

**Report on the 28th IUGG General Assembly held July 11-20, 2023 at the CityCube in Berlin, Germany, by
Katrin Schroeder (IAPSO National Delegate, CNR-ISMAR).**

The 28th IUGG General Assembly has been held July 11-20, 2023 at the CityCube in Berlin, Germany, and was co-organized by the GFZ German Research Centre for Geosciences, Universität Potsdam, BGR Federal Institute for Geosciences and Natural Resources, Geo.X Research Network for Geosciences in Berlin and Potsdam, Leibniz Universität Hannover, DLR Institute of Planetary Research/Technische Universität Berlin, Freie Universität Berlin, BKG Federal Agency for Cartography and Geodesy.

The scientific program covered the full spectrum of geodesy and geophysics, including observation issues from space and on ground, data analysis and integration, modelling and interpretation towards a better understanding of the complex processes in the Earth's system. The symposia were organised by all IUGG Associations. Each of them offered a wide spectrum of oral and poster presentations, as well as joint and union symposia. The participating Associations are: 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). More than 5,000 abstracts have been submitted for about a total of 200 Union, association and inter-association symposia including Union lectures. About 3,500 presentations have been given in oral sessions and about 1,500 as posters, which were presented in close vicinity of the exhibition. Special events were organized for early career researchers where more than 1,300 from 59 countries have attended this IUGG GA. More than 460 abstract were received for sessions run by IAPSO.

Regarding IAPSO, one of its key moments has been the award ceremony, during which the following awards have been presented: Prince Albert I Medal 2023 to Prof. John A. Church, Emeritus Professor at the University of New South Wales, Climate Change Research Centre, "for his outstanding contribution on sea level research and related new insights into climate change". The IAPSO Early Career Scientist Medals has been given Dr. Malte F. Stuecker, University of Hawai'i at Mānoa, USA, in recognition of "his fundamental contributions to understanding the dynamics of tropical climate variability, its interactions with other parts of the climate system, and elucidating the spatial patterns of climate change".

The IAPSO program comprised 8 Symposia and 19 Joint Symposia:

P01 General Topics in Oceanography (physics and biogeochemistry)

P02 Physics and Biogeochemistry of Semi-Enclosed, Shelf Seas, and Coastal Zones

P03 Ocean Mixing Frontiers

P04 Storm Surges, Waves, and Coastal Hazards

P05 The Meridional Overturning Circulation

P06 IIOE-2: A Huge Step Forward for the Indian Ocean Sciences

P07 Unravelling New Aspects of Nutrient Cycling in the Ocean: Multi-proxy and Modelling Approaches

P08 Bringing Scientific and Technological Ocean Information Together for Advancement of Sustainable Development in the Framework of the UN Ocean Decade

JA01 Machine Learning in Geo-, Ocean and Space Sciences (IAGA, IAVCEI, IAHS, IASPEI, IAMAS, IAPSO)

JA03 Analogue Data for the Future: Preservation and Present-Day Utilization of Historical Data in the Geosciences (IAGA, IACS, IASPEI, IAHS, IAG, IAPSO)

JC05 Atmosphere-Ocean-Sea Ice Interactions: Physical and Chemical Processes (IACS, IAMAS, IAPSO)

JG05 Geodesy for Climate Research (IAG, IAMAS, IACS, IAPSO, IAHS)

JG06 Monitoring Sea Level Changes by Satellite and In-Situ Measurements (IAG, IAPSO)

JG07 Modern Gravimetric Techniques for Geosciences (IAG, IAVCEI, IAPSO, IASPEI)

JH01 New, Large, and Open Data for the Earth and Environmental Science Community (IAHS, IAPSO, IACS, IAGA, IASPEI)

JH04 Anthropocene: Perspectives From and Within Geophysics (IAHS, IAMAS, IACS, IASPEI, IAVCEI, IAG, IAPSO)

JH06 Education & Outreach in Geosciences (IAHS, IASPEI, IAGA, IAG, IAVCEI, IACS, IAMAS, IAPSO)

JM02 Tropical-Polar Interactions, Arctic Amplification and Its Influence on Midlatitude Weather (IAMAS, IACS, IAPSO)

JM05 Earth System Models: Assessing the Earth System's State and Fate From Regional to Planetary Scales (IAMAS, IAHS, IACS, IAPSO, IAVCEI?)

