

**Twelfth Session of the UN Committee of Experts on
Global Geospatial Information Management
3-5 August 2022**

Report: UN-GGIM Geospatial Societies (formerly the Joint Board of Geospatial Information Societies). <http://www.fig.net/jbgis/>

Summary

This document provides a report from the UN-GGIM Geospatial Societies Thematic Group (formerly the Joint Board of Geospatial Information Societies - JBGIS) to the Twelfth Session of the UN Committee of Experts on Global Geospatial Information Management, 3-5 August 2022

UN-GGIM Geospatial Societies (UN-GGIM GS)

The UN GGIM Geospatial Societies Thematic Group is a coalition of the Presidents, General Secretaries or equivalent office bearers or their nominees that lead recognized international organisations involved in the coordination, development, management, standardisation or regulation of geospatial information and related matters. These organisations are:

- IEEE Geoscience and Remote Sensing Society (GRSS)
- International Association of Geodesy (IAG)
- International Cartographic Association (ICA)
- International Federation of Surveyors (FIG)
- International Geographical Union (IGU)
- International Map Industry Association (IMIA)
- International Society for Digital Earth (ISDE)
- International Society of Photogrammetry and Remote Sensing (ISPRS)
- International Union of Geodesy and Geophysics (IUGG)

UN GGIM GS meets formally once each year, typically when the UN-GGIM Committee of Experts meet, and informally when schedules permit. This background-report provides a detailed update on the activities of the organisations listed above where they have been provided.

IEEE Geoscience and Remote Sensing Society (GRSS)

No report received

International Association of Geodesy (IAG)

Activities and Areas of Work

The main activities in the period was greatly affected by the COVID-19 pandemic. Almost all planned meetings, symposia and workshops were either cancelled, postponed or arranged virtual.

The IAG General Assembly, the Council of national delegates, the Executive Committee (EC), and the Office carry out the administration of IAG. The IAG Council consists of the delegates appointed by the Adhering Bodies of the IUGG member countries and is responsible for governance, strategic policy and direction of the IAG. The Council meeting is organized at the General Assembly every four years, last time 2019 in Montreal with the election of IAG Officers for the period 2019-2023 and a Review of the Statutes and Bylaws. The IAG Executive Committee (EC) had only virtual meetings in 2021-2022. The

IAG Bureau consists of the IAG President, the Vice President and the Secretary General. It meets monthly by teleconferences to administer the day-to-day affairs.

The scientific structure of IAG comprises four Commissions (Reference Frames, Gravity Field, Earth Rotation and Geodynamics, Positioning and Applications), three Inter-Commission Committees, one project, 12 International Scientific Services, the Global Geodetic Observing System (GGOS), and the Communication and Outreach Branch (COB). The Services generate scientific products by means of Operation, Data and Analysis Centers. The GGOS is IAG's observing system to monitor the geodetic and the global geodynamic properties of the Earth as a system. GGOS works with the IAG Services to facilitate the production of geodetic products and to promote its use to the scientific community, policy makers and the public. The COB provides communication, public information and outreach links, in particular via the IAG Website (<http://www.iag-aig.org>) and the monthly Newsletters.

The main event in the period, the IAG Scientific Assembly was held as an on-line meeting 28.6-2.7, 2021. The theme of the Symposium was Geodesy for a Sustainable Earth. The main organizer was Chinese Society for Geodesy, Photogrammetry and Cartography. A total of 1269 participants and 613 presentations made this event the biggest IAG meeting ever.

The contribution of IAG to the Global Geodetic Reference Frame (GGRF) within the United Nations' Global Geospatial Information Management (UN-GGIM) has been an essential activity, in particular in view of IAG's involvement in the UN-GGIM Subcommittee on Geodesy and planning for the Global Geodetic Center of Excellence.

Partnerships and Regional and International Collaboration

Besides the close cooperation with the other IUGG Association and the UN-GGIM relation, the official liaisons of IAG include

- Advisory Board on the Law of the Sea (ABLOS)
- Group on Earth Observation (GEO)
- International Science Council (ISC) Commission on Space Research (COSPAR)
- International Astronomic Union (IAU) Commission A2 "Rotation of the Earth"
- International Standards Organization (ISO) TC 211
- United Nations Initiative on Global Geospatial Information Management (UN-GGIM)
- UN-GGIM: Geospatial Societies (previously Joint Board of GIS, JBGIS)
- United Nations Office for Outer Space Affairs (UNOOSA)
- UNOOSA Space-based Information for Disaster Management and Emergency Response (UN-SPI-
DER)
- UNOOSA International Committee on Global Navigation Satellite Systems (ICG)

Representatives of IAG will participate in the meetings of these bodies and will report to the IAG EC. The reports of all IAG components (Commissions, Inter-commission Committees, Global Geodetic Observing System (GGOS), IAG Office and Communication and Outreach Branch will be published in the IAG reports.

Priority Issues, Challenges and future plans

A continuing priority is the IAG involvement in the Global Geodetic Reference Frame (GGRF) Subcommittee on Geodesy (SCoG) of the United Nations' Global Geospatial Information Management (UN-GGIM). IAG contribution to the SCoG and the Global Geodetic Center of Excellence (GGCE) will be one of the central targets in the coming years. Priority issues in this respect are the improvement and sustainability of the geodetic infrastructure that underpins all geodetic reference products provided by IAG Services.

The common research with other IUGG Associations is another priority issue, e.g. in joint (sub-) commissions. Research in marine geodesy, climate change, and a Project on New sensors and technologies (e.g. optical and atomic clocks, quantum sensors) shall be intensified, e.g. in the new inter-commission committee adopted in the General Assembly. IAG Study and Working Groups are dedicated to address clearly defined well-focused scientific topics of limited scope within the field of the IAG's Commissions, Services and the Global Geodetic Observing System (GGOS).

The technical and scientific development of geodesy is continuing in the next decade. Space techniques are improving in quantity and quality. New sensors (e.g. optical and atomic clocks, quantum sensors) allow measurements of new parameters, and powerful computers extend the horizon of processing huge amounts of data. The objective of geodesy expanded to the observation and quantification of global change (climate and dynamics of the solid, fluid and gaseous Earth). Increased demands of accuracy and real-time applications will cast new challenges in the future.

One of the challenge in coming year is to recover and re-establishment of several lost opportunities due to the COVID-19 pandemic. Preparations for next IUGG General Assembly and IAG topics there have started. It is expected that most planned activities can be held as planned in 2023.

International Cartographic Association (ICA)

Activities, Areas of Work

The International Cartographic Association (ICA), founded in 1959, has as its aim to promote the discipline of cartography and GIScience internationally. It offers its expertise and knowledge of technological developments to other organizations via events, meetings, workshops, and publications. Its activities happen through the work of its Commissions and Working Groups. These deal with a wide range of topics that cover much of the discipline.

During this period from August 2021 to June 2022, the ICA Executive Committee (EC) met four times. In September 2021, the ICA EC met physically in Florence, Italy for the first time since the onset of the pandemic. In addition to meeting on regular ICA business, the EC conducted a site visit with the Italian Local Organizing Committee for the 30th International Cartographic Conference (ICC) that took place in December 2021 in Florence. During the ICC2021, the EC met again in advance of the conference. The third meeting was virtual in February, 2022 where we reflected on the success of Florence and began plans for the next ICC in Cape Town, South Africa in August, 2023. The fourth EC meeting was in person again in Madrid, Spain in April, 2022 on the fringes of a conference jointly organized by three ICA Commissions: Atlases, Map Design, and Toponymy. There the EC conducted a thorough review of the successes and challenges of the 28 Commissions and 5 Working Groups.

