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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

Activities of IAG Commission 2 "Gravity Field" in the term 2015-2019

The accurate determination of the gravity field and its temporal variations is one of the three fundamental pillars of modern geodesy (besides of geometry/kinematics and Earth rotation). This is essential for applications in positioning and navigation, civil engineering, metrology, but also for many geoscientific disciplines, because the Earth's gravity field reflects the mass distribution and its transport in the Earth's interior and on its surface.

The high-resolution static gravity field, represented by the geoid, serves as a unique physical reference surface. It is used to define height systems and for the prediction of satellite orbits. Since the geoid represents the surface of an ideal ocean at rest, in oceanography it is compared with the actual ocean surface, which can be derived by satellite altimetry. Thus, the so-called mean dynamic topography (MDT) can be computed, from which geostrophic ocean surface currents can be derived. These ocean currents are, beside the atmosphere, the second largest mechanism for global heat transport through the Earth system. High-resolution static gravity field models also provide boundary values for geophysical models of lithospheric structures and dynamic processes in the Earth's mantle and crust.

Temporal gravity variations are a direct measure of variations in the Earth system related to mass transport processes in land hydrology, cryosphere, and the ocean. In fact, gravimetry is the only available measurement technique that is directly sensitive to mass and mass change, and by this is complementary to geometrical techniques such as precise positioning with global navigation satellite systems (GNSS), remote sensing or satellite altimetry.

Since 2000, the era of dedicated satellite gravity missions such as CHAMP, GRACE and GOCE has revolutionized our knowledge on the Earth's gravity field and its changes in time. Temporal gravity measurements quantify the rates of ice mass melting of the large ice sheets of Greenland and Antarctica and their contribution to ongoing sea level rise. They also provide global observations of seasonal, inter-annual and long-term water storage variations for large and medium size catchments, which supports the closure of the terrestrial water budget of the global water cycle. Additionally, mass displacement in connection with large earthquakes events can be measured, which constrain the physical modelling of earthquake mechanisms.

Based on data of these satellite missions, global Earth's gravity field models with homogeneous accuracy and increasingly high spatial resolution are derived, but due to signal attenuation with satellite altitude they are still limited to spatial wavelengths down to 70-80 km. Therefore, complementary detail information from terrestrial, air-borne and ship-borne gravimetry has not become obsolete, but in contrast is nowadays even more important to complete the gravity field picture on a local to global scale. In parallel, new and innovative measurement concepts and satellite systems, which shall provide even more accurate gravity measurements in the near future, are under development and investigation. This also imposes new challenges to develop methodologies for optimally combining different gravity data types of different signal content and with different specific features, and finally to derive gravity field and geoid models on all spatial scales. Figure 1 summarizes the main scientific (yellow) and societal (blue) challenges that shall be tackled by a future sustained gravity observing system as integral part of the Global Geodetic Observing System (GGOS).

In the term 2015-2019, Commission 2 will continue working to develop cooperation in observation, theory, methodology and computation of Earth's gravity field, and promoting several activities such as symposia and collaborative works. The next international symposium will be the joint Comm. 2 & IGFS meeting Gravity, Geoid and Height Systems, to be held 19-23 September 2016 in Thessaloniki, Greece.

Currently, Commission 2 consists of 6 Sub-Commissions, 7 Joint Study Groups and 4 Joint Working Groups. The Sub-Commissions are: SC 2.1: Gravimetry and Gravity Networks (Chair: L. Vitushkin, Russia), SC 2.2: Methodology for Geoid and Physical Height Systems (Chair: J. Agren, Sweden), SC 2.3: Satellite Gravity Missions (Chair: A. Jäggi, Switzerland), SC 2.4: Regional Geoid Determination (Chair: M.C. Pacino, Argentina), SC 2.5: Satellite Altimetry (Chair: X. Deng, Australia), SC 2.6: Gravity and Mass Transport in the Earth System (Chair: J. Kusche, Germany).

