- Remote Sensing
- Heat flow
- Submarine Volcanism
- Tephra Hazard Modelling
- Tephrochronology
- Volcanic Lakes
- Electromagnetic Studies of Earthquakes and Volcanoes (EMSEV)
- Volcanic Hazards and Risk
- Volcanogenic Sediments
- Volcano Geoheritage and Protected Volcanic Landscapes
- Volcano Geology
- Volcano Geodesy
- Volcano-Ice Interaction
- Cities and Volcanoes
- Statistics in Volcanology

- International Volcanic Health Hazard Network
- Volcano Seismology and Acoustics
- Tsunami
- World Organisation on Volcano Observatories

Elected members of the Executive Committee for the 2019-2023 term are:

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
Members	Lizzette Rodriguez	Puertorico
	Eisuke Fujita	Japan
	Jose' Viramonte	Argentina
	Fidel Costa Rodriguez	Singapore
	Julia Eychenne	France

ADMINISTRATION

IAVCEI Executive Committee activities

- Revision of IAVCEI Finances, funding support, and potential funding sources and strategies.
- Update of the IAVCEI Commissions and Working Groups, conducted by the two Vice-Presidents and approved by the EC, in which commissions activity is evaluated and recommendations are proposed for either merging or deactivation. IAVCEI is currently engaged in reducing its overall number of Commissions and in renewing/restructuring its WOVO (World Organization of Volcano Observatories).
- Revision and publication of rules for IAVCEI Prizes and awards.
- Signature of Memorandum of Understanding with different regional and international associations.
- Rebuilding of the IAVCEI website. Publication of a Facebook page and Twitter messages.
- Creation of sub-domains in the IAVCEI volcano domain for hosting the commission's webpages.
- Update of the Editorial Board of Bulletin of Volcanology.
- Creation of a sub-domain for BV in the IAVCEI volcano domain.

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

- Adoption of the Principle of Freedom of Participation in Learned Societies following the submission of Proposal to Modernize IUGG, focusing on adoption of self-governance of the associations.
- Agreement on the need to reintroduce compulsory individual membership fees along the lines of AGU membership fee structure, which allowed us to stop the dramatic decline in financial reserves experienced between 2013 and 2014.

ACTIVITIES

Members

Since the end of 2018 the IAVCEI memberships have remained stable at around 1,000. These include about 600 regular members, 100 Life members, and about 300 students

Webpage

Our web page was completely rebuilt. The site now contains more info about IAVCEI activities, structure and initiatives. New action was undertaken for updating the website and integrating it with social media.

Newsletters

Four issues of the newsletter "IAVCEI News" have been published in 2020 through the website

2020 Meetings, workshops and courses

Due to the current pandemics we had no meeting and workshops. We only supported the 13th International AIV summer school, August 28-September 4, 2020, Bolsena, Italy IUGG meeting, July 8-18 2019, Montreal, Canada)

FUTURE ACTIVITIES

Foreseen activities for 2021:

- Publication of 4 IAVCEI newsletters.
- Reduction of overall Commissions number through proposed merging or deactivation.
- Restructuring of the World Organization of Volcano Observatories (WOVO) and strengthening of the links between IAVCEI and worldwide volcano observatories.
- Funding of workshops and meetings if current pandemics will allow travels and in-person meetings.
- Promotion of gender equity within IAVCEI instances.

Roberto Sulpizio, IAVCEI Secretary General

ACTIVITIES OF THE UNION COMMISSIONS

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

Union Commission on Climate and Environmental Change (CCEC)



CCEC website: www.ccec-iugg.org

INTRODUCTION

The history and purpose of CCEC may be found on the CCEC website at: www.ccec-iugg.org

ADMINISTRATION

Officers and members of the Commission may be found in the IUGG Yearbook. The Chair is Jiangping Li (China), the Vice-Chair is Keith Alverson (USA/Japan), the Secretary-Treasurer is Tonie van Dam (USA/Luxembourg), and Immediate Past Chair is Tom Beer (Australia).

ACTIVITIES

CCEC website maintenance

The CCEC website was updated to reflect the new Executive Committee.

IUGG Union Commissions - Survey 2020

The CCEC polled its members and contributed to the IUGG questionnaire regarding the effects of Covid-19.

Meeting Organization

- At EGU 2020 Assembly (3-8 May 2020), organized Session AS1.16: The global monsoons in current, future and palaeoclimates and their role in extreme weather and climate events, video-conferencing (Convener, Jianping Li, and Co-conveners, Roberta D'Agostino, Kyung-Ja Ha, Pascal Terray, and Andrew Turner).

- Preparation for the IAMAS-IACS-IAPSO Joint Assembly 2021 (BACO-21) from 18th-23rd June 2021 at Busan in Korea. CCEC prepared two sessions (Plastic in the Ocean, Atmosphere and Cryosphere; and global monsoon and weather and climate extremes) for the BACO21, but it had to be cancelled due to the Covid-19 pandemic situation.
- Preparation for the 15th EAC (East Asian Climate) Workshop in State University of New York at Albany (ASRC), USA, 5-7 October, 2020, with theme on “East Asia and North America” under Global Climate Changes: Understanding and Projection”. But it had to be postponed due to the Covid-19 pandemic situation.

Keynote Speeches and Invited Talks

- Keynote Presentation: Keith Alverson, Plastic in our Environment: A Global Challenge with Local Solutions, Global Environmental Action International Conference December 2020, Tokyo Japan Session: Integration of the Environment and Economy: Towards a Virtuous Cycle of Environment and Growth
- Invited Presentation: Jianping Li, Tropical cyclones act to intensify El Niño, 2nd Fudan International Workshop on Atmospheric Science (2nd FIWAS), 110th Anniversary of Fudan University, May 18 2020, video-conferencing.
- Invited Presentation: Jianping Li, Sea surface temperature interhemispheric dipole (SSTID) and its influence on climate, 2nd Shanghai Jiao Tong University Thinking Source Ocean Conference, June 21 2020, video-conferencing.
- Invited Presentation: Jianping Li, Coupled Oceanic-Atmospheric Bridge and Pathways of Influence of the Northern Hemisphere Mid–High Latitudes on East Asian Climate, 3rd International Workshop on the Human-Earth System Dynamics and Modelling, November 03 2020, video-conferencing.

FUTURE ACTIVITIES

We plan to organize:

- The 3rd CCEC scientific workshop in 2021 or 2022 pending the Covid-19 situation.
- Session AS1.10 at EGU 2021 Assembly (April 19-30, 2021): The global monsoons in current, future and paleoclimates and their role in extreme weather and climate events.
- The 15th EAC (East Asian Climate) Workshop at the State University of New York, Albany (ASRC), USA, with the theme “East Asia and North America” under Global Climate Changes: Understanding and Projection”, pending the Covid-19 situation.

The CCEC will liaise with the organisers of the International Year for Basic Sciences for Sustainable Development to establish a suitable collaboration.

Tom Beer, Immediate Past Chair, has been invited to deliver a plenary presentation at the 25th International Clean Air and Environment Conference (17-21 May 2021); In addition, he will make a presentation on Bushfires, Air Quality and Climate Change.



Jianping Li, CCEC Chair

Union Commission on Mathematical Geophysics (CMG)

INTRODUCTION

During 2020 the commission has been awarded an IUGG grant for organizing an advanced geophysical workshop, submitted a book proposal to the Cambridge University Press – IUGG Special Publication Series, and kept organizing the 33rd biennial CMG meeting.

ADMINISTRATION

Membership. The CMG membership remained the same in 2020. **Chair:** Alik Ismail-Zadeh (Germany); **Vice-Chairs:** Ute Herzfeld (USA) and Malcolm Sambridge (Australia); **Secretary:** Ilya Zaliapin (USA); **Past Chair:** Yehuda Ben-Zion (USA). **Executive Committee:** Roberto Carniel (Italy, IAVCEI), Enamundram Chandrasekhar (India), William Dewar (USA, IAGA), 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), Daniel Rothman (USA).

ACTIVITIES

The 33rd IUGG Conference on Mathematical Geophysics (CMG2020) postponed

CMG2020 planned to be held on 22-26 June 2020 in the Seoul National University, Seoul, Rep. of Korea was postponed due to the COVID-19 pandemic. The IUGG-CMG Executive Committee decided to hold the conference at the same place in 2022.



The IUGG-CMG Executive Committee together with the Local Organizing Committee of CMG2020 prepared quite attractive program of the conference. The conference aimed to discuss key theoretical and observational aspects of solid earth, ocean, atmosphere, cryosphere, climate and other contemporary topics in mathematical geophysics. The Program of the Conference covers six themes: Data Sciences, Machine Learning and Artificial Intelligence; Geophysical Fluid Dynamics; Geophysical Inversion: Theory, Algorithms, and Applications; From the Core to the Space: Different Spheres with Common Mathematics; Mathematics for Natural Hazards Science; and Mathematics for Climate Science. News on the conference in 2022 will be available on the official website of the CMG2020 soon: <http://www.cmg2020.org>

The Cambridge University Press Book Proposal

A Book Proposal has been submitted in July 2020 to the Cambridge University Press - IUGG Special Publication Series for an edited monograph "*Data Assimilation and Inverse Problems in Geosciences*". The book sets out basic principle of inverse problems and data assimilation and present applications of the data assimilation and inverse problems in all disciplines of IUGG. The principal goal of the proposed book is to highlight the importance of research in data assimilation for understanding dynamical processes of the Earth and its space environment and for predictability. The book will summarize relevant newest advances in the field of data assimilation and inverse problems related to different geophysical fields. As outcomes of data assimilation contribute to scientific understanding and prediction of natural hazard events, this interdisciplinary book will provide a broader knowledge to those who are dealing with hazard assessment and subsequent risk mitigation/reduction. It will also provide guidance on future research directions to experts and early career scientists including PhD candidates. The book is in review process, which is slowed down by the pandemics. Editors of the proposed book: Alik Ismail-Zadeh (Germany/Russia), Dylan Jones (Canada), Fabio Castelli (Italy), Sabrina Sanchez (Germany, *early career scientist*). Editorial Advisory Board consists of the Members of the Executive Committee of the IUGG CMG.