The five Working Groups for this term are focused on specific priority areas of interest not currently covered by the 28 Commissions. They include: Cartographic Body of Knowledge; Cartography and Sustainable Development; Digital Transformation of National Mapping Agencies; History of the ICA and; New Research Agenda in Cartography. The ICA is committed to ensuring relevance of these topics. In that regard, progress was made in seeking leadership for the Cartography and Sustainable Development with the goal of closely aligning with efforts by the UN-GGIM with specific attention to cartography and the SDGs. A new topic of focus for the ICA relates to Ethics in Cartography. Initial meetings were organized to lay a foundation for future discussions at upcoming conferences. A session occurred at the American Association of Geographers and future sessions have been organized at the Esri International Users Conference, EuroCarto in September, and the AutoCarto 2022 in the U.S. that has a specific focus on this topic.

The other high priority UN-GGIM topic for the ICA includes the Integrated Geospatial Information Framework (IGIF). The EC has been discussing ways in which to actively participate in promoting

and supporting the IGIF. This will be a continued focus for the EC and Commissions and Working Groups. One activity that expanded in the last year was a focus on organizing webinars to advance topics of interest. One was held on the ICA and UN publication “Mapping for a Sustainable World” where authors presented their approach along with many experiences that were enlightening to the participants. Another joint Commission webinar focused on “Cartography Connecting Schools.”

Through its president, the ICA has contributed to the SDG Data Alliance (partners led by the Public Foundation) by working with the UN on a Resource Team to offer guidance and advice to 17 developing countries in their efforts to develop their own Country-level Action Plans based on the IGIF as well as developing an SDG Data Hub through support by Esri.

Lastly, the ICA continued recent publications of the *International Journal of Cartography*, the *ICA News*, eCarto News on the ICA website, and articles in GIM and ArcNews.

Partnerships and Regional and International Collaboration

The ICA actively participated at the Third UN World Data Forum in Bern, Switzerland where copies of the ICA-UN book “*Mapping for a Sustainable World*” were distributed at a booth during the Forum.

In connection with the SDG Data Alliance, the ICA participated in the 2021 and 2022 Geospatial World Forum by advancing education to participants during a 3-day Geospatial Knowledge Infrastructure training session, participating in sessions on National Mapping and National Geospatial Agency topics, and by contributing to discussions on the future geospatial information ecosystem.

The ICA continues its work with the other geospatial societies within the UN-GGIM and related organizations. For example, in the ISC (International Science Council), we work together with other international societies through the Geo-unions group. Recently, the ICA participated in the ISC virtual Extraordinary General Assembly. We also participated in a “Meet the New President of the ISC” session. Via our Commissions and Working Groups we are active in ISO/TC 211 and OSGeo.

Keynote addresses were made virtually and in person in cartography and GIScience. During this period, keynotes were made at the Indian National Cartographic Association (virtual) and in person at the 8th International Conference on Cartography and GIS in Nessebar, Bulgaria.

Participated in the two workshops for the UN-GGIM Arab States and gave two presentations during the Ninth Plenary Meeting of UN-GGIM Arab States, Online Meeting on the IGIF and on the importance of integrating geospatial and non-geospatial data.

At the request of the UN-GGIM Secretariat, the ICA assisted in forming a High-Level Group (HLG) comprised of executives from Member States for governing the Integrated Geospatial Information Framework that includes an active Work Plan that is underway.

In preparation for the Second UN World Geospatial Information Congress to be held in Hyderabad, India October 10-14, 2022, the ICA is contributing to efforts by the International Advisory Committee to ensure a program that advances the 15 thematic areas for the Congress anchored in the UN IGIF.

In response to an Invitation by the UK Ordnance Survey, the ICA actively participated in the 2022 Cambridge Conference with leaders from National Mapping and National Geospatial Agencies from over 30 countries in attendance with others participating remotely.

Priority Topics and Challenges

Two significant regional cartographic conferences are planned for the coming months. EuroCarto will be held September 19-21, 2022 in Vienna Austria (<https://icaci.org/invitation-to-eurocarto2022/>). AutoCarto 2022 will be held November 2-4, 2022 in Redlands, California and will focus on topics related Ethics in Cartography (<https://cartogis.org/autocarto/autocarto-2022/>). Preconference workshops by ICA Commissions and Working Groups are planned for both events.

The ICA is planning its 31st International Cartographic Conference (ICC) and 19th General Assembly in Cape Town, South Africa August 14-18, 2023 (<https://icc2023.org/>). The Local Organizing Committee has been very active and offers a detailed schedule for submissions to the program at the website indicated. A major focus of this event will center on cartography and GIScience on the African continent.

As we all recover and rise from the effects of the COVID-19 pandemic, the ICA looks forward to reestablishing in-person events wherever possible. The ICA website continues to serve as the principal communication medium for timely updates. Periodic blogs, news updates, and future activities are made available on the website in addition to all of the various programs, activities, and work by cartographers and GIScientists.

Perspectives and Future Plans

Looking toward the immediate future, the ICA is focused on two regional cartographic conferences. Plans also are well underway for the next ICA General Assembly and International Cartographic Conference in Cape Town next year. Now more than ever, the ICA will look toward actionable cartography and GIScience to help our global society address the many challenges we all face. We will do this through the advances and innovative work of the ICA Commissions and Working Groups, the many publication outlets we foster and the engagements we plan for future collaboration and successes.

International Federation of Surveyors (FIG)

Activities, Areas of Work – Achievements

The years 2021 and 2022 are again due to COVID19 very different. In June 2021 FIG organized for the first time ever together with the local organizers from the Netherlands a working week which was entirely virtual and online. With 1300 participants it was a big success but showed at the same time that people would like to meet in person again. Around 80 sessions were held in an online environment under the overall theme “Smart Surveyors for Land and Water Management – challenges in a new reality”. Institutional partners were UN-GGIM, UN-Habitat/GLTN and FAO.

Only online meetings were possible during the entire past year 2021. The fact that it is not possible to meet in person did not prevent work to be done and it became clear that online meetings are useful as a supplement to meeting in reality.

FIG Commission 7 held its 2021 Annual Meeting on 23rd September with the theme “mapping the future of land administration”. The event was in conjunction with the 20-year celebration for the Centre for SDIs and Land Administration at the University of Melbourne, Australia. For the second year running the meeting was a fully online activity with 70 participants logging in from around the globe. The streamlined event was used to update delegates and friends of Commission 7 on global developments in land administration over the past year, and to also start focusing attention for the next Chair period (2023-26).

The VII. Croatian congress on cadastre was held between March 31st and April 2nd 2022 in the Dubrovnik Palace hotel. Covid did not yet allow a completely physical environment - the conference was

hybrid - 200 participants onsite and 600 online. Probably the new norm. Although a beautiful and historic setting like Dubrovnik in Croatia does underline the human need to meet and talk directly. In conjunction with the Congress of Croatian Cadastral Surveyors, the 10th workshop for the Land Administration Domain Model (LADM) was organised. An important topic at this Congress was 'Fit-For-Purpose Land Administration - support for Sustainable Development.

The Croatian Geodetic Society (FIG member) organised the event - in close cooperation with the Faculty of Geodesy of the University of Zagreb (FIG academic member), the Geodetic State Administration and the Croatian Chamber of Geodetic Engineers (CLGE member) and under the auspices of the International Federation of Surveyors (FIG).

This year from June 20 to 22, the 5th Joint International Symposium on Deformation Monitoring was organized in Valencia, Spain by the Polytechnical University of València, Spain in cooperation with FIG Commission 6.

