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This monthly newsletter is intended to keep IUGG Members and individual scientists informed about the activities of the Union, its Associations and interdisciplinary bodies and about the actions of the IUGG Secretariat, Bureau, and Executive Committee. Past issues are posted on the IUGG website (<http://www.iugg.org/publications/ejournals/>). E-Journals may be forwarded to those who will benefit from the information. Your comments are welcome.

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1. IUGG's Centennial Anniversary – historical note I

To celebrate IUGG's 100th anniversary, we start publishing short stories about the history of the Union, which was established in Brussels, Belgium, on 28 July 1919. The first story is about its foundation.

“By the First World War's (WWI) outbreak in 1914, international organizations for geodesy, seismology, meteorology, geomagnetism, geoelectricity, and oceanography had already been established. The war interrupted the operation of these bodies, although some were kept active by then-neutral nations. During WWI, some scientific leaders from the allied nations gave thoughts to the post-war renewal of international scientific cooperation. Though early efforts in international cooperation within international associations and the network of national academies were very successful, discussion between existing geoscientific societies and national academies was limited, forcing scientists to devise a new model of cooperation (Good, 2000; Ismail-Zadeh, 2016).

In 1918, representatives of the scientific academies of allied nations decided to foster international scientific cooperation, and establish together with the International Research Council (IRC) scientific unions to organize and promote international cooperation. In particular, a resolution was passed in favor of establishing an international geophysical union “for the purpose of initiating and promoting researches in geophysics” (Wood, 1919), to be made up of all existing scientific groupings dealing with the physical sciences of the Earth. The original proposal for the name of the union was the “international geophysical union”. However in May 1919, at a preliminary meeting, the IRC adopted an expanded name, “International Union of Geodesy and Geophysics” (IUGG), based on a motion of

the representative from Italy (Bauer, 1919). The motivation of the Italian representative is unknown; one conjecture is that in the beginning of the 20th century geodesy positioned itself as a branch of mathematics rather than a branch of physical sciences, and this may be the reason why geodesy was listed separately from all other physical disciplines of IUGG at the time of the Union's establishment. At the same meeting, draft Statutes for IUGG were adopted.

The formation of IUGG was finalized at the first IRC General Assembly held on 18-28 July 1919, in Brussels, Belgium, with the approval of its statutes and future activities (Lyons, 1919). The first nine Member countries of IUGG were Australia, Belgium, Canada, France, Italy, Japan, Portugal, the United Kingdom (UK), and the United States of America (USA). IUGG included several branches of science for which special organizations had existed for many years, well before WWI. They were reconstituted as six Sections within IUGG, each with its own executive committee. According to Bauer (1919), those initial Sections were: (1) Geodesy (President William Bowie, USA, and Secretary Georges Perrier, France); (2) Terrestrial Magnetism and Electricity (President Aikitsu Tanakadate, Japan, and Secretary Louis Agricola Bauer, USA); (3) Meteorology (President Sir William Napier Shaw, UK, and Secretary Charles Frederick Marvin, USA); (4) Physical Oceanography (naming of President was deferred, and Secretary Giovanni P. Magrini, Italy; later Prince Albert I of Monaco was elected President of this section); (5) Seismology (the organization of the section was deferred because of the agreement among the founding member countries regarding the continuation of the International Seismological Association); and (6) Volcanology (President Annibale Riccò, Italy, and Secretary Alessandro Malladra, Italy). Charles Lallemand (France) became the first President of the Union, serving until 1933, and Sir Henry G. Lyons was the first IUGG Secretary General, serving until 1930. Four Vice-Presidents were named: H.S.H. Prince Albert I of Monaco, Bowie (USA), Sir Shaw (UK), and Tanakadate (Japan).

Although German scientists and academies played an important role in the establishment of international associations in geodesy and seismology, the involvement of Germany and other countries of the Central Powers as well as Russia in geodetic and geophysical cooperation was interrupted by WWI and the Russian revolution in 1917. Following the IRC rules, the IUGG membership at the beginning was restricted to the allied and neutral nations. Although the ISC restriction on the membership was removed in 1926, and IUGG's own membership became more inclusive, the international cooperation between allied, Central Powers, and neutral countries resumed to the full extent only after WWII (Cock, 1983; Good, 2000; Ismail-Zadeh, 2016).

