



## INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS UNION GEODESIQUE ET GEOPHYSIQUE INTERNATIONALE

# The IUGG Electronic Journal

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This informal newsletter is intended to keep IUGG Member National Committees informed about the activities of the IUGG Associations, and actions of the IUGG Secretariat. Past issues are posted on the IUGG Web site (<http://www.iugg.org/publications/ejournals/>). Please forward this message to those who will benefit from the information. Your comments are welcome.

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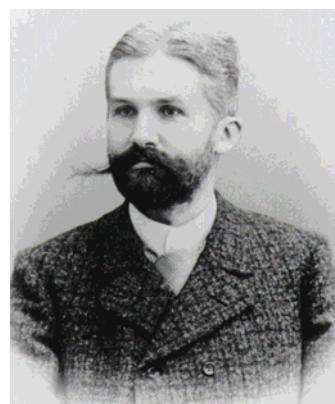
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### 1. Foundation of Instrumental Seismology

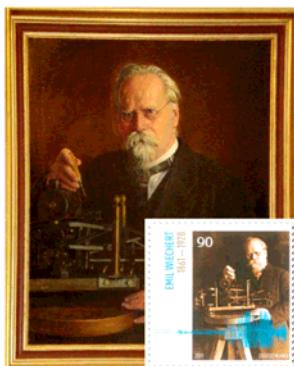
(*contributions of Ernst von Rebeur-Paschwitz and Emil Wiechert*)

In 2011 seismologists celebrated the 150th birthday of two of the founders of instrumental seismology: Ernst von Rebeur-Paschwitz and Emil Wiechert. Wiechert is well-known because his seismometers were standard instruments until the middle of the last century. Rebeur-Paschwitz is less known, although in 1889 he recorded the first teleseismic earthquake and initiated a global network of seismographs to monitor the seismicity of the Earth. Early death ended the seismological carrier of Rebeur-Paschwitz even before that of Wiechert began. Both of them were involved in founding the International Seismological Association (ISA), the predecessor of the International Association of Seismology and Physics of the Earth's Interior (IASPEI).



**Ernst von Rebeur-Paschwitz** was born on 9 August 1861 in Frankfurt/Oder and died from tuberculosis on 1 October 1895 in Merseburg at the age of only 34 years. He studied mathematics and astronomy at the universities of Leipzig, Geneva and Berlin, where he obtained a PhD in 1883 and became Assistant at the astronomical observatory. In 1884 he moved to the astronomical observatory in Karlsruhe, where he worked on improving Zöllner's horizontal pendulum for measuring variations of the plumb line due to the influence of celestial bodies. He added continuous photographic recording to a pendulum, and was aware that his instrument could record distant earthquakes (e.g., Frechet and Rivera, 2012).

He continued his work in 1888 at the Astrophysical Observatory in Potsdam. With financial support from the Royal Prussian Academy of Sciences, two copies of his instruments (manufactured by the firm Rapsold & Söhne in Hamburg) were installed at the Astrophysical Observatory in Potsdam and at the Imperial Navy Observatory in Wilhelmshaven (about 350 km away from Potsdam). Both instruments recorded a significant disturbance on 17 April 1889. Rebeur-Paschwitz identified this disturbance as the record of an earthquake in Japan. This observation was the start of global seismology, which is today one of the major fields in Earth sciences. Rebeur-Paschwitz was also the first to record solid Earth tides (e.g., Varga, 2009). In his last papers (Rebeur-Paschwitz, 1895a b) he identified body and surface waves in his records and proposed to install a global network of seismic stations to monitor the seismicity of the Earth and to study the internal structure of the Earth. John Milne (1895a) made a similar proposal for a seismic network. In addition, Rebeur-Paschwitz suggested an international institute that should collect earthquake data and publish reports. Rebeur-Paschwitz's ideas were presented at the Sixth International Geographical Congress in London in July 1895, where they were accepted in a resolution (Schweitzer, 2003). Rebeur-Paschwitz was not able to attend this congress and died on 1 October. Milne (1895b) wrote in an obituary: "Von Rebeur's last work was an endeavor to obtain co-operation for the observation of these instruments throughout the world, a scheme which, although he has not lived to realize it, will, in all probability, be accomplished in the near future". A documentary film about Rebeur-Paschwitz and his scientific achievements was recently released (Kind et al., 2011).