There is one new FIG publication: Jim Smith and Jan de Graeve published seven books on 3000 years of surveying. They are the proud result of a life-long research and work of the two authors on the History of Surveying. Only a 100 Special Edition Sets of the seven volumes are currently being printed.

The volumes I-V are covering notes on the History of Determining the Size and Shape of the Earth Using Meridian Arcs. Starting from about 800 BCE until about 1960 CE, a span of over 2,700 years. Jan and Jim take us through the efforts of the early Babylonian, Egyptian, Indian and Greek astronomers and the work of the 3rd century BCE Greek mathematician, Eratosthenes, who estimated the circumference of the Earth with remarkable accuracy using the shadow cast by the sun and known latitudes of places in Egypt. They then come to the arc measurements in Europe, Lapland, Peru, Eastern Europe, India, South Africa and many others and end in the 1950s before the introduction of electronic computers and distance measuring devices and satellite navigation systems.

Volume VI is dedicated to the Meridian arcs in East & Southern Africa with emphasis on the Arc of the 30th Meridian. Finally Volume VII: is handling the connection between the Struve geodetic arc and the arc of the 30th Meridian

Although these two books can be considered as two separate volumes they are in fact companions in that they complement one another. Jan De Graeve and Jim Smith have compiled the notes to give researchers and students a feeling for the magnitude of the task to measure, what turned out to be the longest terrestrial measurement covering an amplitude of approximately 105° or 11,635 km from Hammerfest in Norway to Port Elizabeth in South Africa. The second of these two volumes, as the title suggests, only covers the connection between the Struve arc and the arc of the 30th Meridian in Africa.

Partnerships and Regional and International Collaboration

Through our international collaboration with FIG members, the sister professional associations, regional professional bodies as well as UN bodies and the World Bank, FIG aims to transform all surveyors into global surveyors. Surveyors with a global education are more sensitive for the progress of surveying in all its fields and applications everywhere; but also surveyors who will have an understanding of global challenges will be able to develop the profession for the betterment of all parts of our world.

We are working closely together with several UN organizations. In addition there are diverse relationships with our partner and stakeholders. This allows us to offer our professional expertise in all kind of projects. At the same time, it gives us the opportunity to amplify not only the voice of our federation but also our entire profession.

Together with FAO a webinar was held on the FAO Legal Guide and its Application at the Country Level with more than 550 online participants.

Due to COVID19 there was no meeting in person over the last 12 months.

Priority Issues and Challenges

We had to cancel our FIG working week 2020 entirely. Last year we organised a very successful virtual working week. For 2022 we plan the FIG-Congress as a meeting in person. Originally the Congress 2022 was planned to be in Cape Town (South Africa). Due to the difficult conditions regarding vaccination we decided last year to organize the Congress in Warsaw (Poland) and to have the next Congress in 2026 in Cape Town. Normally the main FIG-event is during the first half of the year. But in this year the Congress was moved to September 11-15. It will be an event with some online-elements but the focus is on “meeting-in-person”. All presenters are expected to be on site and the virtual interaction is quite limited.

The current challenge for FIG and our local organizers is the fact that there are currently about 1 million refugees from Ukraine living in the capital of Poland and more than 1,5 million in the whole country.

“Surveying is a modern profession acting globally for a good and better infrastructure of our society and our planet earth. FIG wants to keep and even improve its role as the premier non-governmental organisation that is representing the interests of all surveyors worldwide.” This is the vision described in the work plan.

In a direct relationship to our vision is the motto: “Volunteering for the future”. It sounds simple and trivial, but it is touching a very crucial point: Although we have an Office (in Denmark), FIG is primarily an organisation of volunteers.

Perspectives and Future Plans

The General Assembly of our federation will elect a new president for the term 2023-2026 and to new vice presidents (for the same term) in September at the occasion of our Congress. However it is obvious that “recruiting volunteers” will be also a target in the future. Another aim is to develop a long-term-strategy for FIG, called FIG 2028.

Over the last 30 years, FIG became a globally acting organisation representing the full range of a modern surveying profession. To keep the position as the premier international representation of surveyors, FIG cannot ignore the dramatic changes in technology and society that have occurred in the last decades in order to stay relevant for our profession and society.

FIG will continue to work in the commissions, with sister organizations and with FIG members on the UN Sustainable Development Goals. Surveyors and their products play an essential role in the majority of the 17 SDGs. To respond to this, FIG Council has established a Task Force to work on SDG's, hereunder to identify the professional fields in which surveyors can contribute the most to fulfilling the SDG's, to propose ways in which the surveying community can contribute, and to coordinate the SDG activities. All commission chairs published together with the task force and article in GIM magazine on FIG and the SDGs.

Maintaining the significance of the surveying profession remains an important target for FIG. Council will continue to keep and strengthen our partnership with UN agencies, the World Bank, other international agencies, and sister organizations.

The Volunteer Community Surveyor Program (VCSP) is an innovative volunteer programme that intends to be a powerful driver for both social impact and professional development. The VCSP lever-

ages on the skills, experience, talents and education of young surveyors and matches these competences with the needs of GLTN, particularly in GLTN's county-level implementation plans and programmes. The VCSP is run by the FIG Young Surveyors Network, in partnership with the Global Land Tool Network (GLTN) which is facilitated by UN-Habitat.

Matters/Issues for Consideration

The implementation of IGIF at a national level there is a strong urge to get all members on UN-GGIM-GS more involved in making these future trends come alive.

International Geographical Union (IGU)

The International Geographical Union (IGU) strives to continue to advance its stated purposes, e.e. to achieve pursue excellence in the discipline based on new and appropriate concepts and methods and to realize the role of geography as a major science in global debates on, for example, for example, climate change and social inequity. The IGU promotes actions of its member countries through its Congresses, Regional Conferences, and Thematic Conferences, and through the activities of its 44 Commissions and 3 Task Forces. Four of these Commissions are exclusively dedicated to the Geo-spatial technologies and promoting its practices, specifically Geographical Information Science, Geography of Information, Innovation and Technology, Land Use and Land Cover Change, and Modeling Geographical Systems. IGU aims to establish continuous horizontal and vertical engagement with relevant international organizations, especially the ISC (including the GeoUnions and CODATA), UN-GGIM and CIPSH.

Activities, Areas of Work – Achievements

The Executive Committee focuses its attention on three levels of strategic activity: actions relating to IGU membership and empowerment, actions relating to outreach and actions relating to communication. Increasing the relatively limited geographical footprint of membership among developing world countries, highlighting and further promoting the work of IGU Commissions and Task Forces in relation to key global initiatives, including *inter alia*, the UN Sustainable Development Goals (SDGs), the UN Decade of Ocean Science for Sustainable Development, UN-DRR, Paris Climate Action and Habitat-III, and ISC Future Earth. Increasing the number and quality of IGU-branded publications in order to disseminate geographical knowledge to all countries of the world and communicating the work of the IGU in order to improve decision making through a more structured and accessible website and through greater visibility on relevant social media platforms are some of the core activities of IGU.

The outbreak of 2019 novel coronavirus pandemic (COVID-19) seriously affected all nations. GIS and spatial big data technology have been shown to play an important role during the fight against COVID-19. Members of the IGU Geographical Information Science Commission proposed ten challenges in using GIS with spatiotemporal big data and worked on rapid responses and analyses of dynamic epidemic information by solving these problems. From the perspective of GIS technology, this study revolutionized the data acquisition methods through big data technology which achieved rapid data acquisition, constructed an analysis platform for timely epidemic analysis, and produced epidemic maps allowing timely dissemination of epidemic dynamic information. The work of COVID-19 was published as journal paper: Zhou et al. 2020. COVID-19: Challenges to GIS with Big Data. *Geography and Sustainability*, 1: 77-87. [https://doi: 10.1016/j.geosus.2020.03.005](https://doi.org/10.1016/j.geosus.2020.03.005) (with already more than 430 citations).