Among the manifold tasks of Commission 2 in the term 2015-19, much emphasis will be given to support the realization of several recent IUGG and IAG resolutions. They address the establishment of a global absolute gravity reference system (GAGRS) to replace the International Gravity Standardization Net 1971 (IGSN71), the realization of an International Height Reference System (IHRIS), and the realization of an Global Geodetic Reference System (GGRS), aiming at a consistent integration of geometry and gravity.

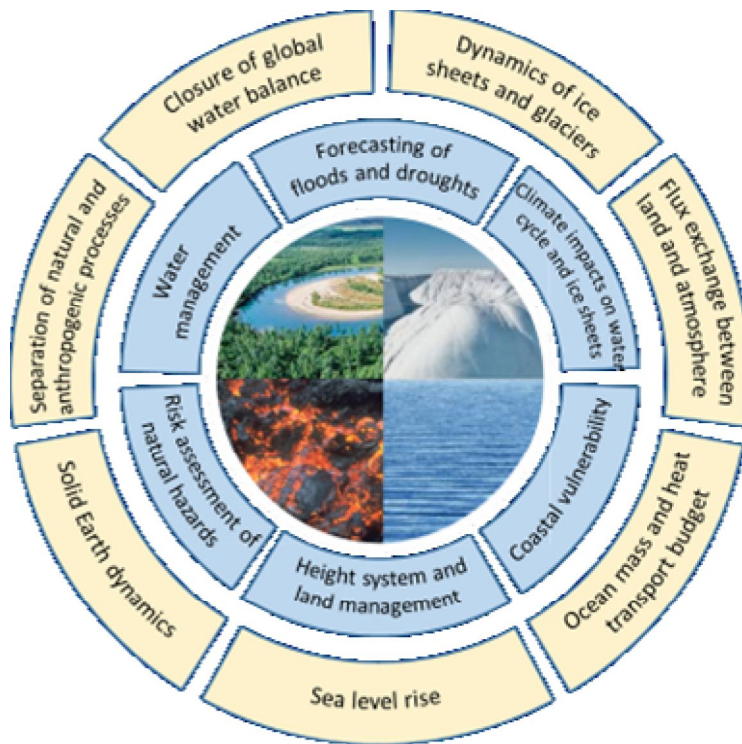


Fig. 1 Main scientific (yellow) and societal (blue) challenges addressed by a future sustained gravity observing system.

ROLAND PAIL

NIST UT1 Internet Time Service

The Time and Frequency Division of NIST operates an Internet time server that transmits UT1 time in the Network Time Protocol (NTP) format. The server is synchronized to UTC(NIST) by a direct connection to a local cesium standard. The offset between UT1 and UTC is added to the reply to a query for the time. The time difference between UT1 and UTC is obtained from IERS Bulletin A, and the value used by the time server changes every day at 0 h UTC. The time step at 0 h UTC is generally about 1 -2 ms. This time step is generally too small to be detected by most users.

The accuracy of the time at the server is approximately 4 ms, and is determined by the uncertainty in the prediction of the difference UT1-UTC in the IERS Bulletin A. The accuracy of the time received by a user will usually be limited by the stability of the network delay from the user's system to the time server. The overall accuracy of the time as received by a user will generally be better than 10 ms, and will often be significantly better than this value.

The name of the server is ut1-time.colorado.edu and its address is 128.138.140.50. The ut1 time service is currently restricted to users who register with NIST (by e-mail to Judah.levine@nist.gov), but it will be converted to open-access in July, 2016.

The NIST is the US National Institute of Standards and Technology (<http://www.nist.gov/>).

Questions or comments to Judah.Levine@nist.gov

FELICITAS ARIAS

Proceedings of the JISDM on the FIG Website

The proceedings of the JISDM conference have now been published on the FIG Website at: <https://www.fig.net/resources/proceedings/2016/index.asp>.

HANS NEUNER
GUENTHER RETSCHER

New horizons at 79°N

The new geodetic Earth observatory being built by the Norwegian Mapping Authority (NMA) at Ny-Ålesund on Svalbard will soon be complete. Installation of the new antennas was finished at record speed this spring.