**Emil Wiechert** (painting by Georg Kötschau, Jena) was born on 26 December 1861 in Tilsit/East Prussia and died on 19 March 1928 in Göttingen. He studied mathematics and physics in Königsberg/East Prussia and obtained a PhD in 1889. He performed research in fundamental physics until 1897 in Königsberg. During that time he contributed essentially to the discovery of the electron, and he remained an active physicist his whole life (e.g., Mulligan, 2001). In 1897 Wiechert moved to Göttingen and became the head of the geomagnetic observatory, which was founded by Carl Friedrich Gauß.

He developed the theoretical base of mechanically recording seismometers including air damping. About hundred of his instruments were installed globally in the following decades. His instruments recorded on smoked paper and, to overcome friction, their masses were several tons. Wiechert and his colleagues and students started systematic analyses of seismic records (e.g., Schweitzer, 2003). They (i) found the relation between angle of incidence and epicentral distance; (ii) digitized seismic traces and determined ground displacement by integration; (iii) identified reflected and converted phases; (iv) developed the Latin based nomenclature of seismic phases; (v) developed traveltimes curves including their inversion and methods for the location of earthquakes; and (vi) started with controlled source seismology. Perhaps the best-known student of Wiechert was Beno Gutenberg, who derived in Göttingen a velocity model of the Earth with a very accurate depth determination of the core-mantle boundary. In December 2011 the German Finance Ministry issued a postal stamp in memory of Emil Wiechert (see above).

Emil Wiechert participated in the foundation of the International Seismological Association (ISA). In 1922 the ISA was dissolved and the Seismology Section of the IUGG was established, unfortunately without German membership. As the result, the German Seismological Society was founded in 1922 with Wiechert as the first President. The Society later changed its name to the German Geophysical Society (DGG). It instituted the Emil-Wiechert and Rebeur-Paschwitz Medals. *Acknowledgment:* I thank Johannes Schweitzer for his review of the initial version of the manuscript.



*Original Rebeur-Paschwitz Horizontal Pendulum, which recorded the 1889 earthquake in Japan (Frechet and Rivera, 2012)*



*Wiechert Seismograph in Göttingen operating continuously since 1903  
(<http://www.erdbebenwarte.de>)*

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Past President, German National Committee of Geodesy and Geophysics (NKGG)

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## **2. IUGG Grants Programme: Deadline for application is 1 April**

IUGG continues its Grants Programme for 2012-2015. Key priority areas are defined for the Grants Programme in line with IUGG overall scientific strategies: (i) creation of new knowledge in Earth and space sciences; (ii) dissemination of knowledge, data and information on geophysics and geodesy; (iii) geoscience for sustainable development; (iv) geoscience and policy interface; and (v) geoscience education and outreach in developing countries. Proposals of high quality related to the priority areas will be funded for a fixed term of one or two years. The IUGG Grants Programme aims to support projects of importance to the international geophysical and geodetic community, which will explore new scientific ideas and develop future international initiatives. A typical proposal may be for a workshop or a meeting of experts from several disciplines to develop a specific scientific programme or assessment, particularly addressing an enhancement of geophysical research and Earth science education in underdeveloped and developing countries. Although the range of activities supported is broad, the project proposals should be of scientific and societal importance, and their results are expected to provide clear recommendations to politicians and other decision makers at national and local levels and to the general public in terms of the urgent actions

to be undertaken. The deadline for the electronic submission of project proposals for the IUGG Grants Programme is **1 April 2012**. ***Proposals can be submitted by IUGG Associations and/or Union Commissions only.*** The guidelines for proposal submission can be found on the IUGG web site (<http://www.iugg.org/programmes/grants2015.php>).