The IGU Modeling Geographical Systems Commission of IGU conducted online training course on geographical analysis models on August 9-16, 2021 in which 1285 students from over 10 countries participated. This training session focused on four hydrological models: Distributed Time Variant Gain Model (DTVGM), Uncertainty Quantification Python Laboratory (UQ-PyL), Geomorphology-Based Hydrological Model (GBHM), and Spatially Explicit Integrated Modeling System (SEIMS).

IGU 19th International Conference on Spatial Data Handling and Geographic Intelligence was organized on August 13-14, 2021 in online mode by the collaborative efforts of IGU commission on Geographic Information Science and Commission on modeling geographical systems. The 2nd International Geography and Sustainability Workshop was organized on November 23-24, 2021 in online mode by the Commission on modeling geographical systems. A total of 500 participants from 40 countries took part in the workshop and at the closing ceremony of the workshop, Prof. Michael Meadows, The president of IGU gave a concluding remark about the workshop. The International Workshop on Geography and Sustainability (GeoSUS) 2021 was held online via Zoom between the 23rd and 24th November, 2021 at Beijing, China. The workshop's theme was "The Geography of the Anthropocene: Transforming our World for Sustainable Development". The workshop focused on land degradation, disaster risk, water resources, agricultural geography, geographical modelling, urban land use, heritage park, geographical education.

Partnerships and Regional and International Collaboration

The IGU Commissions on Geographical Information Science and Modelling Geographical Systems have consistently cooperated with each other and with Commission II of the International Society of Photogrammetry and Remote Sensing (ISPRS). Annually, both Commissions contribute to GIS Awareness Week and World GIS Day. The Modelling Commission worked with several other IGU Commissions and other international organizations in developing a conference and training course and held a pre-IGU Congress Seminar between 12-14 August 2021 in Varna (Bulgaria). The conference was organized by the Commissions for Local and Regional Development and Land Use and Land Cover Change at the International Geographical Union (IGU), and the Bulgarian "Environmental Protection and Reduction of Risks of Adverse Events and Natural Disasters" National Science Program. The conference topics Natural Hazards and Risks; Geographic Information Science among others. There was also an International Workshop on Geography and Sustainability (GeoSUS) 2021 held between the 23rd and 24th November, 2021 in Beijing, China hosted by the IGU Commission on Geography for Future Earth, and co-organized by Beijing Normal University and the Geographical Society of China.

Priority Issues and Challenges

The priority issues of the IGU is to work and achieve goals laid down in the strategy document for 2020-2024. IGU strive to continue to advance its stated purposes that is to achieve excellence of the discipline based on new and appropriate concepts and methods and to realize with much vigor the role of geography as a major science in global debates on, for example, climate change and social inequity, and must promote actions of its members in this context. Promotion of use of geospatial technology in scientific studies amid recent COVID 19 crisis is one of the priority areas where IGU commissions and task forces are working together. Promoting the IGU work in relation to key global initiatives, including inter alia, the UN Sustainable Development Goals (SDGs), the UN Decade of Ocean Science for Sustainable Development, Disaster Risk Reduction, Paris Climate Action and Habitat-III, and ISC Future Earth focusing on challenges of across globe accessibility and usability of Earth Observation (EO), GIS, Open Data, Open Source Softwares, Cloud Computing in mapping, monitoring and modeling in order to contribute towards Climate Change, Future Earth and Sustainable Development Goals. IGU Commissions quite frequently publishes book on Geospatial Technologies and Geography Education under the IGU Springer Series.

Perspectives and Future Plans

IGU established Commissions and Task Forces for the study of a specific geographical issue or topic which benefits from international collaboration and encourage the exchange of ideas and organize conferences, meetings and, where appropriate, field excursions, both between Congresses and in association with International Geographical Congresses. Task Forces are established from time to time to pursue specific objectives of the IGU.

Various IGU Commissions will focus on:

- Imparting training on geospatial investigation through capacity building programmes for young and early career spatial scientist.
- Investigating spatial dynamics and related issues of COVID 19 pandemic.
- Promoting use of state of art geospatial technology (artificial intelligence, Internet of Things, Advanced Geospatial Modeling) in achieving goals of UN-DRR, SDGs etc.

Matters/Issues for Consideration

- Geo-spatial technologies should be linked with formal and informal levels of education.
- Future research focus should be given on emerging areas of sciences linking with disaster risk reduction, food security, air pollution, human health and well-being and biodiversity.
- Lessons learned and best practices should be disseminated at community level using mass media and social-media.
- Preference should be given to geo-spatial technology based modeling for reducing the gap between conventional methods of approach and dynamic forecasting approach.

Conclusion

The IGU promotes knowledge about the spatial information technology as a way of contributing to the UN SDGs, among students, researchers, professionals and common people. Therefore, IGU aims to disseminate the basic concept of Geographic Information System (GIS), Remote Sensing and Global Positioning System (GPS) in an integrated manner for resource and infrastructure planning and their management to develop these skills among students and young researchers to tackle multi-disciplinary challenges and suggesting remedial measures. Geoscientists can also enhance their knowledge through this technology. Geo-spatial technologies have become indispensable tools for examining and resolving geographical issues and should be part of both school and university education. The IGU aspires to reach out to a wide spectrum of people aiming to bridge geo-spatial technologies with geographical education.

International Map Industry Association (IMIA)

Activities and Areas of Work

The International Map Industry Association (IMIA) continued to revamp its programming and offerings as a direct result of the worldwide pandemic that continued to affect our members, partners and communities.

In 2021, we hosted 9 virtual webinars and networking sessions covering topics that matter most to our business community. We offered small group networking to help continue the conversation among attendees but also a way for them to connect — or re-connect — during the pandemic.

In 2022, we were thrilled to host our first in-person event, which was a cocktail networking reception in London in April, on the eve of the London Bookfair.

After a two-year hiatus, the IMIA hosted its in-person forum, [*Transformation in the Industry*](#), in Denver, Colorado in June 2022. The Forum illustrated recent trends and challenges in mapping since Covid arrived, and looked at new advances and opportunities in mapping, publishing, and technology. The Forum concluded with a workshop on Geo Ethics that will contribute to the current discussions and initiatives among several global organizations.

We continue to offer virtual webinars to help our members and the industry understand trends, challenges and solutions to the current business climate. In May 2022, IMIA and our Affiliate Partner British Cartographic Society co-hosted [Where Cartography Meets Industry: Public Land Mapping](#). A panel of experts discussed the varied treatments of publicly accessible land on different continents and illustrated how geospatial data initiatives and public-private partnerships can sustain a healthy retail ecosystem for commercial map products.

In November 2021, we hosted a three-part virtual Mapping Leaders Forum which focused on [Data Challenges & Opportunities](#), [Government Priorities in Geospatial Data](#) and [Use and Distribution of Data](#)

Other events in the second half of 2021 included: [Let's Talk About Maps](#) in July 2021 with the British Cartographic Society and [Outdoor Mapping - a Digital Transformation](#) in June 2021.

Partnerships and Regional and International Collaboration

IMIA has focused on growing its Affiliate Partner Program and enhancing the relationship with its current partners. We entered into an agreement in 2021 with the British Cartographic Society, which has proven valuable for both organizations as we leverage each other's distribution channels and members' expertise to create content-rich events for the industry.