NEW: How the NMA's new Geodetic Earth Observatory at Ny-Ålesund now looks. Photo: Bjørn-Owe Holmberg

Grey clouds were unable to dampen the pleasure felt by Per Erik Opseth, head of the NMA's Geodetic Institute, on the day he visited the facility at the end of May.

He and his colleagues were welcomed by the sight of the new antennas as their flight from Longyearbyen, capital of the Arctic islands, came in to land at Ny-Ålesund.

From the air, the twin telescopes looked like modest dots in the majestic and beautiful landscape. But the ground view, surrounded by Brandallaguna, Cape Mitra and Ny-Ålesund, is more impressive. Each antenna measures 13.2 metres in diameter and looms 18 metres above the ground.

Opseth is both proud and perhaps a little respectful when he can finally view these structures at close hand, immediately after setting foot on the tundra. This is now melting faster than ever before during the earliest spring recorded to date in the Arctic.

Nine years since the start

"It's been a long road, and seeing this now is a special experience," says Opseth. "It's nine years since we started work on the very first plans.

"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."

Opening in two years

Everything has gone according to plan. Being delivered by Germany's MT Mechatronics and its Spanish sub-contractor Asturfeito, the antennas have been installed at record speed since the beginning of April.

The new observatory is due to be officially opened in two years time. The NMA is now negotiating with NASA on the delivery of a satellite laser ranging (SLR) instrument.

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

The cost of the new observatory is around NOK 300 million. Jan Tore Sanner, minister of local government and modernisation, laid the foundation stone in October 2014.

Raised at the UN

The commitment in Ny-Ålesund has also been raised at the UN, whose General Assembly adopted a resolution in February 2015 aimed at strengthening global collaboration on geodesy and enhancing the development and sustainability of the global geodetic reference frame.



PLEASED: Per Erik Opseth, director of the Geodetic Institute at the Norwegian Mapping Authority, is pleased that the new antennas are in place at Ny-Ålesund. Photo: Bjørn-Owe Holmberg

ANNE JØRGENSEN

COSPAR Awards 2016

Objectives of Committee on Space Research (COSPAR) are to promote on an international level scientific research in space, with emphasis on the exchange of results, information and opinions, and to provide a forum, open to all scientists, for the discussion of problems that may affect scientific space research. Citations for honors awarded in 2016 at the 41st COSPAR Scientific Assembly in Istanbul, Turkey are available at https://cosparhq.cnes.fr/sites/default/files/press_release_2016.pdf.

A. JANOFSKY
Associate Director, COSPAR

Meeting Announcements

Workshop "Understanding the Earth core and nutation" in Brussels, 2016

Dear Colleagues,

The Royal Observatory of Belgium organizes a workshop entitled "Understanding the Earth core and nutation" with the objectives to bring together specialists of the core and of the Earth rotation in order for them to share their views and discuss the possible ways to better understand the role of the core in the rotation of the Earth. The workshop is in September 19-20, 2016. Veronique Dehant and her team (in the frame of the ERC RotaNut) would like to invite all interested participants to give a talk or a poster in Brussels during that workshop.

In addition, you might know about the existence of the Journées Systemes de Reference (JSR) organized by Nicole Capitaine from the Observatory of Paris previously. The purpose of this series of conferences was to discuss problems ranging from the concepts and realizations of space and time reference systems to the scientific interpretations of precise observations referred to these systems. Nutations are part of them. This year is a pivotal year as next year these JSR will be organized by the young generation at Observatoire de Paris and there is nothing this year, except our workshop. We will take the opportunity of our workshop to thank Nicole Capitaine for her work in the field of precession, nutation, and Earth rotation and her dedication in the frame of the JSR. In parallel, for all her career and her work in the Scientific Council of the Royal Observatory of Belgium, we will take the opportunity to thank her and nominate her "Astronome correspondant" of the Royal Observatory of Belgium. The ceremony will be held on Monday 19 September, first day of the workshop, in conjunction with the nomination of 3 other "Astronomes correspondants".