Advanced school "*Data Assimilation and Inverse Problems in Geophysical Sciences*"

The Commission was awarded an IUGG grant to organize an advanced workshop in 2021-2022 on the topic of the "*Data Assimilation and Inverse Problems in Geophysical Sciences*" in the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy or in the East African Institute for Fundamental Research (EAIFR) at the University of Rwanda in Kigali, Rwanda. IUGG has signed an agreement with ICTP to promote geophysical education, and hence the workshop will contribute to the cooperation. Also, most recently ICTP and UNESCO established EAIFR, and geophysical sciences are one of the main scientific topics of the new Institute. The workshop will attract international early career and female scientists, and PhD students, especially those from less-affluent countries. International experts in the field of geophysical inversion and data assimilation will be invited to give lectures. Because of the ongoing pandemic, it was decided to hold the school either online or in a hybrid format, where local students of EAIFR and ICTP as well as some lecturers can participate in the school onsite (in Trieste or Kigali, respectively), and others can join online.

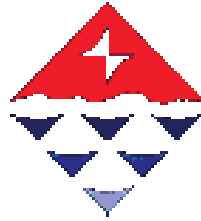
FUTURE ACTIVITIES

- The commission plans to continue working on the CUP book (pending on an approval by the Cambridge University Press) and on an advanced school, which is planned for October 2021.
- The commission will resume its work on organizing the 33rd CMG conference in Seoul, Rep. of Korea, which has been postponed to the summer of 2022.
- The commission considers to develop a series of CMG online lectures - webinars. The audience: experts and early careers with focus on scientists/students from less-affluent countries. The lecture series will contribute to the implementation of Sustainable Development Goal 4 "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all".
- The commission is working on developing its web site. The issue has been discussed with the IUGG web master. The search process is initiated for the site Editor.

Remark: Due to its international and multi-institutional structure, the commission has a solid experience of remote communication. This experience has proven valuable during the COVID-19 pandemics. The commission plans to continue remote communication within the foreseeable future.

Ilya Zaliapin, CMG Secretary

Union Commission on Geophysical Risk and Sustainability (GRC)



GRC website: TBD

INTRODUCTION

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

GRC Terms of Reference:

<https://www.dropbox.com/s/5im3x7n91kf112m/GeoRisk%20ToR.pdf?dl=0>

ADMINISTRATION

GRC Executive Committee:

- Chair: John LaBrecque (IAG, USA) jlabrecq@mac.com
- Vice-Chair: Vyacheslav Gusiakov (IAPSO, RUSSIA) gusiakov@gmail.com
- Vice-Chair: Chun-Chieh Wu (IAMAS, CHINA: ACADEMY OF SCIENCES IN TAIPEI) cwu@typhoon.as.ntu.edu.tw
- Secretary: Yekaterina Kontar (IACS, USA) ykontar@nsf.gov
- Treasurer: Linda Rowan (IAVCEI, USA) lbifrowan@gmail.com
- Past Chair: Joan Marti (IAVCEI, SPAIN) joan.marti@ictja.csic.es
- Association Representative: Mohsen Ghafory-Ashtiany (IASPEI, IRAN) mohsen.ashtiany@gmail.com
- Association Representative: Michael Krautblatter (IACS, GERMANY) m.krautblatter@tum.de
- Association Representative: Christa von Hillebrandt-Andrade (IAPSO, PUERTO RICO) christavon@gmail.com
- Association Representative: Kosuke Heki (IAG, JAPAN) heki@sci.hokudai.ac.jp
- Association Representative: George Balasis (IAGA, GREECE) gbalasis@noa.gr

Members in Active Advisory Capacity:

- Harsh Gupta (IASPEI, INDIA) harshg123@gmail.com
- Alik Ismail-Zadeh (IASPEI, GERMANY/ RUSSIA) Alik.Ismail-Zadeh@kit.edu
- Tom Beer (IAMAS, AUSTRALIA) tom.beer@safesystemsolutions.com.au

- Kuniyoshi Takeuchi (IAHS, JAPAN) takeuchi@yamanashi.ac.jp
- Gordon McBean (IAMAS – IAHS, CANADA) gmcbbean@uwo.ca
- Stephen McNutt (IAVCEI, USA) smcnutt@usf.edu
- Ramesh Singh (IASPEI, USA) rsingh@chapman.edu

Web Master: Farshad Jalili Pirani (Dept. of Civil and Environmental Engineering, Western University, Canada – IUGG early career member) fjalilip@uwo.ca

ACTIVITIES

The COVID-19 pandemic had a very significant impact on our plans with canceled symposia and uncertain timing of future meetings. The curtailment of international travel and associated meetings will likely persist throughout 2021. On the positive side, there has been a near universal acceptance of virtual meetings. During this time the GRC has 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.

GTEWS: The GRC supported the GNSS Tsunami Early Warning Systems (GTEWS) 2020 workshop with the GGOS, the Association of Pacific Rim Universities (APRU), and the IRIDeS of Tohoku University scheduled for July, 2020 in Sendai, Japan. The meeting, supported in part by a grant from the IUGG, sought to develop the implementation of the GTEWS 2017 workshop recommendations as published by the [APRU](#) and the [UN Office for Disaster Risk Reduction \(UNDRR\) GAR19 report](#).

To compensate for the GTEWS 2020 workshop delay, the GGOS/IAG and the GEO Task Force on Disaster Risk Reduction approved the GRC's proposal to initiate a **Meeting of the GTEWS Principals** within the GEO's Geodesy4Sendai community activity within 2021. The GEO Task Force for DRR has identified the establishment of the GTEWS Consortium as a community activity within [Geodesy4Sendai](#). The GTEWS Consortium is the first recommendation of the GTEWS 2017 workshop. The purpose of the GTEWS-Consortium is to advance the implementation of Resolution #4 of the 26th IUGG General Assembly calling for GNSS Augmentation to Tsunami Early Warning Systems. We will engage the GGOS GATEW working group and numerous other commercial and governmental organizations to initiate formation of the GTEWS Consortium. We have the support of the GGOS Coordinating Committee, the IUGG, and the IAG President for this action. GRC has received a \$10K grant from the IUGG and have been offered additional funds by Prof. John Rundle, U. California Davis to initiate the development of the GTEWS-Consortium.

Landslides: The IUGG President Kathy Whaler declared support for the [KLC2020](#) during launching ceremonies on November 5, 2020. Following upon Dr. Whaler's declaration of support, the GRC invited the ICL to participate in the GTEWS-Consortium development. GRC vice-chair Vyacheslav Gusiakov will present a key note address during the [World Landslide Forum-5 \(WLF-5\)](#). Dr. Gusiakov's presentation, [December 11, 2018 landslide and 90-m icy tsunami in the Bureya water reservoir](#), is scheduled for November 5, 2021 on [World Tsunami Awareness Day](#) and will be included in the published ICL proceedings of the WLF-5.

Artificial Intelligence for Disaster Risk Reduction: There is considerable recognition of the importance of machine learning and artificial intelligence for improving disaster early warning such as that supported by GRC's GTEWS initiative. The GRC was invited to participate in the [ITU/WMO/\(UNEP\) Focus Group on AI for Natural Disaster Management](#). As reported in the IUGG February, 2021



Photograph of the 25 million cubic meter landslide occurred on December 11, 2018 in the Bureya water reservoir of eastern Siberia and resulted in 90-m icy tsunami, as seen on June 19, 2019. Photograph was submitted to the World Landslide Forum-5 by GRC vice-chair Viacheslav Gusiakov. (Gusiakov V., Makhinov A. (2021) December 11, 2018 Landslide and 90-m Icy Tsunami in the Bureya Water Reservoir. In: Sassa K., Mikoš M., Sassa S., Bobrowsky P.T., Takara K., Dang K. (eds) Understanding and Reducing Landslide Disaster Risk. WLF 2020. ICL Contribution to Landslide Disaster Risk Reduction. Springer, Cham. https://doi.org/10.1007/978-3-030-60196-6_25)

newsletter, the GRC will make a brief presentation at the organizational meeting (virtual) on March 15 on the application of AI to GTEWS. We thank Dr. Brendan Crowell of the University of Washington for his offer to prepare a brief presentation on the value of artificial intelligence and machine learning to GNSS Tsunami Early Warning Systems.

FUTURE ACTIVITIES

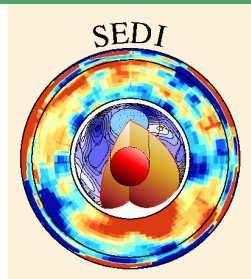
The GRC signature project is the implementation of the 2015 IUGG Resolution #4 for the Indo-Pacific seeking to develop a GTEWS capability to address both tsunamis and landslides. As described in activities, we will continue to pursue these activities in partnership with numerous international organizations including the GEO, GGOS, IAG, ICL, and the APRU.

The GRC is considering the opportunities to contribute to climate and weather-related risk. We were approached at 2019 General Assembly by Jiangping Li (CCEC chair) and Tom Beer (past chair).

The GRC web site is undergoing a revision. The previous site had fallen into disrepair in previous years and had not been updated to include new activities and leadership. The Executive committee has discussed a general outline for website content. Farshad Jalili Pirani (fjalilip@uwo.ca) of the Department of Civil and Environmental Engineering, Western University, Canada and an IUGG early career member) has volunteered to undertake this activity. The IUGG secretariat has offered a location on its main website.

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 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 2020:

The meeting was to be held Taipei, at the National Taiwan University at the Institute of Earth Sciences (Academia Sinica). The local organizing committee was comprised of Frederic Deschamp and Ban-Yuan Kuo (co-leads) along with Wen-Che Yu, Wen-Pin Hsieh and Kenny Vilella. This was supposed to be SEDI's first meeting held in Taipei.



Announcement

SEDI 2020 Online Streaming Platform

The SEDI 2020 online streaming platform held from October 1st to 31st and shared latest results in Deep Earth science. We would like to thank all participants for their contributions (see [list of all participants](#) here). We look forward to seeing you again at SEDI 2022, Taipei (date to be announced).

Virtual SEDI 2020 Online Streaming Platform

However, due to the spread of the corona virus and subsequent travel restrictions, the LOC and the officers of SEDI decided to cancel the meeting scheduled for 2020. The meeting will be held in 2022 in Taipei. A shift to 2021 seemed difficult due to funding, possible travel restrictions into the next year as well as a large number of conferences being shifted to 2021. In addition, an overlap with the CIDER meeting on deep Earth was to be avoided.

Instead a virtual, condensed meeting was held in October 2020, with a smaller number of research presentations and posters and without the long overview talks. We felt that the LOC did an excellent job setting up the virtual meeting and would like to thank them for their efforts!