The Union was established for the period of 12 years, subject to renewal and modification at the end of this period. Delegates of IUGG Member countries agreed to hold general assemblies of the Union every three years. Also, they decided that the Union could meet at any place and not necessary at the same place as the IRC, and Union Sections could call special meetings, when they found them necessary. The objectives of the Union as stated in the Statutes were (1) to promote the study of problems concerned with the figure and physics of the Earth; (2) to initiate and coordinate researches which depend upon international cooperation and to provide for their scientific discussion and publication; and (3) to facilitate special researches such as the comparison of instruments used in different countries (Bauer, 1919)." (This story has been reproduced from Ismail-Zadeh and Joselyn, 2019).

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2. Further nominations for IUGG Officers (2019-2023)

The officers of the Union and Associations, and the National Committees for IUGG may make further nominations and/or recommendations to the Nominating Committee by **8 April 2019**. Any new nominations for a given position of the IUGG Bureau, supported by at least three Presidents or equivalent officers of National Committees of Member Countries, and accompanied by the written acceptance of candidates and a resumé outlining their position, research interests and Union related activities, shall be added to the list above.

3. IUGG Gold Medal 2019 to W. Richard Peltier



The IUGG Gold Medal is bestowed on William Richard Peltier (University of Toronto, Canada) for “*his scientific contributions that have been pioneering and profound in deep earth physics and climate system processes, and for his unselfish contributions to international scientific collaboration*”. “Professor Peltier is certainly one of the few living geophysicists who have had profound influence in the field of the Earth system evolution. His work is truly interdisciplinary, involving geophysics, geodesy, glaciology, climate and paleo-climate science, atmospheric science and geophysical fluid dynamics”, IUGG Fellow Anny Cazenave (France) tells about her colleague.

W. Richard Peltier gained a BSc in Physics, in 1967 from the University of British Columbia, MSc and PhD, both in Physics, in 1969 and 1971, respectively, from the University of Toronto, and DSc from University of Waterloo in 2007. He moved from the position of Assistant Professor (1974) to Full Professor of the University of Toronto in five years. He was visiting professor at UCLA (USA), NCAR (Boulder, Colorado), Cambridge University (UK), IPGP and ENS Paris (France), and University of Bergen, (Norway). W. Richard Peltier has distinction of having been made a Fellow of the American Geophysical Union, the American Meteorological Society, the Royal Society of Canada, and the Norwegian Academy of Science and Letters. He received a number of awards including the top prizes of Canada and the United States.

The Gold Medal will be presented to W. R. Peltier by the IUGG President at the Award Ceremony of the XXVII IUGG General Assembly on 13 July 2019 in Montreal, Canada. The Medalist will receive also a certificate of IUGG Honorary Membership, and a Fellow pin. Peltier will give the Medal Lecture on 17 July 2019.

4. Reports on the ICTP-IUGG joint geoscience education activities

Since 2011, the Abdus Salam International Centre for Theoretical Physics (ICTP) and IUGG has been working together to enhance geophysical and geodetic education and science collaboration. IUGG awards annually grants (48 grant 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.

Integrated Environmental Health Impact Assessment (IEHIA) of Air Pollution and Climate Change in Mediterranean Areas

The school was held at ICTP, Trieste, Italy, from 23 to 27 April 2018. The Mediterranean is a hotspot for climate change and air pollution. Climate change will significantly impact the regional air quality by reinforcing the hot, sunny and dry Mediterranean climate. Mediterranean inhabitants are already regularly exposed to pollutant loads well above WHO (World Health Organization) air quality recommendations standards and will be further exposed. Additional exposures to air pollution and warm conditions will result in an excess of premature deaths, but we still lack quantification of the impact in southern and eastern countries. Thus, there is a need to promote and develop Integrated Health Impact assessment (IHIA) approach by empowering scientists from around the Mediterranean basin.



