International Association of Geodesy Newsletter

November 2016

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Contents

The *IAG Newsletter* is under the editorial responsibility of the *Communication and Outreach Branch* (COB) of the IAG.

It is an open forum and contributors are welcome to send material (preferably in electronic form) to the IAG COB (newsletter@iag-aig.org). These contributions should complement information sent by IAG officials or by IAG symposia organizers (reports and announcements). The *IAG Newsletter* is published monthly. It is available in different formats from the IAG new internet site: http://www.iag-aig.org

Each *IAG Newsletter* includes several of the following topics:

I. news from the Bureau Members
II. general information
III. reports of IAG symposia
IV. reports by commissions, special commissions or study groups
V. symposia announcements
VI. book reviews
VII. fast bibliography

General Announcements

Open Earth observation data now more accessible

Press Release
St Petersburg, 14 November, 2016

At the Thirteenth GEO Plenary Meeting, held in St Petersburg, Russian Federation from 9-10 November, 2016, representatives from GEO's 103 Member governments and 106 Participating Organizations (POs) convened to launch a new look for the Global Earth Observation System of Systems (GEOSS) Portal. Participants also addressed how best to advance GEO Initiatives linked to the Sustainable Development Goals (SDGs) and for the first time, to engage with the commercial sector through a Plenary panel session.

"Open data not only maximizes tax payers' money in government infrastructure, it promotes economic growth, education and capacity building." said GEO Secretariat Director, Barbara Ryan. "GEO brings all sides of the conversation together so that data is broadly and openly available, free to the user and can be used to create value-added products and services to benefit society."

The Plenary meeting was held for the first time in the Commonwealth of Independent States (CIS) Region. New Member governments announced at the Plenary were Uruguay, United Arab Emirates and Mongolia. Among the new Participating Organizations approved in 2016 are the European Association of Remote Sensing Companies (EARSC); the Humanitarian OpenStreetMap Team (HOT); the Integrated Carbon Observation System (ICOS); the Sahara and Sahel Observatory (OSS); and the World Health Organization (WHO).

Co-host Alexander Frolov, Head of Roshydromet said: "We express our pleasure at the success of the GEO-XIII Plenary due to strong cooperation between the GEO community, Roshydromet and Roscosmos. Numerous Side Events organized by Members and POs clearly demonstrate the constantly evolving influence of GEO as an Intergovernmental body."

Mikhail Khailov, Deputy Director General for Automatic Space Complexes of the State Corporation Roscosmos said "Coordination of activities, and the joint harvesting and usage the data of Earth Remote Sensing (ERS) that was organized at the GEO-XIII Plenary is very relevant for all of the GEO community. We are developing the technologies of ERS data processing and thematic services to benefit the people of the Earth through improved coverage, increased volume, quality and promptness of acquired ERS data."

Philemon Mjwara, Director-General, Department of Science and Technology, Republic of South Africa and Chair of the Session reiterated the benefits of having access to EO data as an "enabling resource that allows us to begin addressing the Water-Food-Energy nexus, and other nexus, as a stepping stone to clearly understanding how the Earth's systems work, and ultimately realizing GEOSS."

Pengde Li, Deputy Director General National Administration of Surveying, Mapping and Geoinformation of China said, "Downscaling implementation of GEOSS at national and regional levels has become extremely important to ensure broad engagement and sufficient resources to realize our ambitious vision. Fortunately, we see more and more Members start establishing national inter-ministerial coordination and using regional initiatives as a vehicle for broad engagement."

The Plenary opened with a message from the International Space Station. In the recorded video message, the cosmonauts observed it is easy to understand the interconnected nature of the planet. Space technologies help to understand Earth's complicated processes and problems. Humankind is facing global challenges today, and international cooperation plays a crucial role in tackling these issues. The work of GEO makes Earth observations more widely available and meaningful, for the benefit of humanity. Link: https://youtu.be/C7nmvNb1z14

The Group on Earth Observations (GEO)

