



**International Association
of Geodesy**

Newsletter

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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

To benefit society and science

The new geodetic Earth observatory built by the Norwegian Mapping Authority (NMA) in Ny-Ålesund, 79 degrees north, was successfully inaugurated 6 June.

"Today we have reached a significant milestone which will benefit society and science and bring global Earth observations to a higher level, said Lars Jacob Hiim, State Secretary to the Norwegian Minister of Local Government and Modernisation, in his opening remarks to more than 150 guests.

The inauguration of the observatory coincided with the 10th conference of the International VLBI Service for Geodesy and Astrometry, IVS2018 in Longyearbyen, and 110 delegates were invited to participate in the official opening, and were transported to Ny-Ålesund by boat.

"The development of a basic global infrastructure for better Earth observation and for better monitoring of satellites, especially in the High North, is key in order to measure and deal with climate change. It is fundamental for our understanding of sea level change, said Hiim.



The Norwegian Mapping Authority's geodetic Earth observatory in Ny-Ålesund is the northernmost facility of its kind.
Photo: Bjørn-Owe Holmberg

The new VGOS twin telescopes surrounded by the Brandal lagoon, Cape Mitra and Kings Fjord, are impressive. Each antenna measures 13.2 metres in diameter and looms 18 metres above the ground.

"Everyone who's worked on this project is respectful of the job being done, the environment and surroundings we're working in – and the fact that we're delivering something which will contribute to better monitoring of changes to the planet." says Per Erik Opseth, head of the NMA's Geodetic Institute.

The NMA's geodetic Earth observatory is Norway's most important contribution to the United Nations General Assembly resolution "A Global Geodetic Reference Frame for Sustainable Development.

"Norway takes this work seriously. Together with Australia, we chaired the subcommittee that formulated and negotiated the UN resolution. The time has come to provide stability and commitment to the global collaboration on basic global infrastructure", said State Secretary Hiim.

The NMA's new geodetic Earth observatory ranks as the northernmost facility of its kind and is a cornerstone of the global infrastructure. It has an estimated cost of about NOK 300 million.

Being delivered by Germany's MT Mechatronics and its Spanish sub-contractor Asturfeito, the antennas were installed in 2016. Veidekke Arctic was the turnkey contractor for the station site and the new instrumentation building. The first pile was driven in the autumn of 2014.



Photo: Bjørn-Owe Holmberg



From left: Per Erik Opseth, Head of the Geodetic Institute, NMA. Lars Jacob Hiim, State Secretary to the Minister of Local Government and Modernisation. Anne Cathrine Frørstrup, Director General, NMA
Photo: Bjørn-Owe Holmberg

In August 2017 NASA and NMA signed an agreement to develop a state-of-the-art Satellite Laser Ranging facility. The current goal is to have all systems up and running in Ny-Ålesund by 2022.

“An SLR in Ny-Ålesund will be important because it allows us to observe satellites in Polar orbits,” Opseth explains.

ANNE JØRGENSEN
Norwegian Mapping Authority

Indonesia Airborne Gravity Project 2018 -2019

Background

The national geospatial reference system used in Indonesia is the *Sistem Referensi Geospasial Indonesia 2013* (SRGI2013). It was launched in October 11, 2013, and adopts a semi-dynamic reference system connecting to ITRF 2008 with reference epoch of January 1st, 2012. In this system, Geoid has been chosen as the vertical reference system. Currently, a global geoid model is available that has an accuracy of only 1 meter in the territory of Indonesia. This 1 meter accuracy is considered insufficient for large-scale mapping. A Geoid Model with an accuracy of 20 cm or better is required for large-scale mapping. Therefore, to obtain a geoid model with 20 cm accuracy requires very dense and dispersed gravity data. Efforts in the implementation of accurate geoid in Indonesia had been conducted since the 1980s and were done by measuring terrestrial gravity. Since then, BIG has 6 relative gravimeters consisting of 3 manual terrestrial gravimeter and 3 units of digital gravimeter.

The terrestrial gravity data that had been collected since the 1980s do not cover whole territory of Indonesia, which are vast, consisting of many islands and having complex topography. Airborne gravity measurement is the best solution for obtaining gravity data for the whole country of Indonesia. Between 2008 to 2011, DTU assisted BIG to conduct airborne gravity surveys in Sulawesi, Kalimantan and Papua Islands. To obtain 20 cm geoid for the whole country, the remaining islands will be surveyed in two years (2018-2019).