The objective of the school was to strengthen in- country scientists and stakeholders capacity to face the health challenges posed by environmental stressors. It aimed at giving early-stage researchers a good understanding of risk and uncertainty matched to a set of practical skills in facing the environmental health issues related to evaluating the health impact of air pollution and climate change. Students were trained the practice of exposure assessment, epidemiology and integrated health impact assessment. The school introduced state-of-the-art knowledge on air pollution and climate change in the Mediterranean region, as well as methodologies of health impact assessment. It gave students knowledge of protocols, tools, sources of data and has made them practice on case studies specifically designed for the school in order to enable them performing air quality and climate health impact studies including economic valuation. The school gave insights on how to identify public health priorities for research and preventive actions. The teaching was provided by recognized

experts in atmospheric chemistry, climate, epidemiology, toxicology, economics and other fields. Participants were able to interact and communicate with all these experts. Cosponsors: International Union of Geodesy and Geophysics (IUGG), and Chemistry-Aerosol Mediterranean eXperiment (ENVI-MED), ARCHIMEDES, France. Organizers: Carla Ancona (Dept. of Epidemiology, Lazio Reg. Health Service, Rome, Italy), François Dulac (CEA LSCE, France), Eric Hamonou (CNRS LSCE, France), Konstantinos Makris (Cyprus International Institute for Environmental and Public Health, Cyprus), and Filippo Giorgi (ICTP, Trieste, Italy).

Summer School on Modelling Tools for Sustainable Development - OpTIMUS

The school was held at ICTP in Trieste, Italy from 4 to 29 June 2018, and combined lectures and hands-on exercises in the use of open source modeling tools integrating climate, land-use, energy and water systems, electricity access and investment issues for model-informed policy formulation towards the implementation of the 2030 Agenda for Sustainable Development. Leading academics and researchers working in the field of model-informed development strategies provided four weeks of intensive training of government officials from countries participating in projects on analysis and modelling capacity development. Participants worked on their modeling and analysis skills about the operation and extension of their national models, incorporating and testing new and evolving policy issues and contributing to the practice of evidence-based policy formulation regarding national sustainable development policies. The suite of OpTIMUS modelling tools used includes the geospatial electricity access model OnSSET (OnSSET.org), the energy system and investment model OSeMOSYS (OSeMOSYS.org) and CLEWS - the integrated Climate, Land, Energy and Water System model (OSiMOSYS.org). Topics of the school were Climate variability and change, Land use planning and change, Energy systems, Water resources, Socioeconomic scenario modelling, Integrated modelling for energy systems, Geo-spatial modelling, and Medium to long term energy investment modelling. Cosponsors of the school: International Union of Geodesy and Geophysics (IUGG), United Nations Development Programme (UNDP), UN Department of Economic and Social Affairs (UNDESA), The World Bank, Royal Institute of Technology (KTH), University of Cambridge, and A Global Community of Practice (OpTIMUS). Organizers of the school: A. Tompkins (ICTP), M. Howells (KTH).

Summer School on Theory, Mechanisms and Hierarchical Modelling of Climate Dynamics: Multiple Equilibria in the Climate System

The Summer School on Theory, Mechanisms and Hierarchical Modelling of Climate Dynamics: Multiple Equilibria in the Climate System was held in Trieste, Italy from 25 to 30 June 2018. The climate community is still faced with large uncertainties in estimating possible climate changes in the next decades and quantifying the relative role of anthropogenic contribution to climate change. Although most modern climate models are able to reproduce reasonably well global climatologies and patterns of interannual variations, they still struggle with pervasive biases and the representation of some of the climate phenomena involving the interaction and coupling between the atmosphere, the ocean and the cryosphere. The problem is compounded by the limited understanding of some of the physical mechanisms giving rise to both our present mean climate and its natural variability at different time scales.

One possible way forward is the use of a hierarchy of models to tackle the most pressing questions in climate dynamics and modeling. Key among them, is whether the climate is stable, or whether internal feedbacks could lead to tipping points, abrupt changes, and transitions to fundamentally different equilibria. Changes in the oceanic overturning, ice-albedo effects, land-surface and vegetation coupling to the atmosphere, and radiative- convective properties of the atmosphere have all been suggested as possible causes of instability in the climate system. Advances in our understanding, quantification, and modelling of these processes are necessary both for the

interpretation of the paleoclimate record and for the projection of possible future climate states. A variety of studies have found that multiple equilibria exist both in highly idealized and more comprehensive models of the climate system. Whether multiple equilibria do exist in state-of-the-art climate models is still a subject of controversy.