The registration to the workshop can be found at <https://register-as.oma.be/rotanutWS/>.

As this is a workshop sponsored by the IAG (International Association of Geodesy), young researchers not older than 35 years may ask for financial support at "IAG Travel Award for young scientists" (http://iag.dgfi.tum.de/fileadmin/IAG-docs/IAG_Travel_Award_interactive.pdf).

Thank you very much for your consideration,
We hope to hear from you soon.

Veronique Dehant and the RotaNut staff: Raphael Laguerre, Jeremy Requier, Attilio Rivoldini, Santiago Andres Triana, Antony Trinh, Tim Van Hoolst, and Zhu Ping

Meetings Calendar

ISDE 2016

July 7-8 2016, Beijing, China

URL: www.isde2016summit.org

International Conference "Data Intensive System Analysis for Geohazard Studies"

July 18 – 21, 2016, Sochi region, Mountain cluster, Russia

URL: <http://sochi2016.gcras.ru/>

GAGER 2016

July 18 – 23, 2016, Wuhan, Hubei, China

Geodesy, Astronomy and Geophysics in Earth Rotation (GAGER2016) – A Joint IAU / IAG / IERS Symposium

URL: <http://main.sgg.whu.edu.cn/gager2016/>

ESA-JRC Summer School on GNSS 2016

July 18 – 29, 2016, Ispra, Italy

URL: www.esa-jrc-summer-school.org

International Symposium on Geodesy and Geodynamics (ISGG2016)

July 22 – 25, 2016, Tianjin, China

URL: <http://isgg2016.csp.escience.cn>

ICG+2016

July 27 – 30, 2016, Shanghai, China

IAG/CPGPS International Conference on GNSS+

URL: <http://202.127.29.4/meetings/icg2016>

41st COSPAR Scientific Assembly

July 30 – August 7, 2016, Istanbul, Turkey

URL: <http://www.cospar-assembly.org/>

AOGS 13th Annual Meeting

July 31 – August 5, 2016, Beijing, China

URL: <http://www.asiaoceania.org/aogs2016/>

IAG Commission 4 „Positioning and Applications“ Symposium

September 4-7, 2016, Wroclaw, Poland

URL: <http://www.igig.up.wroc.pl/IAG2016/>

18th General Assembly of WEGENER

September 12-15, 2016, Azores, Portugal

WEGENER 2016: Understanding earth deformation at plate boundaries

URL: <http://wegener.segal.ubi.pt>

ION GNSS+ 2016

September 12-16, 2016, Portland, USA

URL: <http://www.ion.org/gnss/index.cfm>

16th International Mine Surveying Congress

September 12-16, 2016, Brisbane, Australia

URL: <http://www.ism2016.com/>

GGHS2016

September 19-23, 2016, Thessaloniki, Greece

URL: <http://www.gghs2016.com>

13th European VLBI Network (EVN) Symposium

September 20-23, 2016, St. Petersburg, Russia

URL: <http://www.ipa.nw.ru/EVN2016/>

4th International School on “The KTH Approach to Modelling the Geoid”

September 25-29, 2016, Johor Bahru, Malaysia

URL: <https://www.kth.se/en/abe/inst/som/avdelningar/geo/geodesi/handelser-1.78120>