IMIA secured a 2nd Affiliate Partnership with the [Cartography and Geographic Information Society](#) in February 2022. The organizations have agreed to promote each other's events through their vast distribution channels.

Future plans

The IMIA's board of directors and committees are working hard to enhance offerings for our members and the industry for the next 18 months. We will be focusing on an Asia Pacific-centric webinar in the fall. We will be hosting a collective booth at the 2022 Frankfurt Book-fair in October, offering our members a chance to participate in this highly-attended event. Education, networking and collaboration will continue to be top priorities for IMIA.

International Society for Digital Earth (ISDE)

Activities and Areas of Work

The International Society for Digital Earth (ISDE) was founded in Beijing China in 2006. ISDE is an international organization principally promoting academic exchange, science and technology innovation, education, and international collaboration towards Digital Earth. The ISDE Secretariat is hosted by Aerospace Information Research Institute, Chinese Academy of Sciences.

12th International Symposium on Digital Earth - Report

The 12th International Symposium on Digital Earth (ISDE12) was successfully held in a hybrid format (on-site in Salzburg, Austria and online) from 6 to 8 July, 2021. ISDE12 was organized by the International Society for Digital Earth and hosted by Department of Geoinformatics – Z_GIS, University of Salzburg, Austria. With the theme of "Digital Earth for Sustainable Societies", this event has brought policy makers and scientists to explore pathways towards the vision of a 'Digital Earth'. The

symposium was held within the traditional GI-Forum week of the Salzburg University, which included six sub-events related to various topics of Digital Earth. In addition, four workshops were held on 5, July, 2021. The ISDE Youth Forum 2021 on Digital Earth was also held in hybrid format. This forum was to bring together people from science and decision-makers. In accordance with the Sustainable Development Goals (SDGs), it was intended to contribute and encourage the digital bundling of data and information and, with its help, to develop solutions for a better future. To include the ideas and concerns of young people, played a very special role.

More than 700 participants attended the hybrid event both on-site and online.

Despite the difficulties caused by the Covid-19 pandemic, the event was a great success! The event served as a platform for everyone who uses digital and online technologies with reference to our living environment for a better organization of the environment and society (“Earth”).

ISDE Workshop on Data Governance and AI Ethics - Report

The ISDE Workshop on Data Governance and AI Ethics was successfully organized by the ISDE Working Group on Digital Earth Data Governance and AI Ethics during 29 Sept. to 1 Oct. 2021. The aim of the workshop was to highlight some of the key similarities and differences in perspectives from different groups of stakeholders (government, industry, academia and civil society) and different parts of the world on two key related topics: data governance and AI ethics, which are at the forefront of the current digital transformation of society.

Co-chaired by Dr. Massimo Craglia and Prof. Yola Georgiadou, the workshop was attended by 25 participants from government, academia, industry and the voluntary sector coming from Africa, the Americas, Asia, and Europe.

The workshop confirmed that data governance and AI ethics are strongly interrelated. In the same way as the development of AI is strongly related to that of the availability and quality of the data that underpins it, so the ethical development of AI rests on the ethical governance of data and the algorithms to process them.

ISDE Publication Report

ISDE continues to publish two international peer-reviewed academic journals – the *International Journal of Digital Earth* (IJDE) and the *Big Earth Data* (BEDJ). The two journals were jointly published by ISDE and Taylor & Francis Group. IJDE receives an impact factor of 3.538 in 2020, ranking 17/32 in the Remote Sensing category and 18/50 in the Geography, Physical category. BEDJ also made significant progress and was indexed by ESCI, EI and INSPEC in 2021.

Starting from 1st January 2022, IJDE has been converted to fully Open Access journal. A special issue on “Big Data in Support of Sustainable Development Goals” was published in the Big Earth Data journal in 2021, which was promoted in the website of the International Science Council.

Invited by the Editor of Environmental Science of *Oxford Bibliographies*, Prof. Huadong Guo, Dr. Zhen Liu and Prof. Changlin Wang contributed a "Digital Earth" entry in Oxford Bibliographies in Environmental Science. This entry is an additional contribution to the “Manual of Digital Earth” which was published by Springer in November 2019 and has over 900K downloads since its publication. The “Digital Earth” entry is available at:

https://www.oxfordbibliographies.com/view/document/obo-9780199363445/ob_o-9780199363445-0137.xml.

[DOI: 10.1093/OBO/9780199363445-0137](https://doi.org/10.1093/OBO/9780199363445-0137)

Up Coming ISDE Events

On 9-12 May 2022, in collaboration with Geospatial World Council ISDE will organize a special session on “The Platform Economy: Digital Earth as the Billion Dollar Code” during GWF2022 in Amsterdam. The aim of the session is to discuss the social and economic benefits of DE and its current

and future challenges but as well discuss current critical issues like data governance and AI ethic, industry engagement, citizen participation, digital ecosystems...For more information, please browse the webpage: <https://geospatialworldforum.org/platform-economy.asp>

On 6-8 September, 2022 ISDE will organize the 9th Digital Earth Summit in Chennai, India. The Summit will be hosted by the Institute of Remote Sensing, Anna University with theme of “Digital Earth to Bridge Digital Divide for Attainment of Sustainable Development Goals”. Due to the influence of COVID-19, the Summit will be in hybrid format, and cover the topics related to Digital Earth technologies and applications. For more information about the Summit, please visit: <https://isde-2022.org/> Other coming ISDE events include the 13th International Symposium on Digital Earth in July 2023 which will be hosted by the Geography Department of the Harokopio University of Athen, Greece. In addition, the 10th Digital Earth Summit will be held in Rwanda in 2024, hosted by the Centre for Geographic Information Systems and Remote Sensing (CGIS) of University of Rwanda. This will bring the Digital Earth event back to Africa after the Digital Earth Summit in Morocco in 2018.

Other related ISDE activities

On 6-8 September 2021, the Second China Digital Earth Conference was held in Beijing which was organized by ISDE Chinese Committee, together with the First International Forum on Big Data for Sustainable Development Goals which was dedicated to the inauguration of the the International Research Center of Big Data for Sustainable Development Goals (CBAS).

The Proceedings of the Second China Digital Earth Conference was published with open access online by IOP publisher. See more at: <https://iopscience.iop.org/issue/1755-1315/1004/1>

On October 13, 2021, the Honorary President of ISDE, Prof. Huadong Guo, received the “Science for Sustainability Award” at the second General Assembly of the International Science Council (ISC) for his innovative contributions to developing Big Earth Data science and applying it to facilitate the Sustainable Development Goals (SDGs) from global to local scales through data-driven methods and big data cloud platforms. This was the first time award from ISC since its merge of the International Council for Science (ICSU) and International Social Science Council (ISSC).

International Society of Photogrammetry and Remote Sensing (ISPRS)

Activities, Areas of Work – Achievements

ISPRS has been continuing to run its existing Initiatives funded by ISPRS. The year of 2021 has brought results of the Scientific Initiatives (SI 2021). The reports from this Initiative can be found at <https://www.isprs.org/society/si/default.aspx>.

The year of 2022 call is dedicated to Educational and Capacity Building Initiatives (ECBI 2022) program. Their titles and principal investigators are listed at <https://www.isprs.org/society/ecbi/default.aspx> A brief summary of these projects will be available in January 2023 since most of the projects are one-year projects.

ISPRS introduced a new activity for its Ordinary Members, Associate and Regional Members already in 2019. This activity is a financial travel grant for top keynote speakers for their conferences. The number of travel grants is limited to ten per year (more at <https://www.isprs.org/society/ksp/default.aspx>) and has been used due to covid-19 only in a few cases.