A fundamental understanding of key processes within a hierarchical modeling framework will eventually translate into a better representation and simulation within state-of-the-art climate models, as it brings new insights for process-based evaluation of climate model reliability and fit for purpose. The use of hierarchies additionally promotes the use of standardized performance metrics and highlights instances when post-processing approaches (e.g. bias correction) or diverse model tuning practices should be explored. The school was based on lectures on theoretical aspects of atmosphere, ocean and climate dynamics, with a focus on the present state of established knowledge and relevant mechanisms. The topic of the school, *Multiple Equilibria in the Climate System*, was the subject of afternoon lectures, giving an overview of the most recent progress and hypotheses suggesting the existence of multiple equilibrium states, and consequences for past and future climates. Afternoons were devoted to practical sessions, involving the use of simplified climate models and analysis of relevant data sets. Sponsors of the school: IUGG - International Union of Geodesy and Geophysics (IUGG), European Geosciences Union (EGU), Climate Variability and Predictability Program (CLIVAR), World Climate Research Programme (WCRP). Organizers of the school: Fred Kucharski (ICTP), Anna Pirani (Universite' Paris-Saclay), Adrian Tompkins (ICTP), Michela Biasutti (Columbia University, USA), Aiko Voigt (KIT, Germany), Mike Byrne (Imperial College, UK), Riccardo Farneti (ICTP).



The school was followed by the workshop *WCRP Grand Challenge on Clouds, Circulation and Climate Sensitivity: 2nd Meeting on Monsoons and Tropical Rain Belts* (2-5 July 2018). Reliable projections of tropical rainfall changes are key to any climate adaptation efforts in a warming world. Yet, our global climate models are a subpar tool for the task: their spatial resolution is too coarse to reproduce the deep convection that produces most rainfall in the tropics, and current parametrizations are inadequate – as signified by persistent biases in the simulation of the annual and diurnal cycles of rainfall in large areas of the oceans and continents, as well as the response to forcing of the past. Nonetheless, tropical rainfall is organized in the large-scale structures of the monsoons and the ITCZ whose dynamics are shaped by large-scale energetic and momentum constraints that involve the global circulation of both the ocean and the atmosphere. This suggests that building a coherent understanding of tropical rainfall can benefit from an understanding of these large-scale influences and their coupling with small scale cloud and precipitation processes.

Making this link across scales to improve our understanding and our ability to anticipate future tropical rainfall changes is a key question in climate science. The workshop, building on the knowledge and practical skills acquired during the school, aimed to bring together expertise on large-scale atmospheric and oceanic dynamics, small scale cloud and precipitation processes, hierarchical climate modeling and observation. The aim was to both review recent progress on tropical rainfall dynamics and to identify areas where progress is most amenable in the future given the existing and emerging modelling tools and theoretical frameworks.

The Coastal Ocean Environment Summer School in Ghana

The school took place from 30 July to 4 August 2018 at the University of Ghana in Accra, Ghana. Marine issues of great importance to Ghana include fisheries, piracy, pollution, shipping and port management, and the recent advent of offshore oil drilling. The school included lectures, hands-on labs, and a field trip, and addressed the physics and biogeochemistry of the coastal ocean environment, as well as the tools that scientists use to describe and understand this environment. The school included a larger contingent of participants from African countries outside of Ghana: Nigeria, Cote d'Ivoire, Mali, and Benin. The school introduced a “project track” for participants, who wanted to focus on a project. The participant projects were presented on the last day of the school.



Cosponsors of the school: International Union of Geodesy and Geophysics (IUGG), U.S. National Science Foundation (NSF), and University of Michigan. Organizers of the school: K. Appeaning-Addo (Univ. Ghana), B.K. Arbic (Univ. Michigan), R. Farneti (ICTP), and E. Mahu (Univ. Ghana). For detailed information on the programme including list of speakers and photos please see the COESSING school page <https://coessing.org/2018-school>.

Second Workshop on Regional Climate Modeling and Extreme Events over South America