There were several nice talks and a good number of posters, however, due to the time differences it was not easy to talk to other colleagues. Sadly, not all talks were uploaded in time. Also the number of registered participants was smaller than for a normal SEDI meeting (note: there was no registration fee).

Other online conferences have also (in our opinion) shown that the talks/posters are often very nice, but the fostering of collaborations, the feedback, especially for posters or streamed talks, are much reduced compared with a conference "in person". Additionally, the time zones are problematic and while, when on a conference in another place, one can concentrate on the conference, a virtual conference does not allow this, since the teaching and admin duties at home continue. We therefore prefer physical meetings for the future.

We are discussing, however, the future of SEDI meetings with a combination of online/physical attendance to allow attendance also for colleagues without sufficient travel funds or other restrictions. We feel, however, that as a small conference SEDI fosters strong collaborations/interactions and is a good way for young scientists to present their work, and a physical meeting is therefore the best form for SEDI meetings in the future.

FUTURE ACTIVITIES

In **2022, the SEDI meeting** will be held in Taipei, at the National Taiwan University at the Institute of Earth Sciences (Academia Sinica). The local organizing committee is comprised of Frederic Deschamp and Ban-Yuan Kuo (co-leads) along with Wen-Che Yu, Wen-Pin Hsieh and Kenny Vilella.

In **2021, the IASPEI and IAGA meeting (online) in Hyderabad**, contains two sessions (one in IAGA, one in IASPEI), that are chaired (IASPEI) or co-chaired (IAGA) by the SEDI chair.

The **web site for SEDI** has been renewed. The new site went online in early 2020. Some content is still to be filled such as the job postings and SEDI related papers, this will be dealt with in the coming months.

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

Union Commission on Data and Information (UCDI)



UCDI website: www.iugg-ucdi.org

INTRODUCTION

The Union Commission on Data and Information (hereafter UCDI) was established in 2008 by IUGG. The UCDI was envisaged as a coordination entity for the cross-cutting data and information related activities of the eight Associations of IUGG and to engage with similar bodies in other Unions, Organisations and Societies. Accordingly, UCDI is expected to enable a high level of cooperation within and between the scientific communities. This cooperation is needed to encourage the availability of modern data and information systems and services, which are globally distributed, provide universal open access, and ensure their sustainability. Hence, UCDI targets to provide a focused and single voice within IUGG, connecting all IUGG Associations and inter-Association bodies, connect IUGG and its scientists to other bodies/agencies/initiatives that have interest and responsibility on matters of geo-data, advocate and facilitate research and development in the growing field of informatics to improve data and information systems and practices, and promote open access to data and adoption of interoperable data sets.

ADMINISTRATION

Membership: Following the approval of the Bureau of IUGG met in Montreal in July 2019, the President of IUGG reconstituted the Executive Committee of Union Commission on Data and Information (UCDI) as follows.

Chair: Satheesh Sheno (India, IAPSO)
Vice-Chair: Anatoly Soloviev (Russia, IAGA)
Members: Sonia Maria Alves Costa (Brazil, IAG)
Michelle Guy (USA, IASPEI)
Silvia Massaro (Italy, IAVCEI)
Yasuhiro Murayama (Japan, IAMAS)
Bruce H. Raup (USA, IACS)
Satoshi Taguchi (Japan, IAGA)
Alena Rybkina (Russia, CODATA Representative), Co-opted member

Business Meetings: No formal business meeting could be held during 2020, due to the Corona virus pandemic.

ACTIVITIES

(i) UCDI Chair, Dr. Satheesh Shenoi delivered talks on the “Impact of COVID on oceanographic observations and timeseries data” at Maritime History Society, India and another talk on “Challenges and Opportunities in Deep Ocean Research” at India International Science Festival-2020.

(ii) UCDI Chair, Dr. Satheesh Shenoi participated in the 53rd meeting of the Executive Council of IOC/UNESCO held during 3-9 February 2021 (online) as the Vice-chair of IOC representing the Group IV countries and as the liaison officer of IUGG to IOC/UNESCO and as part of Indian delegation.

(iii) UCDI Vice-chair A. Soloviev delivered the following reports at three important scientific conferences.

- “Solar quiet (Sq) daily geomagnetic variation during minimum of solar cycle 23/24” at EGU General Assembly 2020 (Online) during 4-8 May 2020;
- “Geomagnetic Monitoring Progress in Russia and Near-Abroad Countries” at ESA SWE Service Network Workshop (online) during 12–14 October 2020;
- “Geomagnetic support of high-tech activities of the oil and gas industry in the Arctic” (plenary) at All-Russian conference “Global problems of Arctic and Antarctic” (Arkhangelsk, Russia, 2-5 November 2020).



Vice-chair of UCDI, A. Soloviev delivering a report at the plenary session of “All-Russian conference on Global problems of Arctic and Antarctic” at Arkhangelsk, Russia on 3 November 2020

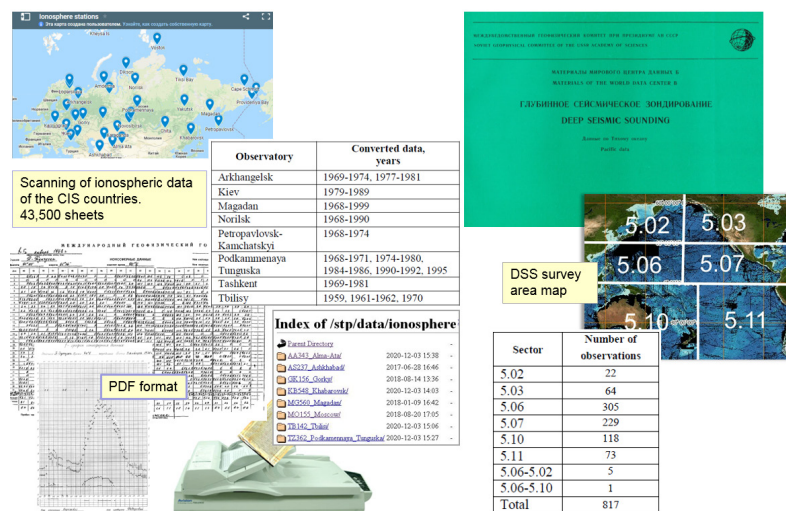
He is also co-organizing two sessions titled “Analogue Data for Future: Preservation and Present-Day Utilization of Instrumental Historical Data in the Geosciences” and “FAIR data and TRUST repositories in the Geosciences: licensing, data publication, citation” at the upcoming 2021 IAGA-IASPEI Joint Scientific Assembly.

Dr. A. Soloviev led the efforts of Geophysical Center of the Russian Academy of Sciences in digitizing the IZMIRAN catalogues containing historical data on magnetic satellite missions Kosmos-49 (1964) and Kosmos-321 (1970). The geomagnetic data provided the evidence for the propagation of magnetic anomalies, associated with the structure and tectonics of the Earth’s crust to the heights of low-orbiting satellites. The results are presented in the ESSD data paper titled “Early Soviet satellite magnetic field measurements in the years 1964 and 1970” by Krasnoperov R., Peregoudov D., Lukianova R., Soloviev A., Dzeboev B. (<https://doi.org/10.5194/essd-12-555-2020>).

Dr. Soloviev actively participated in the efforts of the World Data Center for Solar-Terrestrial Physics, Moscow, Russia that collected and digitized the results of the K index determination at 41 geomagnetic observatories of the former USSR for the period during July 1957 to early 1990s. This unique historical

data collection is valuable for the study of geomagnetic events in the past and for the validation of the forecasts. This data is available from the PANGAEA data archive (<https://doi.org/10.1594/PANGAEA.922233>).

Dr. Soloviev contributed to the efforts of World Data Centers for Solid Earth Physics and Solar-Terrestrial Physics, Moscow, Russia in the “Preservation of Old Data” designed to digitize the analogue data from observatories into electronic documents. Data from 8 ionospheric stations (43,500 documents) were transferred to digital form in 2020. This is available from http://www.wdcb.ru/stp/data/ionosphere_3/.



Digitization of the archived Solid Earth Physics and Solar-Terrestrial Physics data at the World Data Centre, Moscow, Russia in 2020

(iv) The UCDI members, Prof. Satoshi Taguchi and Dr. Yasuhiro Murayama participated in the "International Symposium on Data Science 2020 (Online)" during 23 - 25 September 2020. (https://ds.rois.ac.jp/article/dsws_2020/).



Dr. Yasuhiro Murayama, member UCDI participating as a panelist at "International Symposium on Data Science 2020" (Online)

(v) Dr. Yasuhiro Murayama, Member UCDI gave a talk in the Union session on “Future of Earth and Planetary Science (10): Big Data and Open Science” of JpGU (Japan Geoscience Union) and AGU (American Geophysical Union) Joint Meeting 2020-Virtual (http://www.jpгу.org/meeting_e2020v/).

Dr. Yasuhiro Murayama, Member UCDI contributed to ASEAN’s “APEC Policy Sharing Webinar on Open Science & The 2020 ASPIRE Award Ceremony” (online) (<https://www.akademisains.gov.my/aspire->

[aosw/](#)), and also served as a panellist in the discussion on Open Science Policy and gave a presentation on “Open Science Policy and its Promotion in Japan, and International Developments”. The event was also sponsored by ISC Regional Office of Asia Pacific.

Dr. Yasuhiro Murayama contributed to the official document “IAP (Inter Academy Partnership) input for the UNESCO Open Science Recommendation” (published in July 2020) (<https://www.interacademies.org/publication/iap-input-unesco-open-science-recommendation>)

FUTURE ACTIVITIES

- (i) The plans to organize sessions on data and management at the conferences “Cities on Volcanos 11 (COV11)” should have been held during 23-27 May 2020 at Crete, Greece and the International Indian Ocean Science Conference-2020 (IIOSC-2020) should have been held during 16-20 March 2020 in Goa, India did not materialise due to their postponement owing to Covid19 pandemic. The sessions will be organised when the conferences are held through personal attendance or through online.
- (ii) Interactions with associations and other organisations could happen with some of the Associations and IOC/UNESCO.
- (iii) Planning to hold an online seminar by inviting speakers in the 2 or 3rd quarter of 2021.

Satheesh Shenoi, UCDI Chair

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

1st International Spatial Intelligence Application Innovation and Entrepreneurship Competition and High-level Forum, 26-27 December 2020, Nanjing, China.