Project Status

Absolute Gravity Survey

In 2017 BIG purchased an absolute gravimeter (A10) and from 48 established benchmarks 23 of them have been measured. Currently, the equipment is undergoing maintenance. The mobilization of A10 across the country has been the major issues and hopefully, the remaining BM's can be completed by the end of 2018. Locations of gravity control points can be seen in Figure 1.

Airborne Gravity Survey

In 2018, BIG is purchasing GT2A from Canadian Micro Gravity (CMG). Airborne gravity measurement will cover all of Sumatera's main land, Nias, Mentawai, Bangka and Belitung, and Riau Islands. While purchase is undergoing and can take several months, Ministry of Interior through NCTU of Taiwan allows BIG to use their S-130 for the first stage of the airborne gravity surveys (July – August 2018). Flight plans can be seen in Figures 2 and 3. Line spacing is set to 8 nautical miles, slightly denser from the previous project.

Remarks

As a complex nation geographically, with more than 17,000 islands, a robust method for data collection as well as for computing geoid model are necessary to produce a seamless vertical reference system. We welcome supports, suggestions or other materials for our project to be successful.

Acknowledgement

Special thanks to Taipei Economic and Trade Office (TETO), Jakarta, Indonesia and Indonesia Economic and Trade Office (IETO), in Taipei; Ministry of Interior, ROC and NTCU; and Bandung Institute of Technology (ITB), Indonesia for supporting this airborne gravity survey.

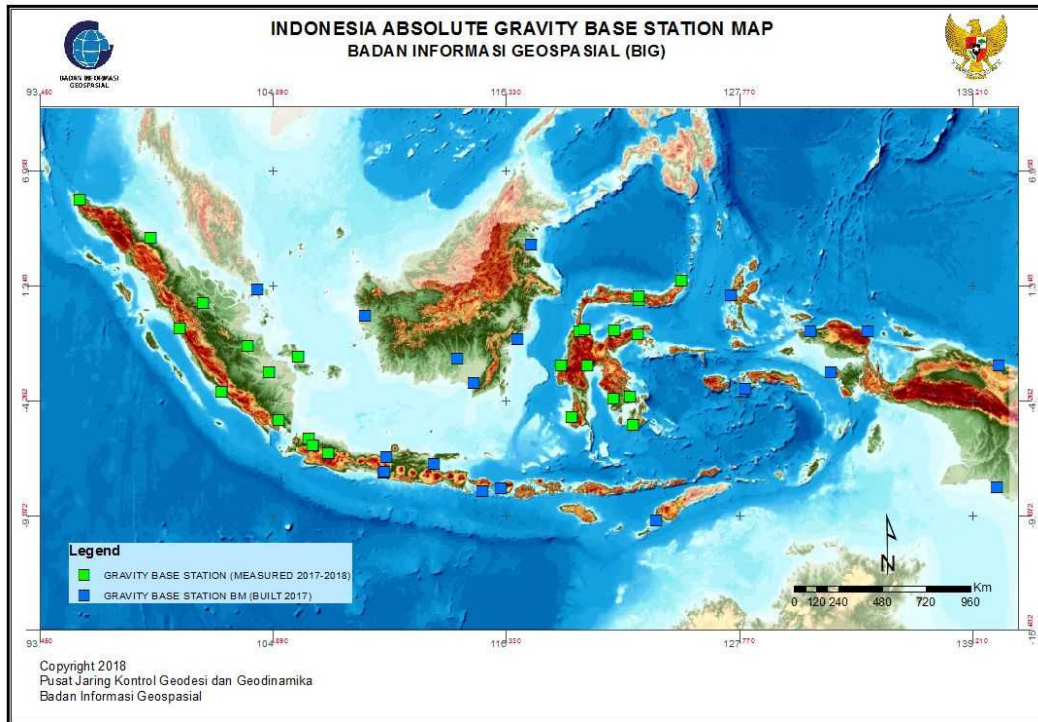


Figure 1. Gravity Control Network.