2021 meetings were still held virtually. Council met at teleconferences eleven times (six times with Technical Commission Presidents) and once already at a hybrid meeting. 2022 allowed us already three hybrid Council meetings and one teleconference, two of them with Technical Commission Presidents.

ISPRS scientific activities continued virtually - nine events and the second edition of the ISPRS Congress in 2021. The Congress programme in 2021 was performed in the style of in situ ISPRS congresses but without the ISPRS General Assembly. The complete list of proceedings can be found in [The ISPRS Archives](#) and the [ISPRS Annals](#).

ISPRS organises its Congresses including the General Assembly in the quadrennial period. Both events were finally held in situ in June 2022 (6 – 11 June) in Nice, France – again with open access proceedings (The Archives and Annals. New Council and new Technical Commission Presidents were elected.

The [Keynote Speaker Webinar Series](#) which started in spring in 2021, continued also in 2022. All webinars are always announced at the ISPRS [web site](#).

ISPRS Journals

ISPRS publishes three scientific journals: a hybrid one - the [ISPRS Journal of Photogrammetry and Remote Sensing](#) (IF 8.979, ranking it 1 out of 50 in Geography, Physical), and two open access journals - the [ISPRS International Journal of Geo-Information](#) (IF = 2,899), and the [ISPRS Open Journal of Photogrammetry and Remote Sensing](#) (established in January 2021).

Partnerships

It is possible to mention co-operation of ISPRS and other geo-societies, members of ISC (International Science Council) forming GeoUnions chaired by ISPRS since 2020. ISPRS participated in virtual meetings of UN COPUOUS and UN-GGIM. ISPRS also opened its series of The Archive proceedings to important world conferences focussed on ISPRS branches like American Society for Photogrammetry and Remote Sensing, ISRSE or CIPA.

Perspectives and Future Plans

The new ISPRS Council held in June 2022 after the Congress decided to continue in activities which support their members – travel grants to important ISPRS events, summer schools, Keynote Speaker Webinar Series, Keynote Speaker programme for its members. ISPRS wants to improve and strengthen its cooperation with industry by various ways. The main scientific plans have been being prepared since ISPRS General

Assembly approved/appointed new Technical Commission Presidents in Nice; they are creating new structure of their commissions by new Working Groups and their officers who submit their plans for the following period.

Matters/Issues for Consideration

UN-GGIM Geospatial Societies need to develop its strategies and implementation plans for further promotion of geospatial information to address key global challenges, especially the challenges facing the 2030 Agenda. The “Covid-19” situation has brought many changes in private lives, functioning of the human society and of very important topics of the last thirty months. The UN-GGIM experts should use their knowledge and tools to create a global co-operation in evaluation of this period. The evaluation should cover not only the data presented by individual countries, WHO, etc., concerning the numbers of people with covid and victims, but it should go far deeper to analyse the data quality, uncertainty, to homogenise the values and their attributes which are not harmonised in the world. The other part of the analysis should consider restrictions in countries, in various periods and their impact in the scale of countries, continents and the entire world to their population and environment. It is one of many goals of SDGs.

International Union of Geodesy and Geophysics (IUGG)

Activities and Areas of Work

The International Union of Geodesy and Geophysics (IUGG), established in 1919, such as the International Research Council (IRC), is the international 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. IUGG is committed to the principle of free exchange of data and knowledge among nations, and encourages unreserved scientific participation by all people.

IUGG is comprised of eight semi-autonomous International Associations, each responsible for a specific range of topics or themes within the overall scope of Union activities. Owing to the interactive nature of the subject fields managed by the Associations, six Union Commissions and the Working

Group on History have been established which serve the Union and the international geophysical community by promoting the study of particular interdisciplinary problems. The Union Commissions are reviewed and renewed at each IUGG General Assembly. In addition, IUGG establishes inter-Association Commissions, and relationships with other scientific bodies with similar interests.

Due to the COVID-19 pandemic, the year 2021 was another remarkable one in the IUGG's history.

IUGG Business Meetings 2021

Due to the ongoing COVID-19 pandemic, the 2021 meetings of the IUGG Bureau, Executive Committee (EC), Finance Committee (FC), and the Scientific Programme Committee (SPC) for the XXVIII IUGG General Assembly ([IUGG2023](#)) were held online.

The FC (incl. its chair and two members) met with the IUGG Treasurer and its consultant on 23 August 2021 to discuss the IUGG financial report, to review the IUGG accounts, and to take an overview of administrative matters and membership, IUGG grants, and allocations.

The Bureau (President, President-Elect, Secretary General, Treasurer, Executive Secretary, and three members at large) met together with the Chair of the Local Organizing Committee (LOC) for IUGG2023 on 31 August 2021 to prepare for the upcoming IUGG EC Meeting. The IUGG EC Meeting was held on 15 and 16 September 2021. The EC is comprised of the IUGG Bureau, the immediate Past President of IUGG, and the Presidents of the Union Associations. The Association Secretaries General, the Chairs of the FC, the LOC, the SPC for IUGG2023, and representatives from the professional conference organizer (C-IN) and the venue of IUGG2023 (Messe Berlin) were invited to attend the EC Meeting.

The EC Meeting started with a welcome speech given by Charlotte Krawczyk, director of the German Research Centre's (GFZ) Geophysics Department. The GFZ acts, on behalf of the German National Committee, as the host of IUGG2023. The IUGG President, the Secretary General, the Treasurer, the Chair of the FC, and the Presidents of the Union Associations reported on activities since the last EC Meeting (Montreal, Canada, July 2019). The IUGG President-Elect reported on the activities of the Union Commissions. The IUGG Executive Secretary reported on the newly established Union Committees. Other topics on the agenda included: (i) preparations for IUGG2023 in Berlin (LOC Chair Harald Schuh and SPC Chair Jürgen Müller reported on the activities of their committees), (ii) IUGG's involvement in international programmes and collaboration with other organisations, and (iii) IUGG's involvement in activities of the International Science Council (ISC). In addition, there was time for open discussion.

On 15 September 2021, a few members of the IUGG Bureau and the LOC met with representatives from Messe Berlin and C-IN for an on-site tour of the IUGG2023 venue. The members of the EC and the Association Secretaries General were invited to join an online discussion afterwards.

The SPC for the IUGG2023 met on 16 September 2021. The SPC is comprised of the Chair (Jürgen Müller), the IUGG Secretary General, and the Association Secretaries General. The Chair, the Vice Chair of the LOC and a representative of C-IN were invited to join the SPC Meeting. The tentative draft of the science programme was discussed, including topics for Union and inter-Association symposia.

Association Scientific Assemblies 2021

IAG Scientific Assembly 2021

The Scientific Assembly of the International Association of Geodesy (IAG) was held in Beijing, China and online from 28 June to 2 July 2021. Due to the COVID-19 pandemic, the Assembly was organised as a hybrid event for the first time. The main local organiser was the Chinese Society for Geodesy, Photogrammetry and Cartography (CSGPC) with more than 20 co-organisers in China.

An unknown factor in the planning was the effect of the COVID-19 pandemic on the number of participants and the number of abstracts. As a surprise, the number of registered participants was 1,269 which is an all-time record in the history of IAG meetings - more than twice that of the previous record. 435 (34%) of the participants were students and early-career scientists. This is a very good number, and we have to continue efforts also in the future meetings to attract young people to participate.