In order to strengthen the exchange of the latest achievements in space intelligent applications, build a high-tech achievement industrial transformation platform, deepen international cooperation, promote scientific and technological innovation and cooperation with countries along the "Belt and Road", gather space intelligent industries, and create new momentum for economic development and transformation and upgrading, the 1st International Spatial Intelligence Application Innovation and Entrepreneurship Competition and High-level Forum was held on 26-27 December 2020, Nanjing, China.

Organizers and Sponsors:

- IUGG Union Commission on Planetary Sciences (UCPS)
- International Association of Planetary Sciences (IAPS)
- Nanjing University of Information Science and Technology
- Jiangsu Federation of Returned Overseas Chinese, China
- Nanjing Federation of Returned Overseas Chinese, China



Photo of 1st International Spatial Intelligence Application Innovation and Entrepreneurship Competition and High-level Forum, 26-27 December 2020, Nanjing, China

3rd International Symposium on the Peaceful Use of Space Technology Health (IPSACE 2020) with one keynote, 17-19 November 2020, Beijing, China.

The 3rd symposium on the Peaceful Use of Space Technology – Health (IPSPACE 2020) was held on November 18 – 19, 2020 at three parallel main venues in the US, Europe, and China and 20 sub-venues around the world with an online and offline format, including an online exhibition, due to the impact of the COVID-19 pandemic. IPSPACE 2020 focuses on the application of space especially on pandemic monitoring, preparedness, prevention, and control. The event brings together world experts to explore civil and commercial use of space technology on human health, education, navigation, agriculture, environment protection, and finance. It aims to promote the peaceful use of space technology for the betterment of human being on earth. Prof. Shuanggen Jin was invited to give a keynote on BeiDou Navigation and Smart Health Applications. For more detailed information and to register, please visit the conference website at: <http://2020peacespace.csaspace.org.cn/8582?lang=en>



Photo of Prof. Dr. Shuanggen Jin's keynote at 3rd International Symposium on the Peaceful Use of Space Technology Health (IPSACE 2020), 17-19 November 2020, Beijing, China

FUTURE ACTIVITIES

Session: Science and Exploration of Mars and Venus at AOGS 18th Annual Meeting, 1-6 August 2021, Singapore

This session covers the study of the ionosphere, atmosphere, surface and interior of Mars and Venus. We invite abstracts on results from ground-based observations as well as past, recent and ongoing missions to Mars and Venus. We propose to have presentations on measurements and theoretical models dealing with the ionospheric environment and its interaction with the solar wind; the atmospheric composition, dynamics and climate; the surface morphology, geology, geochemistry and mineralogy; the deep interior and subsurface structure of both Mars and Venus. The session will also include presentations on various aspects (like their scientific goals, long-term plans, technology etc.) of future missions and missions about to be launched to Mars and Venus. We also invite abstracts on comparative planetology of terrestrial planets. Both solicited talks and contributed presentations will be included in the program.

Conveners:

Dr. Varun Sheel (Physical Research Laboratory, India)

Dr. Takeshi Imamura (The University of Tokyo, Japan)

Prof. Shuanggen Jin (Shanghai Astronomical Observatory, CAS, China)

- 2nd International Spatial Intelligence Application Innovation and Entrepreneurship Competition and High-level Forum, 2021, China
- 4th International Symposium on the Peaceful Use of Space Technology Health (IPSACE 2021), China

Shuanggen Jin, UCPS Chair
Nader Haghighipour, UCPS Vice-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 International Union of Geodesy and Geophysics ([IUGG](http://www.iugg.org)). The three International IUGG Associations of Geomagnetism ([IAGA](http://www.iaga.org)), Volcanology and Chemistry of the Earth's Interior ([IAVCEI](http://www.iavcei.org)), and Seismology and Physics of the Earth's Interior ([IASPEI](http://www.iaspei.org)) powerfully support EMSEV and promote its activities.

During the past 20 years of activity, EMSEV has continuously investigated tectonic and geological setting of active faults and active volcanoes and has constantly worked for a better knowledge of the physical and dynamical processes leading to fault rupture and volcanic eruptions. Based on the expertise of a worldwide community of more than 350 researchers, engineers and students, EMSEV sustains innovative researches and findings in electromagnetism (EM), integration of new EM methodologies with other geophysical data to describe, monitor, analyse, and model fault systems and volcanoes.

EMSEV scientists have really expanded methodologies, increased ground observations, satellite observations and carried out laboratory measurements for understanding earthquake and volcanic processes.

EMSEV objectives are: (1) evaluation and endorsement of advanced studies in the electromagnetic field through international cooperation, conferences and workshops, and high levels international publications, (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 including sponsorship of sessions at international meetings that describe these results and (4) participation in educational and field programs relating to observed results and the reduction of 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 gathers the following 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 <http://www.emsev-iugg.org/emsev/profile.html>.

Country liaison members. Country liaison members are representative scientists from each country (about two per country) who promote electromagnetic studies related to earthquakes and volcanoes and contribute to EMSEV activities in their country and internationally. 36 scientists from 16 countries represent this EMSEV sub-body. Detailed country liaison list is available on <http://www.emsev-iugg.org/emsev/profile1.html>.

EMSEV Members. An EMSEV Member is anyone who has an interest in EMSEV researches and participates to its activities. Exchange of information is facilitated through EMSEV meetings, which are organized every two years, and/or IUGG General Assemblies (including IAGA, IASPEI, and IAVCEI meetings) and EMSEV mailing list.

EMSEV Collaborators. They are active scientists working in Natural Hazards in any related field of research whose expertise does not primarily belong in the EM field but are interested in and involved in the development of new geophysical knowledge. They are interested in participating in EMSEV activities, including cross-disciplinary analysis of observations and understanding of physical processes from different perspectives. Two collaborations, one in Seismology and one in Geochemistry, are already active. These groups will be developed in the next future.

Business meetings will continue to be regularly organized at the EMSEV meetings and International General Assemblies. Minutes of the meetings will be distributed through EMSEV mailing list as usual. Information, activities, and annual and business meetings reports are kept on the EMSEV website that is mainly managed by T. Nagao (webmaster@emsev-iugg.org). Messages and information on activities are also distributed by T. Nagao through the EMSEV mailing list. In FY2020, we sometimes made video conferences instead of on-site meeting. EMSEV organized the official virtual business meeting on December 11, 2020 to discuss the current state and future.

ACTIVITIES

CONFERENCE ACTIVITIES

In 2020, even under the COVID-19 period, EMSEV activities continued to be numerous and rewarding for the benefit of the scientific community. EMSEV was involved in several international meetings, organizing sessions devoted to EM phenomena. EMSEV paid close attention to research achieved and published in international journals in which the sponsorship of EMSEV and the support of IUGG and EMSEV are clearly mentioned.

MEETINGS AND WORKSHOPS

Important sessions were organized at the International Conferences sponsored or organized by EMSEV Bureau members which were attended by international participants:

EGU, 04-08 May 2020 (Online)

NH4.5: Short-term Earthquakes Forecast (StEF) and multi-parametric time-Dependent Assessment of Seismic Hazard (t-DASH), Co-sponsored by JpGU and EMSEV. Convener: Valerio Tramutoli, Co-conveners: Pier Francesco Biagi, Nicola Genzano, Dimitar Ouzounov, Xuhui Shen.

AOGS, 28 June-04 July 2020 (Online)

ST36: Geospace Observation of Natural Hazards

Conveners: Dimitar Ouzounov, Katsumi Hattori, Xuhui Shen, Yunyue Yu.

JpGU, 12-16 June (Online)

JpGU2020 was originally scheduled in May, however, taking into account the COVID-19 situation, the meeting was postponed for seven weeks.

M-IS09: Interdisciplinary studies on pre-earthquake processes, Conveners: K. Hattori, D. Ouzounov, J. Y. Liu, Q. Huang.

AGU Fall meeting, 01-17 Dec. 2020 (Online)

NH005: Integrated Studies of Pre-earthquake Processes, Geohazards, and Space Weather with Multisensor Observations, Conveners: D. Ouzounov, Patrick T Taylor, Livio Conti, Liaisons: J.Y. Liu, K. Hattori.

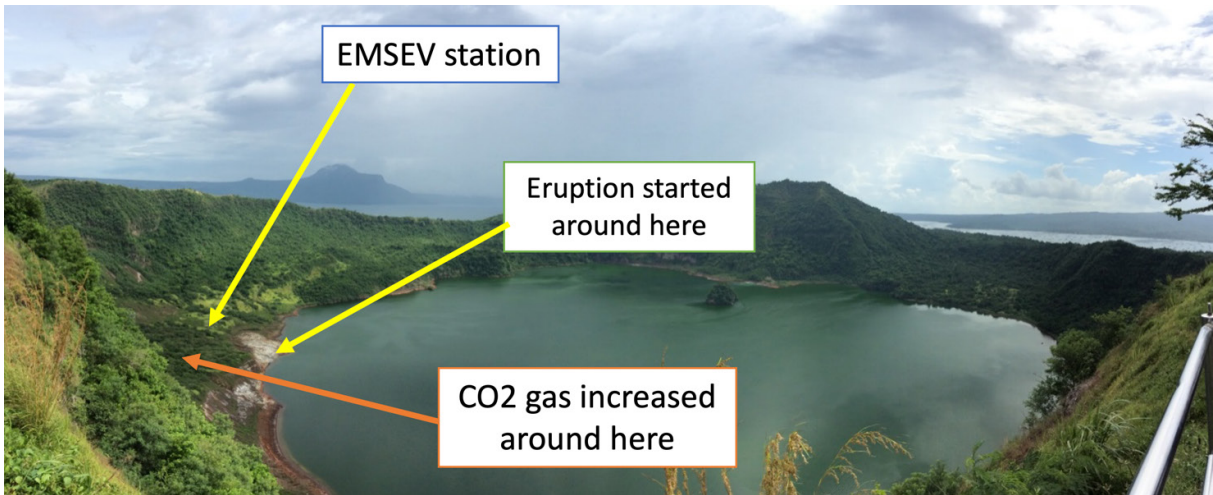
JOINT INTERNATIONAL ACTIVITIES

EMSEV activity on volcanoes (Taal, Philippines)

A cooperative program on Taal volcano between EMSEV and the Philippines Institute of Volcanology and Seismology (PHIVOLCS <http://www.phivolcs.dost.gov.ph/>) evolved from a Workshop in Manila, the capital of the Philippines, in 2003. Taal volcano is a very dangerous and hazardous volcano which may cause serious death and devastation in Luzon Island. Taal Volcano is classified as “DECADE VOLCANOES” by IAVCEI. There have been 33 recorded eruptions at Taal from 1572 to 1977. It means that during the last 40 years, no eruptive activity was recorded. At long last, Taal erupted in January 2020.