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### 3. News for the International Council for Science (ICSU)

#### ***ICSU's new Executive Director appointed***



ICSU announced that Dr. Steven Wilson was appointed new Executive Director (ED) and will provide important leadership as ICSU seeks to implement its newly approved second Strategic Plan 2012–2017. Dr. Wilson will take up his duties on 1 April 2012. Following a degree in Chemistry from the University of Oxford, Dr. Wilson graduated from the University of Bristol in 1995 with a PhD in Chemistry.

After working for the UK Meteorological Office, he joined the UK National Environment Research Council (NERC) in 1998. Dr. Wilson held a number of senior posts, including the post of the NERC Director of Earth Observation. In this period he led the British National Space Centre's Earth Observation activities, represented the UK environmental science community at the European Space Agency (ESA) Council and chaired the ESA Earth Observation Programme Board. Among colleagues and peers, Dr. Wilson is known to be an exceptional manager of both programmes and people. He brings enthusiasm and vigor to all aspects of his work, and he has conceived and helped develop several large, highly successful initiatives and programmes that have earned him widespread respect. Dr. Wilson expressed his eager anticipation to take up the exciting and challenging position of ED: 'I am very excited at the prospect of leading ICSU, as it continues to be one of the world's foremost organizations for science. I look forward to bringing scientists together from all parts of the world, and helping to mobilize the international scientific community to provide new knowledge to tackle the grand societal challenges of the day – be they concerning environmental change, food security or human health.'

IUGG warmly welcomes Dr. Wilson and wishes him all the best at the position of the ICSU ED.

Dr. Wilson succeeds Professor Deliang Chen, who will return to the University of Gothenburg in Sweden after three years at the helm. ICSU President Professor Lee expressed his appreciation of Professor Chen, stating: 'For the past three years, Professor Chen has worked with extraordinary dedication, and made a tremendous contribution to the rejuvenation of ICSU. It was during his tenure that several major initiatives got off the ground, including Future Earth and ICSU's key role at Rio+20. The international visibility of ICSU also increased, thanks in large part to his efforts. His outstanding service deserves the deep gratitude of our entire community. While we will dearly miss his full-time presence, Professor Chen will continue to work with ICSU as a concerned scientist.'

IUGG wishes Professor Deliang Chen all the best and hopes to continue a scientific cooperation with him.

Sources: ICSU and NERC press releases

#### **4. Report on the WCRP Open Science Conference**

The Open Science Conference (OSC) of the World Climate Research Program (WCRP) was held in Denver, Colorado, 24-28 October 2011. WCRP is the major mechanism for the coordination and promotion of climate science and its applications. It is co-sponsored by the International Council for Science (ICSU), the Intergovernmental Oceanographic Commission of UNESCO, and the World Meteorological Organization (WMO). The WCRP establishes and coordinates major internationally coordinated research activities. Current major programs are the Climate and Cryosphere Program (CliC), the Climate Variability and Predictability Program (CLIVAR), the Global Energy and Water Experiment (GEWEX), and the Stratospheric Processes and their Role in Climate Program (SPARC). WCRP research is the major source of the assessments carried out by the Intergovernmental Panel on Climate Change (IPCC).

This major and unusual conference of all the programs of WCRP plus other research communities was aimed at identifying and establishing the major new directions of WCRP and how it will strengthen its collaborations with other related international efforts in biodiversity, human dimensions and economics. The meeting structure comprised a morning of keynotes in plenary, a large number of posters (around 1800 in total) and 3 parallel speaker sessions in the afternoons. The key outcome of the meeting was to identify the grand challenges facing the climate research community and help establish future priorities for climate research. As the meeting proceeded the concept of focusing research on the delivery of ‘climate services’ which would comprise ‘actionable science’ - forecasts that are sufficiently predictive, accepted and understandable to support decision-making, including capital investment decision-making. In his final remarks, Tony Busalacchi, WCRP President, mentioned some key themes that arose for future focus