A total of 615 abstracts were submitted which was also more than twice the expected number. The length of the oral talks was limited to five minutes. In each session, about half of the time was reserved for questions and discussions, which was meant to mitigate the lack of personal contacts. There were three parallel oral sessions and one poster session running each day, allowing about 150 daily presentations of which about 42% were orals.

The theme of the Assembly was "Geodesy for a Sustainable Earth" with a total of seven symposia.

The topics were the following:

1. Reference Frames,
- 2a. Earth's Static Gravity Field,
- 2b. Earth's Time-variable Gravity Field,
3. Earth Rotation and Geodynamics,
4. Positioning and Applications,
5. Global Geodetic Observing System (GGOS), and
6. The ICC symposium with three Inter-Commission Committees and the IAG Project.

During the five days, a total of 36 sessions were organised under the themes. The most popular sessions were related to emerging observing techniques, climate change related topics and geodetic observations of geohazards, in addition to the traditional geodetic topics on reference frames, gravity and deformations.

The technical arrangements went extremely well, thanks to the Local Organisers and skilful technical personnel in Beijing. Sincere thanks to all who made this assembly a great success. Also, many thanks to the symposium organisers, session conveners and chairpersons for the smooth guiding of the program in spite of these exceptional conditions and very busy schedule. We are looking forward to the IAG and IUGG General Assembly 2023 in Berlin, hopefully back to the regular format.

Markku Poutanen, IAG Secretary General

IAGA-IASPEI Joint Scientific Assembly 2021

The International Association of Geomagnetism and Aeronomy (IAGA) and the International Association of Seismology and Physics of the Earth's Interior (IASPEI) had planned to have a joint Scientific Assembly in August 2021 in Hyderabad, India. In the midst of the preparations in 2020 it became clear that a normal in-person meeting will likely not be possible in summer 2021 due to the COVID-19 pandemic. The two Associations and the local organisers decided together to convene the meeting as a virtual event at the originally planned dates.

Thus, the virtual Joint Assembly was held from 21 to 27 August 2021, hosted by the Indian National Academy (INSA) and the CSIR-NGRI with the support from other Earth science institutes of the Indian Governments' Department of Science & Technology, CSIR and Ministry of Earth Sciences. The meeting attracted 828 participants from 53 countries, over 500 from IAGA and nearly 300 from IASPEI and included 212 students from 37 different countries. These numbers are quite satisfying, although a somewhat higher participation was originally expected for an in-person meeting.

The programme did not differ much from the originally planned one, and included three joint plenary talks, eight joint sessions, 27 IAGA and 17 IASPEI symposia with altogether 778 abstracts for oral and poster presentations. It was preceded by the NGRI-CSIR Diamond Jubilee Symposium, which celebrated the 60th anniversary of the institute with eight invited lectures.

During its Opening Plenary, IASPEI presented the IASPEI Medal 2021 to Barbara Romanowicz with a laudation given by Guy Masters. Furthermore, IAGA held its award ceremony where this year's Shen Kuo Medalist, Jay Johnson, gave a well-received lecture entitled "From microphysics to system science: Approaches to understanding dynamics from the sun to Saturn".

Due to the COVID-19 pandemic the Asian Seismological Commission (ASC), one of IASPEI's Regional Commissions, could not hold its General Assembly in 2020. Therefore, the ASC took the opportunity of the Joint Assembly with many participants from Asian countries and organised a General Assembly during the conference.

The Joint Assembly was preceded by the IAGA and IASPEI Schools for Early Career Scientists and a GIFT Workshop to educate teachers from India and neighbouring countries on IAGA and IASPEI topics (see special reports below). All these also were organised for the first time in virtual formats. The International Association of Physics Students, IAPS, that signed a memorandum of understanding for collaborations with IAGA earlier this year, organised another virtual event (IAPS@IAGA) where Early Career Scientists could discuss in small groups with international experts in different fields of IAGA sciences.

The challenge to accommodate all global local times for the presentations at the Joint Assembly led to a concentration of sessions in the period 16:45 to 22:15 IST (10:45 to 16:45 UTC), which resulted in some unfortunate overlaps of sessions. However, all presentations were recorded (either pre-recorded or recorded during live session) and are available for later viewing. The live oral sessions included some lively discussions despite the online limitations, and after some initial difficulties the Association business meetings, an important part of the IAGA and IASPEI Scientific Assemblies, also went well. The only aspect solved less satisfactorily were the poster sessions, which could not be arranged as live discussions.

Overall the technical arrangements worked well. Our Indian colleagues had done a tremendous job to set up the fully virtual environment in less than a year. We sincerely thank the local organisers and the personnel from the professional conference organising company for their dedication. We thank all who made this first virtual IAGA-IASPEI Joint Assembly a great success, including the IAGA and IASPEI officers, symposia organisers, session conveners and chairpersons, who all faced new challenges with the conversion to the virtual format.

IAGA and IASPEI plan to organise another Joint Assembly in Lisbon, Portugal for 2025. We are looking forward to hopefully have this, as well as the IUGG General Assembly in 2023 in Berlin, Germany, as regular meetings with in-person participation.

Monika Korte, IAGA Secretary General
Johannes Schweitzer, IASPEI Secretary General

IACS-IAMAS-IAPSO Symposia Series 2021

In place of the Busan Atmosphere-Cryosphere-Ocean (BACO-21; IAMAS-IACS-IAPSO Joint Scientific Assembly), which had to be cancelled due to travel restrictions, IAMAS, IACS and IAPSO arranged a Virtual Atmosphere-Cryosphere-Ocean seminar series (VACO-21) from 19 to 23 July 2021. IAMAS President Joyce Penner, IACS President-Elect Liss Andreassen and IAPSO President Trevor MacDougall introduced 17 invited speakers, including the recipients of the IAMAS, IACS and IAPSO early career awards for 2021. Over the week, 187 individuals joined the audience. Although the event is now over, recordings of the excellent presentations are available here. In recognition of the large amount of work that the Local Organising Committee had already put into planning BACO-21 before its cancellation, the associations have agreed to hold their July 2025 Joint Scientific Assembly in Busan, Republic of Korea, as BACO-25.

Richard Essery, IACS Secretary General
Steve Ackerman, IAMAS Secretary General
Stefania Sparnocchia, IAPSO Secretary General

Due to the COVID-19 pandemic, the Scientific Assemblies of IAHS and IAVCEI were postponed to 2022 and 2023, respectively.

Scientific Meetings selected for IUGG Support in 2021

IUGG co-sponsors symposia and workshops appropriate to Union disciplines of study. IUGG allocated US\$8,000 to assist the following scientific meetings in 2021 supporting the participation of young and

female scientists and scientists from developing countries (the IUGG Association that endorsed the meeting is indicated in brackets):

- 43rd COSPAR Scientific Assembly, Sydney, Australia, 28 January-4 February (IUGG)
- International Conference on Clouds and Precipitation, Virtual, 3-7 August (IAMAS)
- 13th General Assembly of the Asian Seismological Commission, Virtual, 21-27 August (IASPEI)
- 37th General Assembly of the European Seismological Commission, Virtual, 19-24 September (IASPEI)
- International Ozone Commission Quadrennial Ozone Symposium, Virtual, 3-9 October (IAMAS)

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 and 2021

Due to the COVID-19 pandemic, most of the ICTP scientific meetings planned for 2020 and 2021 were cancelled or postponed. The 2020 and 2021 IUGG contributions will be used to support future ICTP/IUGG projects. The major 2021 event was the [Joint ICTP-IUGG Workshop on Data Assimilation and Inverse Problems in Geophysical Sciences](#), which was organized online from 18-29 October 2021.