The joint research between EMSEV and PHIVOLCS was evaluated by the Japanese government. As a result, from 2009 to 2014, comprehensive research including electromagnetic studies of Taal volcano was adopted ([SATREPS](#); Science and Technology Research Partnership for Sustainable Development), and various observation networks were renewed. The project strengthened not only electromagnetic observations but also broadband seismometer networks and GNSS observation networks. Furthermore, in FY2016, a new 3-year international research program was adopted by JSPS (project leader; Toshiyasu Nagao), and studies on gravity measurement and volcanic gas were added. After the long quiescence, a large eruption (VEI 4) releasing ash clouds and lava occurred in January 2020. The initial outburst started in the Main crater, but a number of fissures located outside of it to the North emitted lava fountains.

After 2016, EMSEV group has made fumarolic gas measurement twice a year. Clear increase of CO₂ gas was observed in September 2019 raised to 5 times relative to it in March 2019.

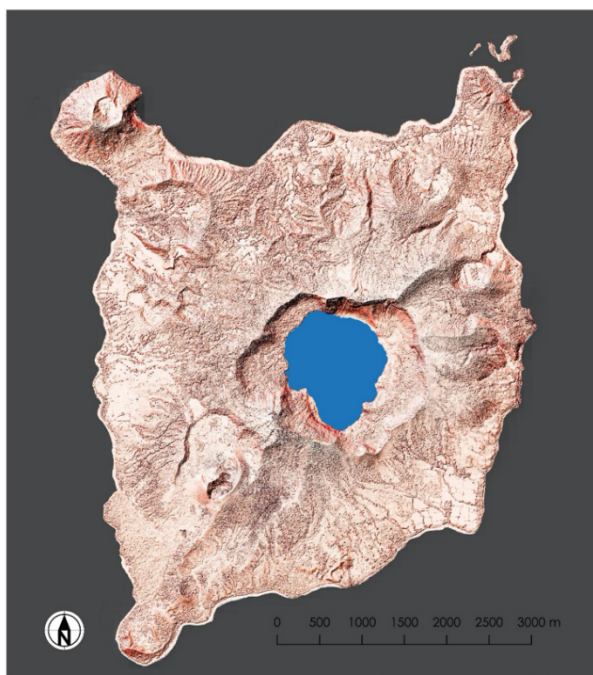


Taal main crater lake

In FY2017, EMSEV group made detailed topographic survey using an unmanned aerial vehicle (UAV), then obtained 45 cm grid DEM (Digital Elevation Model) using more than 6,000 pictures.



Taal Volcano Island (view from the southern side)

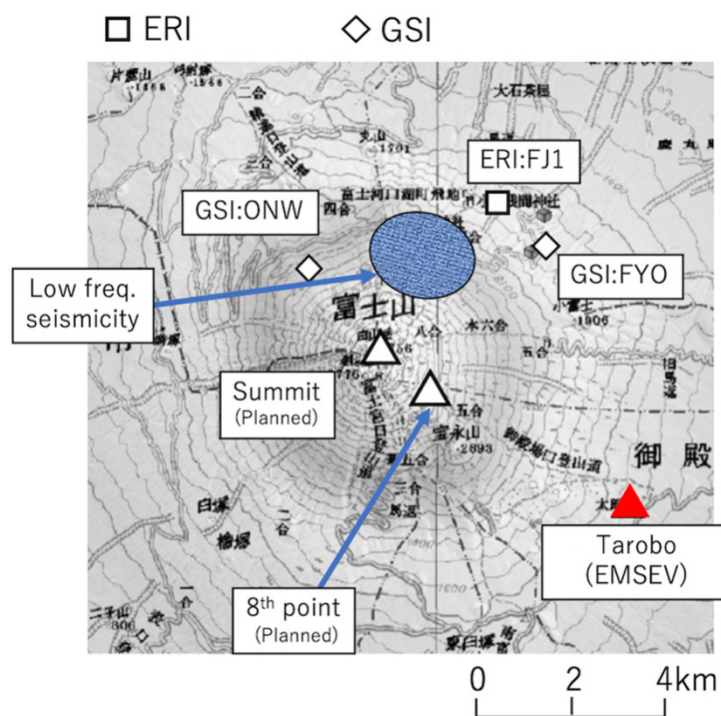


DEM before the eruption

EMSEV activity on volcanoes (Mt. Fuji, Japan)

In 2020, EMSEV launched a new project for volcano monitoring. Mt. Fuji is the highest peak in Japan and has caused numerous eruptions during recorded history. However, it has been quiet since the last eruption of 1707. However, in the 2000s, the number of volcanic low-frequency earthquakes increased rapidly, and after the 2011 Tohoku M9 earthquake, seismic activity increased rapidly. It was decided to start this electromagnetic monitoring of Mt. Fuji as EMSEV project in 2020. Toshiyasu Nagao, chair of EMSEV, serves as a board member of NPO Mount Fuji Research Station. Mt. Fuji is located within 100 km from Tokyo, and eruption prediction is extremely important for disaster prevention in the Tokyo metropolitan area.

In 2020, one total magnetic force station was installed at middle point of the mountain on the southeast side. We will have a plan to install more observation points (summit and 8th point) from next year.



Red triangle shows EMSEV station

EMSEV activity related to Earthquake Processes

In 2011, EMSEV started a new research effort focused on understanding fault failure and failure mechanisms of earthquakes. This was developed through a cooperative research program with Bishkek Research Station (Bishkek RS) in Kyrgyzstan, Russian Academy of Sciences where outstanding research on the relation between EM phenomena and electrical resistivity changes with earthquakes has been being carried out during the last 30 years.

During the IUGG GA 2019 in Montreal, EMSEV and the Bishkek Research Station decided to continue further cooperation not only on electromagnetic study but also seismicity study by using the Kyrgyz seismic network catalogue. At this moment, EMSEV keeps two spontaneous potential measurement stations in Kyrgyzstan.

Chinese Seismo-Electric Satellite mission and EMSEV

Following the promising results obtained during the DEMETER mission between 2006 and 2010 (<https://demeter.cnes.fr/en/DEMETER/index.htm>, <http://demeter.cnrs-orleans.fr/>) on the possible statistically significant occurrence of the ionospheric disturbances a few hours prior to large earthquakes (Magnitude above 5), the Chinese Earthquake Administration has implemented a new satellite monitoring program in which a flotilla of dedicated satellites should be regularly launched. The first EM satellite has been launched from China in February 2018. Professor Xuhui Shen, Head Scientist and Coordinator of China Earthquake-related Satellite Missions is an EMSEV Country liaison member.

A Memorandum of Agreement between Institute of Crustal Dynamics (CEA) and EMSEV was signed during the *International Conference for the Decade Memory of the Wenchuan Earthquake* held in Chengdu in May 2018 (<http://www.4thicce.com/>).

Continuation of Atmospheric field measurement in Kakioka, Japan

Japan Meteorological Agency suddenly informed our EM community that “Kakioka geomagnetic observatory will stop atmospheric electric field observation at the end of February 2021”. Kakioka’s atmospheric electric field observation has a long history. They started the observation in 1929 and continued even during World War II. Furthermore, at the time of the Tohoku Mega-quake (M9.0, March 2011), After the explosion of the Fukushima nuclear power plant, the observed atmospheric electric field was almost zero. We believe the continuation of atmospheric electric field measurement at Kakioka is very important to understand the Lithosphere-Atmosphere-Ionosphere coupling study which is very important for EMSEV activity. Therefore, EMSEV Bureau decided to make a parallel observation between Kakioka’s device and our field-mill device. EMSEV partly covered financially these parallel experiments.

FUTURE ACTIVITIES

In 2020 EMSEV biennial meeting was postponed for two years due to COVID-19 (<https://irsl.ss.ncu.edu.tw/emsev2020>). Furthermore, EMSEV plans to deeply work in two directions. The first one is to keep strong participation in international meetings such as EGU, AOGS, JpGU, CSES, AGU. In addition, a number of EMSEV members will organize regional meetings and educational workshops as in the Philippines or Kyrgyzstan. The second direction is to strengthen EMSEV activities through international cooperation. This will be achieved by the pursuit of cooperation with Philippines (JPSP-KAKENHI program), Bishkek-Research station, Russian Academy of Sciences (EMSEV) and the development of EMSEV’s involvement in the Chinese satellite mission (CSES mission).

Toshiyasu Nagao, EMSEV Chair
Valerio Tramutoli, EMSEV Vice-Chair
Jann-Yeng Liu, EMSEV Secretary
Dimitar Ouzounov, CSES liaison
Jacques Zlotnicki, Past Chair
Malcolm Johnston, Past Vice-Chair

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



ILP website: <https://www.scl-ilp.org/>

INTRODUCTION

The International Lithosphere Program (ILP) is a joint project of IUGG and IUGS and receives additional funding from member states (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. They meet regularly to monitor the progress and to select new projects in close consultation with the representatives of National Committees. The Bureau is chaired by the President with support from the Secretary General. ILP is supported by a science advisory board and its honorary members. The ILP Secretariat is located in the German Research Centre for Geosciences in Potsdam (GFZ-Potsdam, Germany). The current ILP Bureau membership is as follows:

President:	H. Thybo	Turkey/Norway
Secretary General	M. Scheck-Wenderoth	Germany
Representative of IUGG	H. Gupta	India
Representative of IUGS	K. Asch	Germany
Chair Committee National Representatives:	A. Tibaldi	Italy

The Advisory Board to ILP includes the following members: Ö. Adiyaman Lopes (UNESCO), S. Dong (China), C. Ebinger (USA), D. Mueller (Australia), and H. Sato (Japan). The Bureau is further supported by the past president S. Cloetingh (The Netherlands), Honorary President A. Green (Switzerland) and ILP Fellow J.F.W. Negendank (Germany).