The intergovernmental Group on Earth Observations (GEO) is comprised of 103 Member governments, and 106 Participating Organizations. Established in 2005, GEO strives to improve the world's observation systems and provide policy makers and scientists with accurate and useful data that can be used to make informed decisions on issues affecting the planet. GEO's primary focus is to develop a Global Earth Observation System of Systems (GEOSS) to enhance the ability of end-users to discover and access Earth observation data and convert it to useable and useful information. GEO is headquartered in Geneva, Switzerland. For more information, visit www.earthobservations.org

Photo of the Plenary Meeting

GEO SECRETARIAT

Investments in open Earth observation data set to grow

Press Release
Geneva, 17 November, 2016

A global trend towards open data, i.e. data that anyone can access, use and share without restriction is steadily replacing a previous tendency by governments to charge for Earth observations, especially satellite imagery. The Group on Earth Observations (GEO) was established more than 10 years ago to provide access to and sharing of open Earth observations data; years before the Open Data for a Big Data World movement gained momentum.

Today GEO has more than 100 government Members representing their national governments and in excess of 100 Participating Organisations contributing data, knowledge and expertise to the Global Earth Observation System of Systems (GEOSS). The purpose of GEOSS is to put information on the planet's changing environment into the hands of decision makers where it is most useful. The GEOSS Portal makes measurements from the world's satellites and atmospheric, land and ocean stations freely available, by connecting and integrating systems using open standards. There are now more than 200 million data resources in GEOSS that span all GEO's thematic areas, such as food security and sustainable agriculture as well as biodiversity and ecosystem sustainability.

A key strand of the GEO long-term development for the next 10 years is to engage with stakeholders and continue to build global awareness around GEO's convening power and the availability of open Earth observation data. To this end, Steven Ramage was recently appointed to head stakeholder engagement and external relations.

Steven has worked across a number of the GEO societal benefit areas, including disaster resilience, sustainable urban development and water resource management. As an intergovernmental body GEO is uniquely placed to help with analysis, innovation and Earth observation data exploitation for decision making and Steven will lead a number of activities to raise the profile and engagement activities involving open Earth observations data.

GEO Secretariat Director Barbara Ryan said: "We are really pleased that Steven has joined the team, he brings significant experience working across our community, having worked extensively across both the private and public sectors. His visibility and network in the international arena will help us achieve a number of our goals, he has already chaired our first ever commercial sector panel at our annual Plenary event and it was a great success."

Government investments in satellite and *in situ* Earth observations make up around 65 percent of total cost. Companies not only contribute in terms of hardware; they also stimulate provision of services. The EO commercial data market was estimated at $1.6 billion in 2014 and is set to rise, almost in line with the incremental curve of increase of data availability.

A number of countries including Canada, Ghana, Japan, Jamaica, Kenya, Singapore, the United Kingdom and the United States have invested in open data portals over recent years. Many of these data sets are available on the GEOSS Portal for example more than 20,000 data records from *http://data.gov.uk* are now live and discoverable. Government engagement in GEO goes beyond data sharing and, alongside Defra and the UK Space Agency, the National Centre for Earth Observation (NCEO) is working to increase visibility of GEO to the UK Earth Observation community so that access to Earth observations can lead to the development of

applications and tools for better decision making. The UK represents one of 103 Member governments in GEO, including the European Commission.

Steven Ramage

Steven Ramage

Steven has spent his career in areas relating to geospatial data integration, notably around data quality control and open geospatial standards. Recent experience involves advising governments on location strategy and policy, undertaking work for the World Bank and the United Nations around global geospatial information management. Steven has spent many years in the commercial and not-for-profit sectors working to translate the technology gap between policy, implementation and the rate of change of geospatial technology. His experience began in offshore satellite positioning and marine survey services in the 1990s and he has worked internationally since that time. He is a Visiting Professor at the Institute for Future Cities at the University of Strathclyde and a SASNet Fellow at the Urban Big Data Centre at the University of Glasgow, Scotland. Steven is a Fellow of the Royal Geographical Society, Member of the Global Advisory Council for the Open Geospatial Consortium, Mentor for DisruptSpace and Technical Editor for GIS Professional Magazine.