1. Predictions of the full Earth System including biological and human systems.
2. The persistent and critical uncertainties resulting from poorly constrained understanding of cloud-radiation feedback and clouds and aerosols, which are significantly hampering model development and evaluation, but also the potential for a strong ongoing observational program (of which, e.g., cloudsat and calypso are a start) to make substantial progress in this area.
3. Future climate on regional scales, via both high resolution global models and regional models used responsibly.
4. Estimating the “true uncertainty” - going beyond the commonly used but poor proxy for uncertainty of model ensemble spread. In particular, development and use of stochastic physics and perturbed physics methods.
5. Decadal predictability – some great and promising work has started (MIROC-Japan; ECMWF and Hadley centre-Europe). What ocean observations are needed?
6. Polar predictability – we need to understand ocean/ice-sheet dynamics; ocean sea-ice dynamics.
7. Gain an understanding of regional sea level rise.
8. Capacity development, not only regionally, for effective applications, but also globally in terms of the next generation of scientists.

A selection of some other key issues are:

- USA/European budget impacts on key satellite missions – ocean vector winds may face major gaps and degradation; satellite gravity measurements that have revealed the acceleration of the mass loss from the ice sheets (Greenland and Antarctica) and track water budgets over land (such as groundwater changes), face a 5-7 year gap as the GRACE-follow-on will likely only be launched in 2017 and GRACE will likely stop working in 2015, but could stop earlier; altimetry is relying on the JASON 2 satellite lasting well beyond its design life.

- The community as a whole struggles with the balance between service provision and spending resources on improving the core process understanding and models. Regarding the latter, the model/observationalist ‘Climate Process Teams’ created under US CLIVAR seems like an excellent model to follow, targeting process science and driving a fast pathway into improving the model physics.
- Susan Solomon’s talk on Climate Change commitment and irreversibility clearly communicates the long time scales for ‘recovery’ constrained by both the ocean slow thermal response time and the long residence of CO<sub>2</sub> in Earth’s atmosphere. The upshot is that the temperature reached even on total cessation of carbon emissions will not come down much over the next ~1000 years, essentially locking in this warming for many human generations. Sea levels will continue to rise during this time. She also demonstrated that emission reduction of the short lived GHGs (e.g. methane) cannot be traded for the long-lived CO<sub>2</sub> with regard to this long-term warm plateau, the intensity of which is dependent solely on the total time-integrated carbon emissions.

Meeting outcomes will be posted as a series of white papers edited to include community comments. All the talks and many of the posters presented at the meeting are available at <http://www.wcrp-climate.org/conference2011/>

Received from Tom Beer, IUGG Liaison to WCRP

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## 6. Report on the SCOR/IAPSO Workshop

The SCOR/IAPSO workshop “Towards an Observing System for the Greater Agulhas System: Building Links and Capacity for East African participation” was held in Mauritius, 21-25 March 2011.



*Meeting participants (photo from <http://www.jcomm.info/wio-dbcp2>)*

The SCOR/IAPSO Working Group 136 on the Climatic Importance of the Greater Agulhas System conducted their second meeting joining with a meeting and capacity building workshop in Mauritius with the WMO/IOC Data Buoy Cooperation Panel (DBCP). There were fifty attendees;

about half of the participants came from East Africa. The agenda was formulated around the WG136 Terms of Reference: (1) to facilitate collaborations between existing and planned studies of the region; (2) to write a review paper on the climatic importance of the greater Agulhas; (3) to identify key components of the region that deserve further study and/or sustained observations; and (4) to organize a Chapman Conference with the participation of the African science community. A further goal of the WG is to contribute to capacity building in East African countries, which border the Great Agulhas System.

One of the primary goals for WG136 at this meeting was to network with East African scientists and to contribute to capacity building for the region. Four workshops were created and run by WG members. In addition, IUGG/IAPSO sponsored the attendance of trainer Pierrick Penven (Associate member), who led a hands-on capacity building workshop on ocean modeling, demonstrating some basic geophysical fluid dynamics through a hierarchy of models built using ROMS.