First International Workshop on VLBI Observations of Near-field Targets

October 5 – 6, 2016, Bonn, Germany

URL: <http://ivscc.gsfc.nasa.gov/meetings/index.html>

20th International Workshop on Laser Ranging

October 9 – 14, 2016, Potsdam, Germany

URL: <http://iwslr2016.gfz-potsdam.de/international-workshop-on-laser-ranging>

INTERGEO, Geodätische Woche

October 11 – 13, 2016, Hamburg, Germany

URL: <http://www.intergeo.de/>

5th International VLBI Technology Workshop

October 12 – 14, 2016, Haystack Observatory, Westford, MA, USA

URL: <http://www.haystack.mit.edu/workshop/ivtw2016/Index.htm>

RFI 2016: Coexisting with Radio Frequency Interference

October 17 – 20, 2016, Socorro, NM, USA

URL: <http://go.nrao.edu/rfi2016>

GGOS Days

October 24 – 28, 2016, Cambridge, MA, USA

URL: <http://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html>

IDS Workshop

October 31 – November 1, 2016, La Rochelle, France

URL: <http://ids-doris.org/meetings/ids-meetings.html>

SAR Altimetry Workshop

October 31 2016, La Rochelle, France

URL: <http://www.aviso.altimetry.fr/en/news/events-calendar.html>

OSTST 2016

November 1 – 4, 2016, La Rochelle, France

URL: <http://ids-doris.org/meetings/ids-meetings.html>

IGNSS 2016

December 6 - 8, 2016, Sydney, Australia

International Global Navigation Satellite Systems 2016 Conference

URL: <http://www.ignss2016.unsw.edu.au>

AGU 2016 Fall Meeting

December 12 – 16, 2016, San Francisco, California, USA

URL: <http://meetings.agu.org/upcoming-meetings/>

EGU General Assembly 2017

April 23-28 , 2017, Vienna, Austria

URL: <http://www.egu2017.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>

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>

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/society/public.asp?view=up_coming

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://cosparhq.cnes.fr/events/scientific-assemblies>

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-FIG Workshop “Reference Frames in Practice”

The link between these two geospatial sister organisations is a fundamental one. Because geodesy has always provided the foundation for surveying and mapping, many geodesists with an “applied” focus have been interested in, and have contributed to, FIG activities. The strongest relationship is between IAG Commission 4 “Positioning & Applications” and FIG Commission 5 “Positioning & Measurement”. However, IAG Commission 1 “Reference Frames”, the IAG’s International GNSS Service (IGS), and International Earth Rotation & Reference Systems Service (IERS) conduct activities and generate products very relevant to FIG members and organisations.

This is not surprising because modern geodesy is closely associated with positioning tools such as GPS/GNSS, applied geodesy applications such as ground and structural deformation monitoring, new terrestrial mapping technologies such as mobile imaging/scanning systems, datum concepts such as the International Terrestrial Reference Frame (ITRF), geoid models, and height systems.

The IAG and FIG also work together in a number of international forums such as GEO (Group of Earth Observation), UN-ICG (International Committee on GNSS), and the UN-GGIM (Global Geospatial Information Management). The FIG typically represent the interests of high accuracy users and service providers (including national mapping organisations), while the IAG provides the link to the geodetic (theory & practice) community. The common interests of the two organisations is also obvious from their membership of the Joint Board of Geospatial Information Societies (JBGIS). In fact the JBGIS is a very important forum for the IAG, where it works with all its geospatial “sister” organisations to promote awareness of the value of geospatial data, products, services; as well as datums, technologies and standards, for the benefit of science and society.

One recent example of the close cooperation of the IAG and FIG is the “Technical Seminar on Reference Frame in Practice” that was run 21-22 June 2013, immediately following the South East Asian Survey Congress, 18-20 June, in Manila, Philippines. This is the second time such an IAG-FIG workshop has been run (the first being in 2012, at the FIG Working Week in Rome, Italy). The workshop was also sponsored by the UN-GGIM-Asia-Pacific, the UN-ICG and the Philippines Geodetic Engineering and Geomatics Society, with generous corporate support provided by Esri, Trimble and Leica Geosystems. There were speakers from Australia, New Zealand, Japan, Korea, Philippines, Singapore, Indonesia, Fiji, PNG, and Sweden, with about 50 participants.

The first day’s program dealt with the following topics:

- Case Studies – The Status and Issues of Geodetic Infrastructure from Countries in the Region
- IGS Services and Other Initiatives
- APREF Status and Determination
- Reference Frame Infrastructure

Topics of the second day were:

- Gravity and the World Height System
- Multi-GNSS Environment
- Going Geocentric
- Dynamic Datums
- The Role of Manufacturers in the Provision and Operation of Geodetic Infrastructure

A technical manual on “Reference Frames in Practice” is currently under preparation and will be published by the FIG. We will continue to see joint IAG-FIG activities in the years to come.