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GEO SECRETARIAT

Meeting Announcements

Meetings Calendar

IGNSS 2016

December 6 - 8, 2016, Sydney, Australia
International Global Navigation Satellite Systems 2016 Conference
URL: http://www.ignss2016.unsw.edu.au

7th Gaia Science Alerts Workshop 2016

December 7 - 9, 2016, Utrecht, The Netherlands
International Global Navigation Satellite Systems 2016 Conference
URL: https://www.ast.cam.ac.uk/ioa/wikis/gsawgwiki/index.php/Workshop2016:main

AGU 2016 Fall Meeting

December 12 – 16, 2016, San Francisco, California, USA
URL: http://meetings.agu.org/upcoming-meetings/

10th Coastal Altimetry Workshop

February 21-24 , 2017, Florence, Italy
URL: http://www.coastalaltimetry.org/

Munich Satellite Navigation Summit

March 14-16 , 2017, Munich, Germany
URL: http://www.munich-satellite-navigation-summit.org/

Fourth SWARM Science Meeting and Geodetic Missions Workshop

March 20-24 , 2017, Banff, Alberta, Canda
URL: http://www.swarm2017.org/

North-American CryoSat Science Meeting and Geodetic Missions Workshop

March 20-24 , 2017, Banff, Alberta, Canda
URL: http://www.cryosat2017.org/

GEODATA 2017

April 3-7 , 2017, Rosario - Santa Fe, Argentina
URL: www.geodata2017.com.ar

EGU General Assembly 2017

April 23-28 , 2017, Vienna, Austria
URL: http://www.egu2017.eu/

IAU Symposium 330

April 24-28 , 2017, Nice, France
URL: http://iaus330.sciencesconf.org/

Ninth IVS Technical Operations Workshop

April 30 – May 4 , 2017, Westford, MA, USA
URL: https://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html

ENC 2017

May 9-17 , 2017, Lausanne, Switzerland
URL: http://www.enc2017.eu/

23rd Working Meeting of the European VLBI Group for Geodesy and Astrometry (EVGA)

May 15-19 , 2017, Gothenburg, Sweden
URL: http://iag.dgfi.tum.de/index.php?id=291

EUREF 2017 Symposium

May 17 – 19, 2017, Wroclaw, Poland
URL: http://www.euref.eu/euref_symposia.html

FIG Working Week 2017

May 29 – June 2, 2017, Helsinki, Finland
URL: http://www.fig.net/fig2017/

TransNav 2017

June 21 – 23, 2017, Gdynia, Poland
URL: http://transnav2017.am.gdynia.pl

ICC 2017

July 2 – 7, 2017, Washington, DC, USA
URL: http://icc2017.org/

IGS Workshop 2017

July 3 – 7, 2017, Paris, France
URL: http://kb.igs.org/hc/en-us/articles/216574478-IGS-Workshop-2017

IAG/GGOS/IERS Unified Analysis Workshop (UAW)

July 10 – 12, 2017, Paris, France
URL: https://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html

IAG and IASPEI Joint Scientific Assembly

July 30 – August 4, 2017, Kobe, Japan
URL: http://iag.dgfi.tum.de/index.php?id=291

AOGS 14th Annual Meeting

August 6-11, 2017, Singapore, Singapore
URL: http://www.asiaoceania.org/aogs2017/

Workshop on Glacial Isostatic Adjustment and Elastic Deformation

September 5-7, 2017, Reykjavik, Iceland
URL: http://www.polar.dtu.dk/english/Workshop-on-Glacial-isostatic-adjustment-and-elastic-deformation-2017

COSPAR 2017

September 18-22, 2017, Jeju Island, South Korea
3rd Symposium of the Committee on Space Research (COSPAR): Small Satellites for Space Research
URL: http://cospar.kasi.re.kr/cospar-symposium-2017/

IAG Workshop: Satellite Geodesy for Climate Studies

September 19-21, 2017, Bonn, Germany
URL: http://www.igg.uni-bonn.de/apmg/index.php?id=ws2017

AGU 2017 Fall Meeting

December 11-15, 2017, New Orleans, LA, USA
URL: https://meetings.agu.org/

EGU General Assembly 2018

April 8-13 , 2018, Vienna, Austria
URL: http://www.egu2018.eu/

AOGS 15th Annual Meeting

June 3-8, 2018, Hawaii, USA
URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