JP01 Tides (IAPSO, IAHS, IAGA, IASPEI, IAG)

JP02 Arctic Ocean Physics and Biochemistry in a Changing Climate (IAPSO, IACS)

JP03 Physical and Biogeochemical Ocean and Ice Processes in the Southern Ocean: Observations, State Estimation and Modeling (IAPSO, IACS)

JP04 Ice Sheet-Ocean Interactions: Challenges and Insights From Theory, Observations and Modelling (IAPSO, IACS, IASPEI)

JP06 Electromagnetic Studies of the Ice and Ocean System (IAPSO, IACS, IAGA)

JS05 Real-Time GNSS Data and Products Usage: Interoperability and Management Challenges (IASPEI, IAG, IAVCEI, IAPSO)

JV02 Dispersal of Volcanic Particulates in the Atmosphere and the Oceans (IAVCEI, IAMAS, IAPSO) Katrin Schroeder participated to the Association Meeting as the new National Delegate, replacing Mauro Scavo who resigned from this role in June 2019.

Report on the IAPSO General Business Meeting at the 28th IUGG General Assembly, July 14th, 18.30-20.00

Participants: National Delegates, Executive Committee Members and invited guests

1. Introduction of IAPSO Executive Committee (EC) and National Delegates

2. Approval of the agenda

The agenda is approved

3. Approval of the minutes of the GBM Montreal, Canada, on July 11, 2019

available at https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2019/IAPSO_GBM_2019_Minutes.pdf

The minutes are approved

4. Election of new Executive Committee Members for 2023-2027

President: Hans van Haren (The Netherlands, M)

Secretary General: Silvia Blanc (Argentina, F)

Past President: Trevor McDougall (Australia, M)

Vice President: Agatha de Boer (Sweden, F)

Vice President: Toshi Hibiya (Japan, M)

Treasurer: Ken Ridgway (Australia, M)

EC Members at Large (eight): Juliet Hermes (South Africa, F), Yukio Masumoto (Japan, M), Malin Ödalen (Germany, F, ECS), Jae-Hun Park (Korea, M), Regina Rodrigues (Brazil, F), Joellen Russell (USA, F), Ale Sanchez-Franks (UK, F), Peter Zavialov (Russia, M)

5. Adoption of the IAPSO action plan to implement IUGG Resolution 1 on Reducing the Carbon Footprint by the Research Community

The resolution has been adopted

(https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A3_IAPSO_action_plan_to_implement_IUGG_Resolution_1_2019.pdf)

6. Reports on actions taken by the IAPSO EC and Officers

T. McDougall reported on the following:

Establishment of the Joint Commission on Ice-Ocean Interactions (JCIOI, joint with IACS).

Establishment of the IAPSO Best Practice Study Groups.

2021 and 2023 Awards (Prince Albert I Medals, IAPSO ECS Medals)

2023 Eugene LaFond Medal; process update.

Award committee for 2025 Prince Albert I Medal; generation of nominations.

Award committee for 2025 IAPSO Early Career Scientist Medals; generation of nominations.

Other matters arising from Executive Committee meetings.

7. IAPSO finance report

K. Ridgway reported on the IAPSO Quadrennial and interim financial reports 2019-2022 (https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A4_IAPSO_Financial_Reports_2019-2022.pdf) and on the Budget 2023 – 2025 (https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A5%20IAPSO_Biennial_Budget_2023_2024a.pdf)

8. Report on IAPSO activities 2019-2022

S. Sparnocchia (Secretary General) reported on the IAPSO activities of the past 4 years, IUGG General Assembly in Montreal 2019, Attendees, number of symposia and presentations, IAPSO grants and gave a preliminary report on the IUGG General Assembly 2023 in Berlin.

Available on the IAPSO website

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A6_IAPSO_Activities_Quadrennial_Report_2019-2022.pdf

and

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A7_Report_IUGG_GA_2019.pdf

The Secretary General starts reporting on the principal activities carried out by the Association:

Organization of Scientific Assemblies

- The 27th IUGG General Assembly in Montreal, Canada, from 8-18 July, 2019. The Assembly attracted about 4,000 participants from 94 countries, 346 of them registered as IAPSO. The IAPSO scientific sessions were held from 9-14 July and included 11 IAPSO symposia (216 oral presentations and 94 posters) and 5 IAPSO-lead Association Joint symposia (111 oral presentations and 51 posters). IAPSO also co-sponsored 12 Joint symposia led by another Association (189 oral presentations and 104 posters).
- The Virtual Atmosphere-Cryosphere-Ocean seminar series (VACO-21) replaced the postponed joint assembly with IAMAS and IACS in Busan (South Korea). It consisted of a reduced number of invited speakers. The program was organized over 5 days from Monday 19 July to Friday 23 July 2021. Over the week, 187 individuals joined the audience. Recordings of the excellent presentations are available here: <https://www.youtube.com/channel/UCP3bCxu-NlglINmeoHgGxEQ/videos>. IAPSO contributed with the talks of 4 invited speakers.