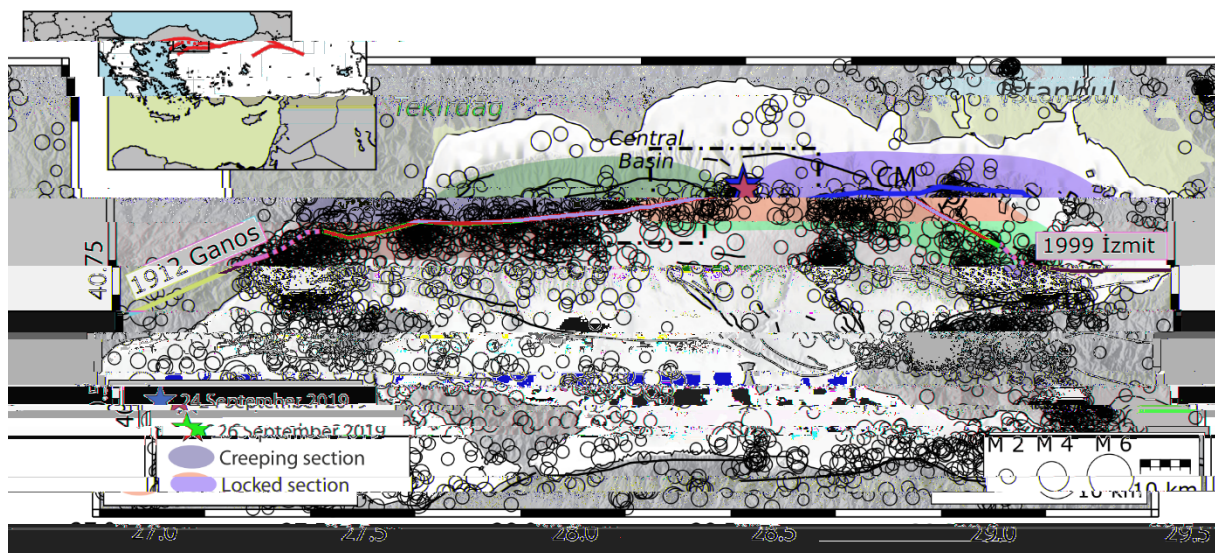
ACTIVITIES

ILP had its 40 years anniversary in 2020. A series of events were planned during the year in this connection, with very strong participation and anniversary symposia at IGC in Delhi and EGU in Vienna. However, only the EGU event could be carried out as a well attended virtual symposium.

The ILP awards were presented during a virtual business meeting:

- The Evgueni Burov Medal was awarded to Prof. Clinton P. Conrad, CEED Oslo, for his outstanding contributions to the studies of mantle dynamics and links to surface processes, his significant scientific leadership, and unselfish service to the scientific community.
- The Flinn-Hart award was awarded to Dr. Attila Balazs, ETH-Zürich, for his important achievements in the field of modeling and understanding of extensional lithospheric tectonics and sedimentary basin processes by use of truly multi-disciplinary research.

The ILP Task Forces and Coordinating Committees have been highly visible at large international meetings, including EGU and AGU. Strong presence and participation, including a main 40 years anniversary symposium was planned for the IGC in Delhi, which unfortunately was postponed. The TF and CCs contributed to specific conferences within their thematic fields and had planned dedicated smaller international workshops. A major international meeting, DEEP2020, was planned to be held in October 2020 in Beijing with participation of several TF/CCs and a special symposium organised by TFI on Lithosphere Structure and Mineral Resources, but this meeting was postponed until 2021. The publication activity was significant for most teams and some TF and CC produced Special Issues in peer-reviewed journals summarizing topical results. ILP is a Founding Member of the Deep-Time Digital Earth programme.



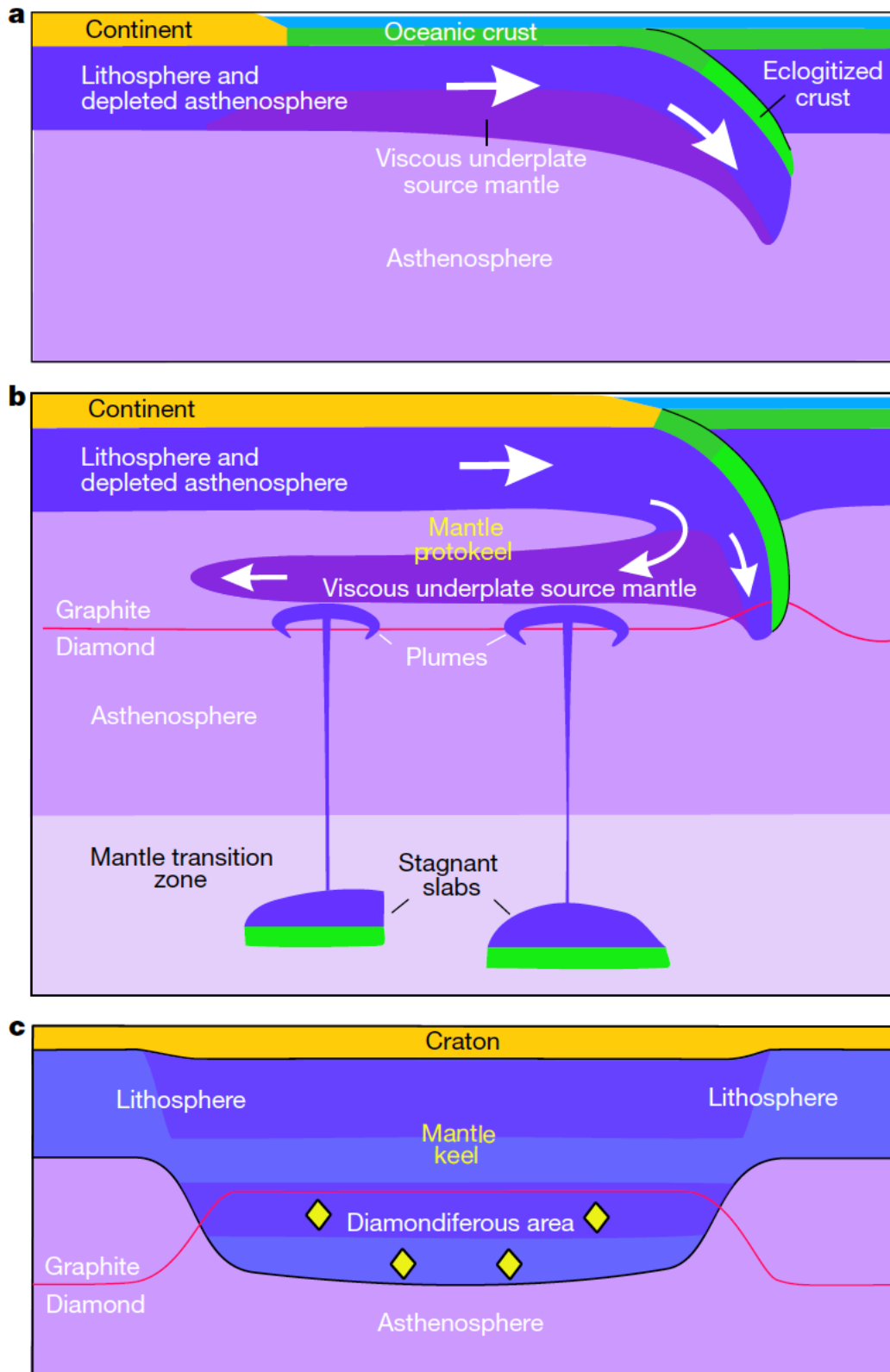
TT III: Locations of the recent earthquakes in the Marmara Sea that have been interpreted in terms of new mechanisms active along the North Anatolian Fault Zone, where a major earthquake is anticipated that will threaten the city of Istanbul. This Task Force has made significant progress for the understanding of locked and creeping sections of the branches of the North Anatolian Fault Zone. The 1912 Ganos and 1999 İzmit ruptures are highlighted by the light-blue line, and the unruptured Main Marmara fault (MMF) by the red line. The creeping section of the MMF is shaded in purple. The locked part is shaded in red. From annual report from Task Force III.

A few highlights from 2020 for the projects that now have ended: TFIII has developed a new model for the origin of two earthquakes in the Marmara Sea which may be of importance for understanding the development of the anticipated large earthquake near the city of Istanbul. TFIV has initiated new collaboration with the Advanced Light Source at the Berkeley synchrotron facilities. TFVIII has developed the new research programme on bio-geodynamics of the lithosphere and initiated collaboration with the European active at the GALaCTiC infrastructure. TFI, TFVI and TFIIX are in the process of publishing 4 large scientific volumes. CC2 has initiated collaboration with NSF on support for networking activities around natural hazards in the Himalayan region.

Clearly the special situation created by the present Covid-19 pandemia has affected the activities strongly, but the TF/CCs have managed to stay active by inventive activities. An extract and the full annual reports from the TF/CCs annual reports are available on request.

A virtual bureau meeting on 24 April 2020 approved ten new projects for the period of 2021-2025, and the current Task Forces and Coordinating Committees now include:

- TF I - Lithosphere structure and mineral resources (Chair: I. Artemieva, Denmark)
- TF II - Deformation and magmatic processes from the lithosphere to the surface: integrated multidisciplinary approaches (Chair: A. Tibaldi Italy)
- TF III - Global Lithospheric Stress - The World Stress Map in 3D (Chair M Rajabi, Australia).
- TF IV - Continental Lithosphere: a Broadscale Investigation (CoLiBrI) (Chair: G. Hetényi, Switzerland)
- TF V - Assessing the relationships between lithospheric processes and seafloor topography at oceanic hotspots and divergent margins (LithoMar) (Chair: A. Savini, Italy)
- TF VI - Sedimentary Basins (Chairs: L. Matenco, Netherlands and F. H. Nader, France)
- TF VII - Bio-geodynamics of the lithosphere (Chairs T. Gerya, Switzerland and R. Stern USA)
- CC-1 - TOPO-EUROPE (Chairs: T. Ehlers, Germany; S. Cloetingh, Netherlands)
- CC-2 - Lithospheric Seismicity and Tectonics in the Himalaya (Chair: M. Karplus, USA)
- CC-3 - Anatolian Tectonics (ANATEC) (Chair: O. Göğüş, Turkey)
- CC-4 - Global Geo Transects (GGT) (Chairs: D. Shuwen, China; L. Brown, USA)



TF VIII: A dynamic model of cratonic keel formation (Perchuk et al., 2020, Nature). a, Beginning of plate tectonics. Early stage of subduction of the oceanic plate with highly depleted mantle (both lithospheric and asthenospheric). b, Protokeel formation caused by viscous flow under the continent of depleted mantle originally related to the oceanic plate. The lower part of the protokeel is formed by diapirs originating from hydrated stagnant slabs in the mantle transition zone. c, Culmination of the compositionally stratified mantle keel formation by conductive cooling of the protokeel structure during secular cooling of the Earth.