10th IVS General Meeting

June 3-8, 2018, Longyearbyen, Spitsbergen, Norway
URL: http://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html

42nd COSPAR Scientific Assembly

July 14-22, 2018, Pasadena, CA, USA
URL: https://www.cospar-assembly.org/

IAU XXXth General Assembly

August 20-31, 2018, Vienna, Austria
URL: http://astronomy2018.univie.ac.at/

21st International Workshop on Laser Ranging

October 27-31, 2018, Canberra, Australia
URL: http://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html

AGU 2018 Fall Meeting

December 10-14, 2018, Washington, D.C., USA
URL: https://meetings.agu.org/

EGU General Assembly 2019

April 7-12 , 2019, Vienna, Austria
URL: http://www.egu2019.eu/

27th IUGG General Assembly

July 8 – 17, 2019, Montreal, Canada
URL: http://www.iugg.org/assemblies/

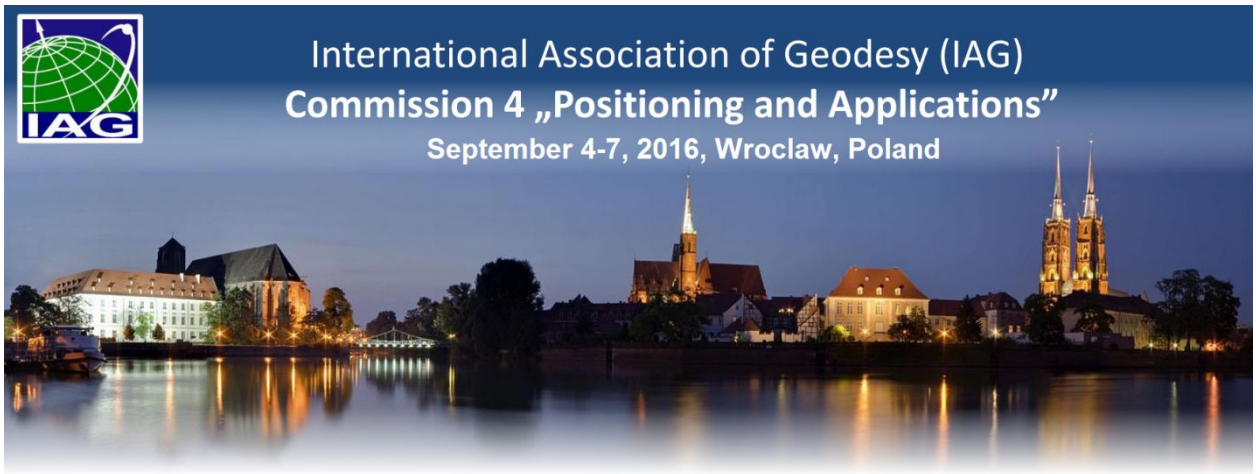
AOGS 16th Annual Meeting

July 28 – August 2, 2019, Singapore, Singapore
URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

Reports

IAG Commission 4 "Positioning and Applications" Symposium

September 4-7, 2016, Wroclaw, Poland



The Commission 4, "Positioning and Applications", of the International Association of Geodesy (IAG) held its very first Symposium. It took place in Wroclaw, Poland, from September 4 to 7, 2016. The venue was the Didactic and Scientific Center of the Faculty of Environmental Engineering and Geodesy, on Grunwaldzki Square 24a.

A total of 67 geodesists participated in the event, with the presentation of 58 scientific contributions being 40 orals and 18 posters. Link to the presentation slides and posters is possible via the online programme. During the event, several entities of Commission 4 held splinter meetings.

The Scientific Committee was composed by the members of Commission 4 Executive, listed here.

The Local Organizing Committee, spearheaded by Tomasz Hadas, Krzysztof Sosnica, Anna Krypiak-Gregorczyk and Jacek Paziewski did a tremendous job which deserved the accolades of all participants.