The workshop was organized by the University of São Paulo, and held in São Paulo, Brazil, from 5 to 9 November 2018. The main focus of the workshop was the application of different dynamical (RegCM4) and ESD models for the generation of high resolution climate experiments in the framework of the SESA-Flagship Pilot Study of the Coordinated Regional Downscaling Experiment (CORDEX). One of the objectives of the study is to investigate multi-scale aspects, processes and interactions that result in extreme precipitation events using dynamical models (high resolution, convection permitting and coupled models) and statistical models and to compare and validate ESD and RCM products exploring the added value of downscaling. The workshop made the participants aware of the available climate data in South America, and trained them to analyze and downscale these data to an adequate resolution needed to reproduce a particular phenomenon of interest. Lectures and hands-on sessions on these tools applied to climate change studies provided a background for regional climate modelling focused on the South America region. The following topics were covered by the workshop: added value of dynamical and statistical downscaling; climate change at global and regional scales; climate variability at regional scale influenced by local and remote forcing; analysis of the model results; and uncertainties in global and regional climate change projections. Cosponsors of the workshop: International Union of Geodesy and Geophysics (IUGG), National Scientific and Technical Research Council (CONICET), The São Paulo Research Foundation (FAPESP), Universidade Estadual Paulista (UNESP), Núcleo de Apoio à Pesquisa – Mudanças Climáticas (INCLINE), Universidad de Buenos Aires (UBA), and Universidade de São Paulo (USP). Organizers of the workshop: E. Coppola (ICTP-Italy), R. P. da Rocha (USP), M. Llopart (UNESP), S. Solman (CIMA-CONICET), M.L. Bettolli (UBA-CONICET), M. Barreiro (URU).

(Photos: courtesy of ICTP)

5. Meeting calendar

A calendar of meetings of interest to IUGG disciplines (especially those organized by IUGG Associations) is posted on the IUGG website (<http://www.iugg.org/calendar.php>). Individual Associations may list more meetings on their websites according to their disciplines.

April

- 2-4, GEO, Amsterdam, The Netherlands, Geospatial World Forum. Web: <https://geospatialworldforum.org/>
- 3-7, PAIGH, Washington DC, USA, American Association of Geographers Annual Meeting 2019. Web: <https://annualmeeting.aag.org/AAGAnnualMeeting/Home.aspx?hkey=9c5fc57b-feba-472d-9918-f23136815c1b&WebsiteKey=5c824785-24cf-4da2-80b9-d257a3acc8af>
- 4-5, IAMAS, Cambridge, United Kingdom, 1st QuIESCENT (Quantifying the Indirect Effect: from Sources to Climate Effects of Natural and Transported aerosol in the Arctic) Workshop. Web: <https://sites.google.com/view/quiescent-arctic/workshops/1st-quiescent-workshop>
- 7-12, EGU, Vienna, Austria, European Geosciences Union General Assembly 2019. Web: <https://www.egu2019.eu/>
- 11-12, IAU, Brussels, Belgium, IAU 1919-2019: 100 Years Under One Sky Celebration Flagship Ceremony. Web: <https://www.iau-100.org/programme-brussels-event>

- 18-20, IUGG, COSPAR Mandi, India, C2E2 Himalaya 2019. International Workshop on Climate Change and Extreme Events in the Himalayan Region. Web: <http://www.c2e2himalaya.iitmandi.ac.in/>

May

- 8-12, IPCC, Kyoto, Japan, 49th Session of IPCC. Web: https://www.ipcc.ch/site/assets/uploads/2019/01/IPCCP49_Info_Participants.pdf
- 13-17, UNISDR, Geneva, Switzerland, Global Platform for Disaster Risk Reduction. Web: <https://www.unisdr.org/conference/2019/globalplatform/home>
- 15-17, IAG, Athens, Greece, 4th Joint International Symposium on Deformation Monitoring (JISDM). Web: <http://jisdm2019.survey.ntua.gr/>
- 20-24, IUGG, ICTP, Trieste, Italy, International Space Weather Initiative Workshop. Web: <http://indico.ictp.it/event/8682/>
- 22-24, IAG, Tallinn, Estonia, EUREF Symposium 2019. Web: http://www.euref.eu/euref_symposia.html
- 27 May-7 June, IUGG, ICTP, Trieste, Italy, Fifth Workshop on Water Resources in Developing Countries: Hydroclimate Modeling and Analysis Tools. Web: <http://indico.ictp.it/event/8685/>

June

- 10-14, ISPRS, Enschede, Netherlands, ISPRS Geospatial Week 2019. Web: <https://www.gsw2019.org/>
- 24-28, CTBTO, Vienna, Austria, SnT 2019. Science and Technology Conference. Web: <https://www.ctbto.org/SnT2019/>
- 26-28, IAMAS, WCRP, Bangi, Malaysia, 4th ACAM (Atmospheric Composition and Asian Monsoon) Workshop and 3rd ACAM Training School. Web: <http://www.ukm.my/acam/>

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