IAPSO endorsed the following scientific meetings supported by IUGG:

- The Workshop on Sea Level Data Archaeology, held from 10 to 12 March 2020 in Paris, France. (http://legacy.iocunesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26751).
- The Second World Conference on Meteotsunamis, held from 18 to 20 May 2022 in Menorca, Spain. (<http://2cm-menorca.ime.cat/>).

IAPSO Awards

Two Prince Albert I Medals were awarded in this four-year period. Prof Corinne Le Quéré was awarded in 2019 for her fundamental contributions to our understanding of ocean biogeochemistry and global carbon cycling, and her work to quantify the ocean's role in the uptake of global carbon emissions. Prof Carl Wunsch was awarded in 2021 in recognition of his ground-breaking contributions to the development of modern physical oceanography.

Four Early Career Scientist Medal were awarded in this quadrennium. Dr Gerard McCarthy is the recipient of the 2019 IAPSO Early Career Scientist medal in physical ocean science for his outstanding contribution to research on the Atlantic Meridional Overturning Circulation and its role in Earth's climate system. Dr Mar

Benavides is the recipient of the 2019 IAPSO Early Career Scientist medal in chemical ocean science for her development of original strategies, integrating disciplines, to introduce a novel and comprehensive oceanographic approach to nitrogen cycling research. Dr Thomas Wahl is the recipient of the 2021 IAPSO Early Career Scientist medal in physical ocean science for his fundamental contributions to the research on changes in mean sea level, tides, storm surges, waves, and their interactions. Dr Jessica Fitzsimmons is the recipient of the 2021 IAPSO Early Career Scientist medal in chemical ocean science for her contributions to advances in the analysis, distribution and cycling of trace elements in the oceans, particularly iron.

The Eugene LaFond Medal was awarded in 2019 to Phd student Mr. Balakrishnan Rohith from India for his oral presentation 'Basin-wide sea level coherency in the tropical Indian Ocean driven by Madden-Julian Oscillation' delivered within the IAPSO-IAG joint symposium 'Monitoring Sea Level Changes by Satellite and In-Situ Measurements' during the IUGG 2019 General Assembly.

IAPSO Best Practice Study Groups

Starting from 2019 and every two years, IAPSO issues a call for two Best Practice Study Groups to support the community in solving problems in the conduct of oceanographic research. IAPSO provides each group with funding for the cost of one meeting. So far 4 study groups have been approved. Some of the activities were delayed by the covid pandemic which hindered the organization of the meeting. These are

- Best Practice Study Group on moored CTD measurements (2020-2021, extended to 2022)
- Best Practice Study Group to identify approaches to be recommended for seawater pH measurement (2020-2021, extended to 2022)
- Best Practice Study group on Tidal Analysis (2022-2023)
- Best Practice Study Group for the systematic evaluation of mapping methods in reconstructing ocean heat content and thermosteric sea level (2022-2023)

Working Groups, Commissions and Services

IAPSO is sponsoring/co-sponsoring Working Groups, Commissions and Services relevant to its prime goal of 'promoting the study of scientific problems relating to the oceans and the interactions taking places at the sea floor, coastal, and atmospheric boundaries insofar as such research is conducted by the use of mathematics, physics, and chemistry'. Information on Working Groups, Commissions and Services, including their reports, are maintained and updated on the IAPSO website (<https://iapso-ocean.org/activities/...>). Those active in the period of this report are:

- IAPSO Early Career (EC) Scientist Working Group. <https://www.iapsoecs.org/>. The first IAPSO ECS networking event was held during the IUGG 2019 General Assembly. A second virtual interactive career event was organized during the VACO21 week. The event was recorded and made available on the IAPSO ECS website.
- Joint Committee on the Properties of Seawater, JCS (with SCOR and IAPWS). <http://www.teos-10.org/>. This is a permanent committee with limited membership responsible for maintaining and improving the recent seawater standard (TEOS-10). In particular, the development of new definitions and measurement procedures for seawater salinity, seawater pH and relative humidity of air, traceable to the SI and thus ensuring measurement comparability over climatological time scales of decades or centuries, are being pursued by this joint committee. A repository of knowledge and software for the scientific community is maintained in their website.
- Commission on Mean Sea Level and Tides (CMSLT). <https://iapso-ocean.org/activities/commissions-and-committees.html>. The Commission aims to support research into applications of sea level measurements. In

addition to sponsoring meetings, the CMSLT is the body that the Permanent Service for Mean Sea Level formally reports to.