The Symposium covered the interest areas of Commission 4, which are by themselves broad in nature. These areas are divided into 4 Sub-Commissions (SC). SC 1 deals with emerging positioning technologies, including, for example, indoor positioning, UAV positioning and navigation, smartphone positioning and navigation and ubiquitous positioning. SC 2 is concerned with applications from mapping to monitoring of deformations, including multi-sensor systems, and laser scanning. Atmospheric remote sensing is the focal point of SC 3, including ionosphere, neutral-atmosphere , radio occultation, reflectometry, radio occultation, space weather and coupling. And, finally, SC 4, which is dedicated to multi-constellation GNSS methods and technologies and their novel applications.

Commission 4 Symposium Group photo

MARCELO SANTOS

Report of the Fourth International School on Least Squares Approach to Modelling the Geoid

held at Universiti Teknologi Malaysia, Johor Bahru, Malaysia on Sept 25-29, 2016.

The UTM-KTH Geoid School, which is was officially named as The Fourth International School on Least Squares Approach to Modelling the Geoid, was held at Universiti Teknologi Malaysia (UTM), Skudai, Johor Bahru, Malaysia from September 25 to 29, 2016. The School was organized by Geomatic Innovation Research Group (GnG), Faculty of Geoinformation and Real Estate UTM, and it. The school was conducted in collaboration with Professor Lars Sjöoberg and Dr Ramin Kiamehr. Both are from Geodesy Department, Royal Institute of Technology (KTH) in Stockholm, Sweden and Dr. Ramin Kiamehr from Zanjaninal University in Zanjaninal, Iran.

A total number of thirteen participants attended the Geoid School. Only two foreign participants managed to come and they were both Both are from Bandung Institute of Technology, Indonesia. The rest are were all from Malaysia. Four of them are were surveyors working in the government sectors – three from Land and Survey Department of Sarawak and one from National Surveying and Mapping Department Kuala Lumpur. Two geodesy academic staff from local universities also participated – one from Universiti Teknologi Malaysia, Skudai Johor Bahru and one from Mara University of Technology Arau, Perlis. One participants from surveying

instrument company also attended. The rest of the participants are were all postgraduate students of UTM Skudai Geomatic Innovation Research Group whom their research mainly involved on gravity and geoid determination.

Group photo taken after the official opening of the Geoid School

The main objective of the Fourth International School on Least Squares Approach to Modelling the Geoid was aimed at providing a good opportunity for all participants to familiarize themselves with the latest developments in geoid determination with special focus on the use of KTH Least Squares Modification of Stokes Approach software package (LSMSA). The school was also aimed as well for the participants to building up contacts and collaboration works with the professionals dealing with geoid determination particularly in the region of Malaysia and Indonesia.

The contents of the lecture for the The Fourth International School on Least Squares Approach to Modelling the Geoid include were as the following topics follows:

- Basic Physical Geodesy, Modification of Stokes' formula, Additive corrections in the KTH Method, LSMSA vs the R-C-R technique and some practical experiences on geoid computation using KTH Method.

The lab sessions were focused with the following contents:

- Gravity data snooping and gridding, Gravity field determination by global geopotential models, Digital Elevation Models (DEM) and geoid, and full project workshop of computing geoid using KTH GEOLAB Software.

Lecture and lab session of the Geoid School

At the end of the Geoid School all the participants were asked to give feedback by answering questionnaires regarding the school. The feedback showed that participants were overall satisfied with the Geoid School in overall with some suggestions are were put forward for future improvement. Among the suggestions are were to provide a longer slot for the lecture on basic Physical Geodesy and to provide a more structured detailed hand-out on lab exercises. The closing ceremony was held on Sept 29 ended with the presentation of certificate to all participants.

Certificate presentation during closing ceremony (left to right: Dr Ramin Kiamehr, Professor Lars Sjöberg, Zainal Abidin Md Som dan Dr Tajul Ariffin Musa, Head of GnG)

This report was written by Zainal Abidin Md Som, Chairman of the Local Organizing Committee, The Fourth International School on Least Squares Approach to Modelling the Geoid, Universiti Teknologi Malaysia (UTM) Skudai, Johor Bahru, Malaysia.

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