Cooperation with the International Science Council (ISC)

ISC Extraordinary General Assembly 2021

The Extraordinary General Assembly 2021 of the International Science Council (ISC) was held online from 1 to 5 February 2021. The agenda can be downloaded [here](#). IUGG was represented by President Kathy Whaler and Secretary General Alexander Rudloff.

ISC Members, including IUGG were invited to discuss and vote on the proposed changes to the ISC Statutes and Rules of Procedure and to elect the 2021 Elections Committee.

The new ISC Statutes and Rules of Procedure are available [here](#).

The composition of the 2021 Elections Committee is available [here](#).

ISC Annual Report 2020

The International Science Council's 2020 Annual Report is now available [here](#). 2020 was an unprecedented year for the scientific community and for the world. The COVID-19 pandemic caused widespread disruption, but also created new opportunities and demonstrated the importance of international scientific collaboration.

ISC Governing Board 2022-2024

At the 2nd General Assembly of the International Science Council (ISC), a new Governing Board (2022-2024) was appointed to lead the ISC, an international nongovernmental organisation (and umbrella organisation of IUGG) that works to provide a global voice for science. The Governing Board is the central decision-making body of the Council, which was formed in 2018 by the merger of the International Council of Science (ICSU), representing the natural sciences, and the International Social Science Council (ISSC).

The ISC Members elected four Officers of the Governing Board and ten Ordinary Members to join the incoming President of the ISC, Peter Gluckman, who takes up his presidency at the conclusion of the 2021 General Assembly.

Motoko Kotani (Mathematics; Japan) has been elected President-Elect, assuming the Presidency at the next General Assembly in 2024.

Anne Husebekk (Medicine; Norway) has been elected Vice-President for Freedom and Responsibility in Science, **Salim Abdool Karim** (Medicine; South Africa) Vice-President for Outreach and Engagement, and **Sawako Shirahase** (Sociology; Japan) Vice-President for Finance of the Council.

The elected Ordinary Members of the Governing Board are: **Karina Batthyany** (Sociology; Uruguay); **Françoise Baylis** (Bioethics, Philosophy; Canada); **Geoffrey Boulton** (Geology; UK); **Melody Burkins** (Geology, Ecosystem Studies; USA); **Mei-Hung Chiu** (Chemistry, Science Education; China-Taipei); **Pamela Matson** (Environmental Science; USA); **Helena Nader** (Biomedical Sciences; Brazil); **Walter Oyawa** (Civil Engineering; Kenya); **Maria Paradiso** (Geography; Italy); and Martin Visbeck (Oceanography; Germany). The Chief Executive Officer, Heide Hackmann, is an ex-officio Member of the Governing Board. A summary of the 2nd ISC General Assembly is available [here](#).

ISC Global Risk Perception Report 2021

The ISC published the [Global Risk Perceptions Report 2021](#), which reports about the global risk perceptions of leaders from business, economics, and government. The publication aims to contribute to the discourse that has been shaped through the respective work of the World Economic Forum and to spark dialogue, identify knowledge gaps, and support the growth of a multi-sectoral scientific community working to better understand and provide solutions to global risks.

ISC also published [A Framework for Global Science in Support of Risk-informed Sustainable Development and Planetary Health](#). This document takes stock of recent developments in disaster risk science and provides a compelling set of directions for research and scientific collaboration for a more holistic and collaborative approach to understanding and managing risks.

Cooperation with International and Intergovernmental Organizations IUGG to be involved in ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management

The IUGG is pleased to announce the initiation of the [ITU/WMO/UNEP Focus Group on AI for Natural Disaster Management](#) (FG-AI4NDM). The focus group is building a community of experts and stakeholders to explore current practices (and untapped potential) in the use of AI to support:

- data (collection/monitoring, handling),
- modelling (reconstructing, forecasting, and projecting), and
- communication (early warning systems, etc.) of natural disasters.

All scientists under the umbrella of the IUGG are welcome to participate! Please [join](#) the mailing list.

UN World Water Development Report 2021 on Valuing Water

On 22 March 2021, the [United Nations World Water Development Report 2021 on Valuing Water](#), the UN-Water flagship Report on water issues, was published by UNESCO and coordinated by the UNESCO World Water Assessment Programme.

The Report assesses the current status of and challenges to the valuation of water across differing sectors and perspectives and identifies ways in which valuation can be promoted as a tool to help achieve sustainability.

IAHS contributed to chapter 5 (Food and agriculture) and chapter 11 (Knowledge, research and capacity development as enabling conditions).

The [Report](#) is available for free download, in English, French and Italian. The [Executive Summary](#) is available in 11 languages. The [Audiobook](#) of the Executive Summary is available in 4 languages.

Open Science and the UNESCO Initiative

The UNESCO recommendation on Open Science was unanimously adopted by Member States during the Science Commission plenary. The road to the Open Science Recommendation being adopted commenced with a resolution from the [40th session of UNESCO's General Conference](#) in 2019, where 193 Member States tasked UNESCO with the development of an international standard-setting instrument.

That instrument, the [UNESCO Recommendation on Open Science](#), has now been adopted by Member States at the Science Commission plenary at its 41st General Conference, paving the way for it to be passed at the full General Conference. As reported in the [IUGG E-Journal Vol. 21. No. 8](#) (item 5), the International Science Council (ISC) supported this initiative with a delegation. IUGG was represented by Christophe Cudennec and Nilay Dogulu (both IAHS).

IUGG at the Global Geoscience Societies Meeting 2021

On 30 June 2021, the American Geophysical Union (AGU) organised the Global Geosciences Societies Meeting. Representatives from 11 societies including the AGU, the African Geophysical Society (AGS), the German Geophysical Society (DGG), the European Geosciences Union (EGU), the Geological Society of America (GSA), the Indian Geophysical Union (IGU), the International Union of Geodesy and Geophysics (IUGG), the Japan Geoscience Union (JpGU), the Korea Geoscience Union (KGU), the Mexican Geophysical Union (UGM), and the American Geosciences Institute (AGI) attended the meeting. IUGG was represented by the President, Secretary General, and Executive Secretary.

Following up on the [Declaration of the Significance of Geoscience Expertise to Meet Global Societal Challenges](#), which was signed by many geoscience societies in May 2020, the representatives of the societies agreed on establishing task groups dealing with strengthening the societies common goals, including (i) support of early-career scientists and student communities, (ii) advocacy for Earth and space sciences in global and domestic policy-making, (iii) public engagement and outreach to increase Earth and space sciences awareness, and (iv) inclusion and representation in Earth and space sciences.

International Year of Basic Sciences for Sustainable Development 2022

On 2 December 2021, the United Nations General Assembly proclaimed 2022 as the International Year of Basic Sciences for Sustainable Development ([IYBSSD 2022](#)).

The IYBSSD 2022 will focus on the links between basic sciences and the [Sustainable Development Goals](#). It was proposed by a consortium of international scientific unions and scientific organisations including IUGG, led by the International Union of Pure and Applied Physics ([IUPAP](#)).

With this [resolution](#), the United Nations General Assembly “invites all [its] Member States, organisations of the United Nations system and other global, regional and subregional organisations, as well as other relevant stakeholders, including academia, civil society, inter alia, international and national non-governmental organisations, individuals and the private sector, to observe and raise awareness of the importance of basic sciences for sustainable development, in accordance with national priorities”.

IUGG is delighted to be a founding partner of the IYBSSD. Science within the remit of IUGG is a close match to the Sustainable Development Goals (see [Mapping IUGG to Sustainable Development Goals](#)), so we can look forward to making a major contribution, through our own activities and in liaison with other organisations, to addressing the goals and celebrating the achievements of the International Year.