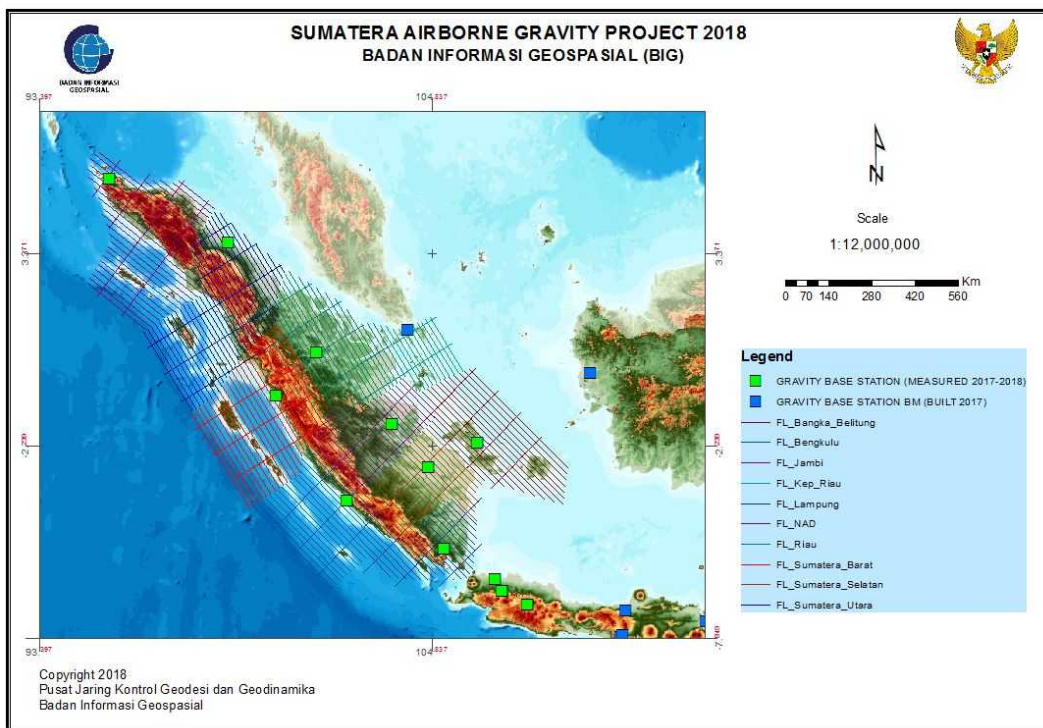


Figure 2. Survey Flight Plan 2018.

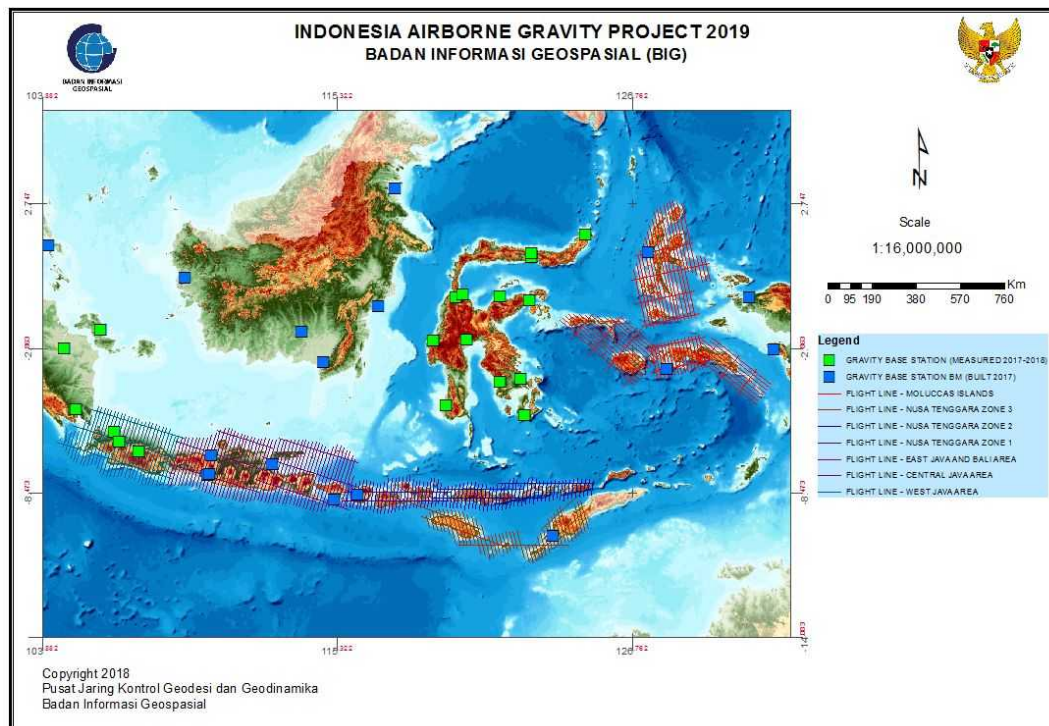


Figure 3. Survey Flight Plan 2019.

HASANUDDIN Z. ABIDIN
 Head of Geospacial Information Agency (Badan Informasi Geospasial) of Indonesia

COSPAR Awards 2018

Committee on Space Research (COSPAR) announced Awards 2018 to be presented on 15 July during the 42nd COSPAR Scientific Assembly 14 - 22 July 2018, Pasadena, CA, USA. Please find a press release detailing awards to be bestowed at https://cosparhq.cnes.fr/sites/default/files/press_release_cospar_awards_2018.pdf.