- Joint Tsunami Commission (with IAPSO/IASPEI/IAVCEI). <https://tsunamicommission.ipma.pt/home/>. It is an Inter-Association Commission responsible for international coordination of tsunami related meetings, research, and publications. Members of the Tsunami Commission actively participated in the organization of numerous tsunami sessions at AGU, EGU, AOGS, as well as regional and national workshops and conferences.
- Joint Commission on Ice-Ocean Interactions (JCIOI, joint with IACS). <https://sites.google.com/view/jcioi/home>. The Commission was formally established in January 2021, to facilitate community efforts to fill critical knowledge gaps in ice-ocean interactions. Their first workshop was held online from 17-20 October 2022, drawing together researchers interested in the processes that govern ocean-driven melt of glaciers and ice sheets. The sessions were recorded, and are available via <https://www.youtube.com/channel/UC-K08KQA86pNh5oLHNZU0Hw>.
- Permanent Service for Mean Sea Level (PSMSL). Website: [www. www.psmsl.org/](http://www.psmsl.org/). The 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 staff is continuously engaged in keeping the data bank updated with the most recent data. These are widely used in scientific work, climate projections of sea level change, and to support decision making on how to improve resilience and adapt to future changes.
- IAPSO Standard Seawater Service, hosted by OSIL since 1989. www.osil.co.uk. The IAPSO Standard Seawater Service is the only internationally recognized standard for the calibration of salinity measurement devices. Under an agreement with IAPSO, OSIL produces and supplies ampoules of standard seawater to the oceanographic community.

SCOR Administration and collaboration

SCOR continues its activities in being the oversight and reporting body for many international marine biological bodies to the International Science Council, and in funding between 2 and 3 new Working Groups each year. These Working Groups are funded for three face-to-face meetings of up to 10 international researchers on topics which are in need of such international discussion and resolution. In the past four years the following three Working Groups have been established in the discipline areas of immediate relevance to IAPSO.

- Analysing ocean turbulence observations to quantify mixing (ATOMIX)
- Developing an Observing Air-Sea Interactions Strategy (OASIS)
- Coupling of ocean-ice-atmosphere processes: from sea-ice biogeochemistry to aerosols and Clouds (Clce2Clouds)

The October 2019 SCOR annual meeting in Japan was attended in person by IAPSO President Trevor McDougall. The subsequent annual meetings of 2020, 2021 and 2022 were attended virtually by him.

PLANNED FUTURE ACTIVITIES/ ANNOUNCEMENTS

- Participation in the 2023 SCOR Annual Meeting in Guayaquil, Ecuador from 17 to 19 October 2023.
- Organization of the next Joint Assembly with IAMAS and IACS in Busan, Republic of Korea, in 2025.

9. Reports from IAPSO Commissions, Services, and Working Groups

The reports of the above mentioned commissions can be found here:

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A8_JCS_Report_2019-2022.pdf

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A9_Tsunami_commission-Activities_2019-2022.pdf

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A10_Report_JCIOI_Activities_2019-2022.pdf

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A11_IAPSO_PSMSL_2019-2022.pdf

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A12_IAPSO_SSW_Report_2019-2023.pdf

https://iapso-ocean.org/images/stories/business_meetings_agendas_and_minutes/2023/A13_ECS_WG_Activity_report_2019-2022.pdf

10. Plans for the next Joint Scientific Assembly

Prof. Young Ho Kim, NC Republic of Korea and member of BACO25 LOC presented the venue and logistics for the next joint Scientific Assembly to be held in Busan in 2025 (July 20-25). http://baco-25.org/2025/english/main/index_en.asp

11. Update on the Decade of Ocean Science for Sustainable Development

Presented by Christa von Hillebrandt-Andrade, IAPSO EC member

12. Call for any resolutions

none

13. Other Business

none