FUTURE ACTIVITIES

- Development of new science plan in collaboration with Task Forces/Coordinating Committees and scientific advisors
- Provide active support to new Task Forces and Coordinating Committees
- Several sessions with TF and CC contributions at EGU and AGU
- Several workshops to be held by the TFs and CCs, depending on pandemic situation
- Virtual ILP Business and Bureau meetings at vEGU Vienna, 2020
- Award the E. Burov medal and Flinn-Hart award with virtual lectures at vEGU 2021 and the Virtual Business meeting
- Strengthen links with other IUGG and IUGS programs
- Seeking new support from national science foundations and industry

Budget request for 2021

To assure continuity and enable us to support our Task Forces and Coordinating Committees we ask for the annual IUGG subvention of 15,000.00 USD.

Hans Thybo, ILP President
Magdalena Scheck-Wenderoth, ILP Secretary General

IUGG FINANCIAL REPORT

INTRODUCTION

In short, this report describes the status of the IUGG finances for the year 2020, the first year of the IUGG quadrennium 2020-2023. The report will be presented at the Bureau Meeting in September 2021. The [budget](#) for 2020-2023 was approved at the Council Meeting in Montreal, in July 2019.

The basic currency of IUGG is US dollars (USD). The price of 1 unit in 2020 was USD 2,055. The budget value is in comparison USD 2,060.

As of 1 January 2021, IUGG has 73 members with 58 paying members representing 276 units. 12 members (18 units) are in observer status as of today, 28 February 2021. 15 members are associate members. On page 96 one can find more details about memberships.

The membership dues paid by members are the economical basis for the activities of IUGG. The situation is right now relatively steady in the sense that the union has a constant number of members and thereby also a constant income basis. There is an ongoing debate of value for money regarding memberships of scientific organizations like IUGG. Therefore, IUGG continues to have focus on the membership issue.

A very warm thank you to the IUGG members for the continued support of IUGG, also in the situation where a pandemic is surging. The pandemic has affected the finances of IUGG considerably.

The IUGG accounts are audited by a chartered auditor, presently PricewaterhouseCoopers (PwC).

The accounting method is a cash flow system, with the money kept in three bank accounts. Therefore, the 4-year accounting for the full budget period gives a more precise description of the financial status of the union than the individual accountings year by year.


At the IUGG General Assembly in Montreal 2019 (IUGG2019) a new Treasurer was elected, Dr. Niels Andersen. This report is however prepared by Dr. Aksel Walløe Hansen, Treasurer 1999-2019, as a special consultant.

A student has assisted the treasurer keeping order in the IUGG files, writing letters etc. Dr. Dmitry Krupsky has maintained the IUGG [website](#). There was no Assistant Treasurer in 2020.

Overview of the report:

Summary of the IUGG accounts in USD for 2020	page 91
General comments and highlights	page 92
Overview of IUGG grants and allocations	page 95
Membership information and statistics	page 96

SUMMARY OF THE IUGG ACCOUNTS IN US DOLLARS FOR 2020

		SUMMARY OF IUGG ACCOUNTS 2020	
US dollars	Accounts	Budget	
RECEIPTS			
1. Membership Subscription	485.238,00	535.600,00	
2. Assembly Surcharge	0,00	0,00	
3. Royalties	460,05	200,00	
4. Miscellaneous			
a. Interest	9,96	100,00	
b. Gain on exchange	3.121,64		
c. Other	187.102,29		
d. Associations, 2019 surcharge	0,00		
e. Remaining transfer, Montreal	5.653,91		
5. Total Receipts	681.585,84	535.900,00	
6. Cash in hand	700,00	0,00	
7. Bank balance on 1/1 2020	726.246,88	662.000,00	
EXPENDITURES			
11. Administration			
11.1 Personnel	20.698,09	15.000,00	
11.2 Equipment	0,00	1.000,00	
11.3 Supplies	687,88	4.000,00	
11.4 Communications	9,20	4.000,00	
11.5 Travelling	7.030,93	70.000,00	
11.6 Miscellaneous	5.954,45	5.000,00	
11.7 special	187.094,73	0,00	
12. New initiatives			
12.1 Education and outreach	0,00	30.000,00	
12.2 Science	10.000,00	40.000,00	
13. General Assemblies			
13.1 Organizational expenses	0,00	0,00	
13.2 Travel grants	0,00	0,00	
14. Symposia	1.500,00	25.000,00	
15. Annual allocations			
15.1 Annual allocations	289.853,22	262.600,00	
16. Dues and Grants			
16.1 ISC	27.558,60	32.000,00	
17. Union activities			
17.1 GRC, SEDI, CMG, UCIDI, UCPS, CCEC	4.000,00	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	2.010,89	3.000,00	
19. Contingencies	0,00	2.500,00	
20. Loss on exchange	0,00		
21. Total Expenditures	571.397,99	538.100,00	
22. Balance on 31/12 2020	837.134,73	659.800,00	
USD/DKK			
	Exchange rates	Line 8	6,688 =DEC 31, 2019
December 31, 2020		Line 24	6,059 =DEC 31, 2020
Aksel Walløe Hansen		Other:	6,518 average
USD/EUR			
		Line 8	0,896 =DEC 31, 2019
		Line 24	0,815 =DEC 31, 2020
		Other:	0,875 average

GENERAL COMMENTS AND HIGHLIGHTS

General Remarks

The financial status of IUGG in 2020 is much affected by the COVID-19 pandemic. Numerous travel and meeting activities were cancelled or postponed. This is reflected in the bottom line of IUGG's accounts.

The annual balance of the IUGG economy is of the same size or bigger than 1 year's turnover. In 2020, IUGG ended up with a surplus of the order USD 110K. The reason for this is the abovementioned reduced travelling and meeting activity.

When the world returns to a more normal way of life it is expected that much of the funds not spent will be activated. The summary for the full 4 yr period will be a more robust sign of the economy of IUGG than the special year 2020.

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

IUGG is also hosting the funds of the IUGG/IUGS interunion activity International Lithosphere Program (ILP), and the Union Commission on Climatic and Environmental Change (CCEC). The corresponding accounts are not included in this report. These two balances as of 31 December 2020, are:

CCEC: USD 17,142.12

ILP: EUR 144,834.88

In connection with a soon change of IUGG's bank status to Business Pro with Danske Bank in 2021, ILP will be given full access to this special account.

The final settlement of the IUGG2019 accounting was delayed. Therefore, the final accounting of IUGG's financial engagement in the General Assembly is included in the 2020 IUGG accounting. See lines 3, 5c and 13.1 and 15.1.

In the following notes we comment on the various lines of the accounting.

Notes

Line 1, Membership Subscription

The amount shown in the summary is a mix of late payments for 2019, regular payments for 2020 and one early payment for 2021. On 1 January 2021 the total payment received in 2020 for the year 2020 was equivalent to 188 units. Additional 15 units were already paid in 2019. Therefore, a total of 203 units was paid by the end of the year 2020. The budget anticipated a payment equivalent to 260 units out of a total of 276 units.

On the day of writing this report (28 February 2021) IUGG has received extra payments equivalent to 55 units for 2020. Making it a total of 258 units. 18 units (from 12 members) are still in arrears.

Line 3, Royalties

IUGG has signed a publishing contract with Cambridge University Press giving rise to a small royalty fee.

Line 4.a, Interest

In 2020, Danske Bank resumed paying interest on accounts in USD, but only a very small amount.

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. In 2018, there was a loss. But in 2019 it was a gain. Therefore, in the long run the gain/loss will tend to cancel each other.

The main currency of IUGG is USD. Therefore, we “lose on exchange” when we keep money in EUR and DKK when the USD goes up. And vice versa when the USD goes down.

It should also be noticed that an averaged exchange rate is used for all account movements during the year.

Line 4.c, Other

This line was introduced for the 2020 accounting to accommodate the transfer of ILP money from Potsdam, Germany. IUGG will host this money for the time being. The transfers of ILP funds and payments of contribution from countries took place to both the EUR and the USD accounts. Line 4.c is balanced by line 11.7 representing the transfer of all received ILP funds to a special ILP account, see also page 92.

Line 4.e, Remaining transfer, Montreal

A late payment in association with the IUGG2019 accounting was received in 2020.

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

Line 11.1, Personnel

In 2020, IUGG was paying remunerations to three persons: Dmitry Krupsky, IUGG webmaster, Simon Jacobsen, student assistant, and Aksel Walløe Hansen, special consultant. The total is higher than the budget value.

Line 11.2 – 11.4, Equipment, Supplies, Communication

These expenditures are much smaller than assumed in the budget.

Line 11.5, travel expenses

Here, the expenditure is 10 times smaller than the budget figure, due to the cancelled Bureau Meeting in Seoul, Rep. of Korea.

This line includes all travel expenses, both those of the Bureau and Executive Committee and liaison officers. In 2020, the Bureau did not meet for its annual meeting. Instead, a teleconference took place. The actual expenditure is associated with representative travelling by a liaison officer. 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 12, New Initiatives

The line represents IUGG support of two types of initiatives: cofunding of the International Centre for Theoretical Physics (ICTP) IUGG related activities and a grant programme in support of smaller science projects. The ICTP activities were postponed to 2021 and only one of the approved science projects was organized in 2020. In both cases due to COVID-19.

Line 14, Symposia

Except for one early March meeting all approved workshops/meetings were cancelled or postponed to 2021 or later.

Line 15.1, Annual allocations to Associations

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

	%	2020 amounts in USD
IACS	10.50	27,648
IAG	12.56	33,072
IAGA	15.10	39,760
IAHS	12.55	33,046
IAMAS	15.06	39,655
IAPSO	10.79	28,411
IASPEI	12.94	34,073
IAVCEI	10.50	27,648
		263,313

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.

The amount shown in line 15.1 of the 2020 account summary, page 91, differs from the sum given in this table. The actual allocated money in 2020 includes additional amounts of money (surcharge from IUGG2019) paid in 2020 to some of the associations.

Line 17, Union activities

Again, due to COVID-19 most activities were cancelled or postponed. Two installments were done: ILP and CCEC. See also page 95.

Line 18.1, Professional fees

This line represents the cost of the audit of the IUGG2019 accounting. Due to COVID-19 this audit is postponed to 2021.

Line 20, Loss on exchange

See line 4.b for explanatory details.