AARON JANOFSKY
 Associate Director
 Committee on Space Research (COSPAR)

Meeting Announcements

Meetings Calendar

IAG Sponsored Meetings

IAG Workshop on Hydrogeodesy

June 29-30, 2018, Wuhan, China

URL: <http://hydrogeodesy2018.csp.escience.cn/>

42nd COSPAR Scientific Assembly (with REFAG2018 and Panel on Satellite Dynamics)

July 14-22, 2018, Pasadena, CA, USA

URL: <http://cospar2018.org/>

8th UN-GGIM Session

August 1-3, 2018, New York, USA

URL: <http://ggim.un.org/meetings/GGIM-committee/8th-Session/>

IAU XXXth General Assembly

August 20-31, 2018, Vienna, Austria

URL: <http://astronomy2018.univie.ac.at/>

19th General Assembly of WEGENER

September 10-13, 2018, Grenoble, France

URL: <https://wegener2018.sciencesconf.org>

GGHS2018

September 17-21, 2018, Copenhagen, Denmark

“Gravity, Geoid and Height Systems 2” Symposium, 2nd joint meeting of the International Gravity Field Service and Commission 2 of the IAG

URL: <http://www.space.dtu.dk/gghs2018>

International DORIS Service (IDS) Workshop

September 24-29, 2018, Ponta Delgada, Azores

URL: <https://iag.dgfi.tum.de/en/meetings-calendar/>

GGOS Days 2018

October 2-4, 2018, Tsukuba, Japan

URL: <http://176.28.21.212/en/meetings/2018/ggos-days/general/>

SIRGAS Symposium 2018

October 9-12, 2018, Aguascalientes, Mexico

URL: <http://geoweb2.inegi.org.mx/sirgas2018/html/en/index.html>

SIRGAS Workshop on Vertical Reference System

October 15-17, 2018, Aguascalientes, Mexico

URL: <http://geoweb2.inegi.org.mx/sirgas2018/html/en/index.html>

IGS 2018 Workshop

October 29 – November 2, 2018, Wuhan, China

URL: <https://iag.dgfi.tum.de/en/meetings-calendar/>

International Workshop on GNSS Ionosphere (IWGI2018)

November 4-6, 2018, Shanghai, China

URL: <http://202.127.29.4/geodesy/iwgi2018/>

21st International Workshop on Laser Ranging

November 5-9, 2018, Canberra, Australia

URL: <http://www.iwlr2018.serc.org.au/>

27th IUGG General Assembly

July 8 – 17, 2019, Montreal, Canada

URL: <http://www.iugg.org/assemblies/>

IAG Related Meetings

ESA/JRC International Summer School on GNSS 2018

July 16-27, 2018, Loipersdorf, Austria

URL: <https://www.esa-jrc-summerschool.org/>

IX International Symposium "Metrology of Time and Space"

September 12-14, 2018, Mendeleevo, Russia

URL: <http://www.vniiftri.ru/index.php/en/news/conferences/741-sym9>

ION GNSS+ 2018

September 24-28, 2018, Miami, Florida, USA

URL: <https://www.ion.org/gnss/>

EVN Symposium and Users' Meeting

October 8-11, 2018, Granada, Spain

URL: <http://evnsymp2018.iaa.es/>

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/>

AOGS 16th Annual Meeting

July 28 – August 2, 2019, Singapore, Singapore

URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

Reports

EUREF Symposium 2018

The IAG Reference Frame Sub-Commission for Europe, EUREF, symposium was held in Amsterdam 30 May – 1 June, 2018. There were a total of 120 participants and a traditional program with five sessions, including the National reports. The science sessions included the reference frames, European geodetic networks, observational techniques, and applications. During recent years, topical tutorial lectures have been organized prior the Symposium. This year the topic of the full-day Tutorial was *InSAR-geodesy and geodetic infrastructure*. InSAR is an emerging technique in geodesy, and the interest on it and possible applications seems to be great. This was reflected also in the presentations in the Symposium.

Another actual topic in the Symposium was an issue with new GNSS satellite systems, foremost Galileo. Up to now, lack of proper software has retarded applications, but this seems to be mostly solved. However, there is another issue, affecting especially permanent reference stations and precise positioning, both using calibrated antennas. Antenna calibrations have been done mainly for two GPS frequencies and Glonass.