Discussions during the meeting on Resource and Science Planning for the region and on the Chapman Conference have led to a short document on the elements for a sustained observing system in the Greater Agulhas region, to be presented at the 8th International CLIVAR Indian Ocean Panel meeting, and to a Chapman proposal for a conference in Grahamstown, South Africa, in September 2012 (*note: the proposal was approved by AGU*).

Received from Johan Rodhe, IAPSO Secretary General

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## 7. Awards & Honors

The Prime Minister of India Dr. M. Singh appointed **Harsh Gupta** (IUGG President) as a Member of the Indian National Disaster Management Authority (NDMA), which is chaired by the Prime Minister.

**Alexei Gvishiani** (President of the Russian National Committee for Geodesy and Geophysics) was elected a Full Member (Academician) of the Russian Academy of Sciences at the Annual Meeting of the Academy in December 2011.

Congratulations to Alexei and Harsh!

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## 8. Announcement: IUGG GRC First Conference

The IUGG Union Commission on Geophysical Risk and Sustainability (GRC) organizes the First Conference “Extreme Natural Hazards and Their Impacts” co-sponsored by the Natural Hazards Focused Group of the American Geophysical Union. The Conference will be held from 11 to 14 December 2012 on the campus of the Chapman University, Orange, California, USA. Oral and poster papers related to the following sessions are invited:

Session I - Some of Major Recent Earthquake and Tsunami Events

Session II - Recent Volcanic Events

Session III - Floods, Landslides and Droughts

Session IV - Connection Between Extreme Climate and Natural Hazards

Session V - Early Warning of Natural Hazards

Session VI - Recent Satellite Sensors for Monitoring Natural Hazards

Session VII - Disasters Management in Developing Countries

Session VIII - Natural Hazards and Infrastructures

Session IX - Natural Hazards Mitigations

A field trip to the fault(s) of the southern San Andreas Fault System, led by Tom Rockwell, SDSU, San Diego will be arranged. For detailed information about the conference, please visit <http://www1.chapman.edu/~rsingh/GeoRisk2012>.

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## **9. IUGG-related meetings occurring during February – April**

A calendar of meetings of interest to IUGG disciplines (especially those organized by IUGG Associations) is posted on the IUGG web site (<http://www.IUGG.org/calendar>). Specific information about these meetings can be found there. Individual Associations also list more meetings on their web sites according to their disciplines.

### **February**

- 16-17, IOC-UNESCO, Tokyo, Japan, Japan-UNESCO/UNU Symposium “The Great East Japan Tsunami on 11 March 2011 and Tsunami Warning Systems: Policy Perspectives”
- 20-24, IAVCEI, Auckland, New Zealand, IAVCEI-IAS 4th International Maar Conference: a multidisciplinary congress on monogenetic volcanism
- 22-25, AIST, IUGG, and several other co-sponsors, Tsukuba, Japan, First Workshop of Asia-Pacific Region Global Earthquake and Volcanic Eruption Risk Management G-EVER1

### **March**

- 4-9, IAG, Madrid, Spain, 7th IVS General Meeting “Launching the Next-Generation IVS Network”
- 26-29, DIVERSITAS, ESSP, IHDP, IGBP, WCRP; London, UK; Conference “Planet Under Pressure: New Knowledge Towards Solutions”

### **April**

- 22-27, EGU, Vienna, Austria, General Assembly of the European Geosciences Union
  - 22-27, ICSU, WMO, SCAR, IASC, Montreal, Canada, IPY 2012 - From Knowledge to Action
  - 26-29, DIVERSITAS, ESSP, IHDP, IGBP, WCRP; London, UK; Conference “Planet Under Pressure: New Knowledge Towards Solutions”
  - 28-29, ICSU GeoUnions, Istanbul, Turkey, GeoUnions Annual Business Meeting
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**Note: Contributions to IUGG E-Journal are welcome from members of the IUGG family. Please send your contributions to Alik Ismail-Zadeh by e-mail (insert in Subject line: *contribution to E-Journal*). The contributions will be reviewed and may be shortened by the Editor.**