OVERVIEW OF IUGG GRANTS AND ALLOCATIONS

IUGG is supporting science in different ways:

- i) Annual allocation to Associations, line 15 (see further comments on page 94)
- 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

Here follow the main figures for the amounts allocated for the year 2020, in USD:

i) Line 15.1 (Associations)		
8 Associations		289,853
ii) Line 12 (New initiatives)		
12.1 ICTP training course activities were postponed	0	
12.2 2 IUGG grants programme (only one grant paid)	<u>10,000</u>	
Total		10,000
iii) Line 14 (Symposia grants)		
Only grant received money before lockdown	<u>1,500</u>	
Total		1,500
iv) Line 17 (Union activities)		
17.1 CCEC	4,000	
17.2 ILP	<u>15,000</u>	
Total		19,000
v) Line 13		
13.2 Travel grants, General Assemblies		<u>0</u>
Grand total		320,353

MEMBERSHIP INFORMATION AND STATISTICS

On 31 December 2020, IUGG had 73 members, 58 paying members and 15 associate members. The 58 paying members represent 276 units.

On 1 January 2021, 16 paying members representing 31 units were in observer status. As of today, 28 February 2021 four observers have already paid their dues in arrears. These countries are not included in the list below showing members in arrears. In conclusion, 12 members are today in observer status, representing 18 units.

In category 1, 8 members, 8 units

Iran (10. year as observer)	special situation
Azerbaijan (6. year as observer)	
Indonesia (6. year as observer)	
Vietnam (5. year as observer)	
Jordan (4. year as observer)	
Mozambique (2. year as observer)	
Israel (1. year as observer)	

In category 2, 5 members, 10 units

Nigeria (7. year as observer)
 Saudi Arabia (5. year as observer)
 Pakistan (3. year as observer)
 Egypt (2. year as observer)

In category 3, 2 member, 6 units

Brazil (2. year as observer)

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	16	2	32
1	18	1	18
A	15	0	0
In total	73		276

ADDITIONAL UNION MATTERS

Awards and Honors

The **American Geophysical Union** (AGU) awarded the following scientists who have been active in IUGG at the 2020 AGU Fall Meeting:

Giuliano Di Baldassarre (Sweden), Chair of the IAHS Panta Rhei Working Group (2018-2019), was named the Paul A. Witherspoon Lecturer.

Donald B. Dingwell (Germany), IAVCEI President (2015-2019), was awarded the Harry H. Hess Medal.

Augusto Neri (Italy), Member of the Union Commission on Mathematical Geophysics (CMG; 2008-2012), was awarded the Gilbert F. White Distinguished Award and Lecture.

Malcolm Sambridge (Australia), IASPEI Representative, Union Commission on Mathematical Geophysics (CMG), was named the Beno Gutenberg Lecturer.

The **European Geosciences Union** (EGU) awarded the following scientists who have been active in IUGG at the 2020 EGU General Assembly:

Donald B. Dingwell (Germany), former IAVCEI President, was awarded the Arthur Holmes Medal.

Claire J. Horwell (United Kingdom), Leader of the IAVCEI International Volcanic Health Hazard Network (IVHHN), was awarded the Plinius Medal.

Valérie Masson-Delmotte (France), former IACS Division Head, was awarded the Milutin Milankovic Medal.

The **Asia Oceania Geosciences Society** (AOGS) awarded the following scientists who have been active in IUGG:

Sang-Mook Lee (Korea, Rep.), President of the IUGG National Committee for the Republic of Korea, was awarded the 2020 Wing Ip Medal in recognition for unselfish cooperation and leadership in geoscience in the Asia Oceania region.

Kenji Satake (Japan), President of the International Association of Seismology and Physics of the Earth's Interior (IASPEI), was awarded the 2020 Axford Medal in recognition of his excellence in geoscience.

International Association of Hydrological Sciences (IAHS)

Hubert Savenije (Netherlands; Dooge medal) from the Technical University Delft, and **Bruno Merz** (Germany; Volker medal) from the GFZ German Research Centre for Geosciences, Potsdam, were awarded the IAHS-UNESCO-WMO 2020 International Hydrology Prize. The Prize is awarded annually to two people who have made outstanding contributions to hydrological science. The Dooge medal is aimed at fundamental contributions to the science of hydrology, whereas the Volker medal is aimed at outstanding applications of hydrological science for the benefit of society at large.

Eleni Maria Michailidi (Greece) and **Sylvia Antoniadis** (Greece) were awarded the 2020 Tison Award, which promotes excellence in research by young hydrologists.

Konstantinos Soulis (Greece) was awarded the 2020 Hydrological Sciences Journal Associate Editor Award, which is granted for outstanding overall contribution to the journal's impact and visibility, and excellence in supporting authors and editors through the peer review process.

Ozgur Kisi (Turkey) and **Andrzej Walega** (Poland) were awarded the 2020 Hydrological Sciences Journal Reviewer Award, which is granted for outstanding contribution to the journal, and excellence in supporting authors and editors with timely and relevant reviews.

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

The [Instituto Geofísico-Escuela Politécnica Nacional of Ecuador](#) (IG-EPN) was awarded the 2020 IAVCEI Award for Volcano Surveillance and Crisis Management (VSCM). For the first time in IAVCEI history, the celebration was held in online mode on 20 October 2020, involving over 100 participants plus Facebook watchers, and was recorded for subsequent display on the IAVCEI [website](#). The VSCM Award, given every two years, honours the personnel from volcano observatories or institutions responsible for monitoring volcanoes that have made a remarkable contribution to the mitigation of volcanic hazards and volcanic risks.

Others

Mioara Manda (France), President of the International Association of Geomagnetism and Aeronomy (IAGA), became an Honorary Citizen of her home town Comănești, Romania.

Valérie Masson-Delmotte (France), Head of IACS Division IV (2008-2019), was awarded the ISC Scientific Committee on Antarctic Research (SCAR) President's Medal for Outstanding Achievement in Antarctic Science.

Pierre Hubert (1943-2020)

Pierre Hubert (1943-2020) passed away on 31 December 2020. He became an engineer with a degree from Ecole Centrale in Paris in 1967, and received his PhD in 1971 and Doctorat ès Sciences (Habilitation) in 1986 in hydrology, from Université Pierre et Marie Curie in Paris. He worked from 1971 to 2007 for Ecole des Mines de Paris, and has always been at the heart of the Paris multi-institutional master and doctoral curricula on hydrology.

Pierre developed research activity on hydrology in the widest sense, from theoretical to science-management aspects, with a strong engagement in exploring multi-disciplinary approaches, and with an intense international focus which allowed him to tackle the diversity of challenges across hydroclimatic, socio-hydrological and geopolitical contexts; and back to have a panoramic view and contribution.

Pierre was at the scientific forefront on several topics, including isotopic hydro(geo)logy, modelling, scaling (fractal and multifractal), geo-statistics, change detection, as applied to various hydrometeorological variables and settings. The Hubert segmentation method is now a key one in the toolbox of any hydroclimatologist addressing the question of change. His methodological developments improved the design of monitoring networks, increased the understanding of processes and patterns, and then facilitated the modelling and the optimised management of resources and hazards.

Pierre developed bilateral and multilateral cooperation between France, Québec, Tunisia, Algeria, Western Africa, Romania, Russia etc. – always supporting individuals, groups and networks to accompany dynamics towards governance and scientific gap filling. He did so with a deep trust in the humanistic values of Science and Education being universal and independent from politics, and in the epistemological values of Hydrological Sciences benefitting from studying the hydrological diversity across the world.

Pierre was rapidly identified as a multifaceted expert, as well as a very pleasant character, in the French, francophone, and international institutions and communities. He benefited from his multiple engagements to encourage the emergence, funding and articulation of cooperation mechanisms. He has been active in the French SHF – Société Hydrotechnique de France and its Milon Prize. He has been a long-term contributor to the UNESCO International Hydrological Programme and the WMO Commission for Hydrology through the representation of France and then of IAHS and IUGG.

Pierre was a key player in the organisation (front of stage and backstage) of conferences and publications, on both sides of science content and of accessibility/open access, seen as platforms for science sharing, consolidation and dissemination. Beyond editorial and peer-reviewing tasks, he has been particularly active in the francophone side of the at-the-time bilingual Hydrological Sciences Journal of IAHS, and of the multilingual UNESCO-WMO International Glossary of Hydrology that he expanded in linguistic coverage and online accessibility, <http://hydrologie.org/glu/aglo.htm>. Early on



Pierre Hubert (photo credit Gaël Hubert)

he took the opportunities offered by the Internet to facilitate the open archiving of publications and the networking of scientists, in particular with the setting and mastering of the francophone portal <http://hydrologie.org>.

Pierre early engaged in IAHS, recognising in the Association a unique worldwide network whose vocation was close to his values, and where he could scale up his own efforts for articulating hydrological sciences and players. He served as President of the French IAHS then IUGG sections from 1990 to 2000. After successive roles in the IAHS commissions and publication mechanisms, he was Secretary General of IAHS from 2000-2011, thanks to a nomination when the position became vacant and then to two re-elections. He was particularly involved and efficient in facilitating the functioning of the Association, the emergence of digitisation, the digital rescue and open archiving of the IAHS publication series, the shaping of the agenda-setting PUB – Prediction in Ungauged Basin decade, the partnership with UN Agencies (in particular UNESCO IHP and WMO CHy). He also accompanied the emergence of IACS, and facilitated the interfacing with sister associations and contributions to transversal initiatives of IUGG. From 2011 to 2019, he followed up as a Bureau Member of IUGG, not only representing hydrological sciences, but also contributing to the strategy of the Union, from the Earth System Science approaches to the celebration of the 100yr Anniversary.

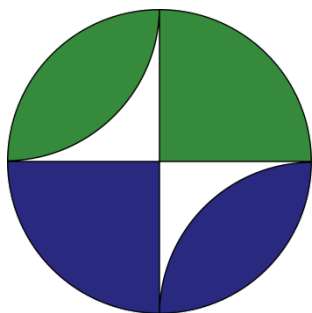
Pierre Hubert received the IAHS-UNESCO-WMO International Hydrology Prize / Volker Medal in 2015 as a recognition of his scientific excellence coupled with a profile of engagement for the community. He was made Knight of the Légion d'honneur in France. The many messages shared over the last weeks across various networks acknowledge this double reputation, and further list many anecdotes and testimonials of how Pierre was always mixing the scientific and the human adventures.

Christophe Cudennec, IAHS Secretary General

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
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