What has been missing is the possibility to make the calibration also for Galileo and BeiDou, and this concern both the robot calibration and calibration in an anechoic chamber. This was recognized in a resolution of the Symposium, where EUREF *...asks the EUREF community, GSA, ESA and the GNSS industry to support the IGS antenna working group in order to overcome the missing receiver antenna calibrations for Galileo signals*. This information has been forwarded also to those places who are doing the calibrations or owns equipment for it.

There was also a resolution related to InSAR. As adopted in the Plenary, the resolution states that EUREF *...recognising the potential of collocating InSAR transponders or reflectors with continuous GNSS stations and geodetic benchmarks, encourages the EUREF community to start to consider the integration of InSAR technology into reference system activities*.

Being in the home place of NAP, the Normaal Amsterdams Peil, height questions were also on the agenda of the Symposium. A height and gravity related resolution was adopted, where the *IAG Reference Frame Sub-commission for Europe (EUREF), recognising that physical (gravity related) heights have many important uses*,

for example in European and national height systems and in studies of sea level rise and for flood protection, and noting that precise regional gravity data and geoid models are necessary for height determination using satellite-based techniques, encourages National Mapping Authorities, universities and research institutes to release their gravity and height data where this is legally possible, and requests the EUREF Governing Board form a working group to study the optimal application of height and gravity data. The purpose is encourage institutes to release gravity and height data which have been more difficult to obtain for research and practical purposes, contrary to the open databases of GNSS data. Unfortunately legislation or adopted practicalities restrict release of gravity and height data in many countries.



Photo: Lennard Huisman

The three-day Symposium was very active, and well organized in an inspiring environment of Amsterdam Nemo Science Museum. The social event included a memorable canal cruise to the conference dinner. Many thanks to the local organisers for the excellent event and great atmosphere. We welcome everyone to the 2019 EUREF Symposium in Tallinn.

MARKKU POUTANEN
Chair of EUREF

Obituary

Jean O'Brien Dickey (1945-2018)



Jean O'Brien Dickey, a pioneer geodesist expert in Earth rotation passed away on May 9 2018, in Pasadena, California. Jean studied Physics at what is now Saint Francis University in Pennsylvania, then completed her Ph.D. in Physics at Rutgers University in 1976. After a postdoc at Caltech, she joined the Jet Propulsion Laboratory (JPL) in 1980 and switched her interest to planet Earth. Her first studies involved the rotation and orientation of the Earth from Lunar Laser Ranging. She continued her work at JPL until her retirement in 2017, and stayed on as Research Associate until her passing.

Jean studied various aspects of the exchange of angular momentum between the solid Earth, atmosphere, and oceans: from short time scales such as the Madden-Julian oscillation, through interannual changes associated with the El Niño-Southern Oscillation, to decadal time scales, associated with the topography of the core-mantle boundary and electromagnetic torques imposed by the core and lower mantle. Jean also proved that a short term increase in J_2 superimposed on its long term downward trend due to Glacial Isostatic Adjustment (J_2 is a scaled version of the spherical harmonic of the gravitational field with degree 2 and order 0) was caused primarily by a surge in subpolar glacial melting and by mass shifts in the Southern, Pacific, and Indian oceans.

Jean was very active in IAG activities. In 1983 she chaired the Special Study Group (SSG) on "Atmospheric excitation of Earth's rotation" and was a member of the SSG on "Lunar Laser Ranging". In 1991 she was elected President of the IAG Section 5 "Geodynamics". She was also appointed IAG representative in the Organizing Committee of the IUGG General Assembly 1995 in Boulder, where she was elected Second IAG Vice-President 1995-1999 and USA National Correspondent and Delegate to the IAG Council. From 1999 to 2003 she served as a member in the IAG Special Commission on Fundamental Parameters.

Jean chaired the National Academy of Science/NRC Committee on "Earth Gravity from Space" in 1996-7 which provided a critical impetus for NASA to select in open competition the GRACE mission. GRACE inaugurated a wide range of studies of mass flow in the Earth system, especially melting of Greenland and Antarctica, surface hydrology and even deep ocean currents. Jean was the first woman to serve as President of the AGU Geodesy Section, from 1994 to 1995.

Jean was a Senior Research Scientist at JPL, was elected Fellow of the IAG in 1991 during the IUGG General Assembly in Vienna, and Fellow of the American Geophysical Union in 1994. She was awarded the NASA Exceptional Service Medal in 1998 and the NASA Exceptional Scientific Achievement Medal in 2003.

Jean is survived by two sons, two grandchildren, three sisters and two brothers.

SUSAN E. OWEN and VICTOR ZLOTNICKI