SEASC website: <http://www.seasc2013.org.ph>



Reference Frame in Practice Workshop



Participants at Workshop

CHRIS RIZOS

Report on the 18th International Geodynamics and Earth Tides Symposium 5-9 June 2016, Trieste Italy

The Symposium is held every four years and gathers researchers working on the observation of tidal effects on gravity, tilt and strain, earth rotation parameters and Earth’s deformation. It is supported by the International Association of Geodesy, in particular by its Commission 3, the Sub-commission 3.1 and the International Geodynamics and Earth Tide Service.

The Earth tides constitute a time variation at fixed frequencies which are well known and can be used to verify the good functioning of the instrumentation, and to infer rheological properties of the Earth. Instrumentation that has the required precision to record tides, records a multitude of parameters closely linked to geodynamics and the earthquake cycle. For the first time the Earth Tides Symposium made this more visible by adding word “Geodynamics” to the title. The successful Symposium attracted 105 attendants from 31 countries who presented 66 oral presentations and 40 posters. The contributions were grouped into the following sessions:

1. Tides and non tidal loading.
2. Geodynamics and the earthquake cycle.
3. Variations in Earth rotation.
4. Tides in space geodetic observations.
5. Volcano geodesy.
6. Natural and anthropogenic subsurface fluid effects.
7. Instrument and software developments.

Nine invited lectures of half an hour each allowed insight into specific themes, as the principal outcomes of 18 years superconducting gravity in Medicina (Italy) (H. Wziontek), the lunisolar stress tensor and the triggering of earthquakes, the correction of observed free oscillation spectra due to local heterogeneities obtainable from tidal observations (W. Zürn), a review on the results of 40 years of longbase laser strainmeter observations in California (D. Agnew), the geodetic observation of slow slip events (SSE) or giant silent earthquakes at subduction zones (K. Heki), the role of earth tides in global plate tectonics (C. Doglioni), an overview of local to global geodetic monitoring of natural hazards and global change (H. Schuh), the separation of surface loading from time dependent tectonic deformation in GNSS observations (J. Freymueller), and a review of new developments of terrestrial and space based gravimetric instrumentation in China (Houze Xu). The program included a talk of the Rector of the University M. Fermeglia on ‘The great energy challenge: how to avoid the ‘perfect storm’ and the President of the OGS - Istituto nazionale di oceanografia e di geofisica sperimentale M.C. Pedicchio on ‘OGS in the frame of the Friuli Venezia Giulia and Trieste science system’.

During the Symposium the ‘Paul Melchior Medal 2016’ was awarded to Trevor Baker. The medal aims to nominate an outstanding scientist with a huge experience and high impact on to the Tidal Community, who contributed significantly to develop the science and technology of tidal research. The laudatio was presented by Walter Zürn.

The participants were invited to visit the Grotta Gigante cave, a giant cave close to Trieste in the classical Karst that houses the longbase Marussi horizontal pendulums and to the mouths of the Timavo river, a fast flowing powerful body of water that emerges from the foot of the Karst after flowing 40km several 100 meters below the surface.

The Local Organizing Committee (LOC), Carla Braitenberg (Chair of LOC), and Giuliana Rossi (Co-chair), wish to thank the University of Trieste and the sponsors of the symposium, namely the OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), the Dipartimento di Fisica E. Caianiello, University of Salerno, the Department of Mathematics and Geosciences of the University of Trieste, Leica Geosystems S.P.A., International Association of Geodesy (3 IAG Travel Awards for young scientists), the European Geosciences Union (support to 5 young scientists), M. Fermeglia - the Rector of the University of Trieste and M.C. Pedicchio - the President of OGS, Institute of Oceanography and Applied Geophysics for hosting and supporting this event.

Link to the meeting homepage: <http://g-et2016.units.it/>



Group photo of participants

Trieste, 21 June 2016

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²OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), CRS - Centro Ricerche Sismologiche,
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