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International Association of Geodesy

# Newsletter
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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

Global Geodetic Centre of Excellence (GGCE)

*A new benchmark for global geodesy*

**On August 9 2019, Member States of the United Nations Committee of Experts on Global Geospatial Information Management commended the Subcommittee on Geodesy on the revised proposal to establish a global geodetic centre of excellence under the auspices of the United Nations.**

UN-GGIM, NEW YORK: Strong support for the proposal of creating a global geodetic centre of excellence under the auspices of the United Nations.

Photo: Anne Jørgensen

The Subcommitee on Geodesy has reached a new milestone on the road towards a sustainable global geodetic reference frame (GGRF).

**A strong mandate for global geodetic excellence**

At the Ninth Session of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), the GGRF accounted for the most interventions which signaled a strong interest in advancing the subcommittee's work program. Of the Member States intervening on GGRF, 67% strongly supported the establishment of a Global Geodetic Centre of Excellence (GGCE). This gives the subcommittee a strong mandate on the way forward. In addition, three Member States—the Russian Federation, Germany, and India—announced their interest in hosting or supporting the activities of the future GGCE.

«This is a significant contribution to the enhancement and sustainability of the GGRF», say the UN-GGIM Subcommittee on Geodesy co-chairs Alexey Trifonov (the Russian Federation) and Gary Johnston (Australia).

**A strong mandate for global geodetic excellence**

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## The journey towards a global geodetic centre of excellence (GGCE):

**2015**: UN General Assembly resolution on the GGRF

**2016**: UN-GGIM Committee of Experts requested a position paper on governance

**2018**: UN-GGIM Committee of Experts requested a broad consultation of the position paper on governance

**Intersessional period**: Position paper consultations with UN-GGIM regions, interalia proposal to establish coordinating unit

**2019**: UN-GGIM Subcommittee on Geodesy revised the position paper based on the consultations and published it as part of the UN-GGIM Ninth session meeting documents and presented at side event; Forum on GGRF

**2019**: UN-GGIM Committee of Experts supported the proposal of a GGCE

**Coming period**: Work to fill the requests from UN-GGIM Committee of Experts.

## GGCE three thematic priorities:

**Enhance global cooperation**
- Bring stakeholders together to build continuity and commitment

**Provide operational coordination**
- Coordinate and guide the implementation of the GGRF road map in the Member States;

**Provide capacity building**
- Provide advice, communication, and management support
- Guide Member States to better utilize GGRF infrastructure to improve national to global prosperity

**What the centre will do**

The GGCE will be an operational hub with the intention to strengthen the capacity to implement the UN General Assembly resolution 'A global geodetic reference frame for sustainable development'. The centre will support the objectives of UN-GGIM and the Subcommittee on Geodesy, provide technical assistance and capacity building, and encourage and facilitate open geodetic data sharing. By also providing advocacy and outreach, the centre will enhance the capacity of the Subcommittee to effectively and efficiently manage global cooperation in the area of geodesy.

More information on the GGCE can found in the GGRF Position Paper on Governance:

http://ggim.un.org/meetings/GGIM-committee/9th-Session/documents/GGRF_Position_Paper2019_24July_web.pdf

**Participation – contacts:**

UN-GGIM Subcommittee on Geodesy invites you to contribute to the initial GGCE work program. Don't hesitate to contact the subcommittee's co-chairs:

**Alexey Trifonov** (the Russian Federation): trifonovav@economy.gov.ru

**Nicholas Brown** (Australia): Nicholas.Brown@ga.gov.au

Nicholas Brown has taken over as co-chair from Gary Johnston due to his retirement. The Subcommittee on Geodesy extends their thanks to Gary for his work through the years.

**Broad consultations ahead**

The subcommittee is planning to undertake consultation on the practical implementation of the Centre, that is, to decide on modalities, function, financial arrangements, and a programme of work.

In order to ensure coherence and avoid duplication of effort, consultation will be made in direct coordination with the Committee of Experts and relevant geodetic stakeholders, including the International Association of Geodesy (IAG), International Federation of Surveyors (FIG), and the regional geodetic committees of the UN-GGIM.

The plan is to present the initial centre work program to the UN-GGIM Bureau in April 2020, with ongoing progress and status to be reported at the UN-GGIM 10th session in August 2020.

**Encouraging more participation of Member States**

The Subcommittee on Geodesy welcomes all Member States to take part in the practical implementation of the GGCE. By informing the co-chairs in writing of what they want to contribute, all UN-GGIM Member States are welcome to do so. NGOs can participate in the meetings and working groups of the subcommittee if they ask to become observers.

**Recommendations:**

The UN-GGIM Subcommittee on Geodesy

- **Agrees** that the ITRS, through its numerical ITRF realization, be adopted for geospatial and scientific positioning applications.
- **Urges** Member States to record their national reference frame definition, and its alignment to the ITRF, in the ISO Geodetic Registry.
- **Takes note of** the developments that are currently undertaken by the IAG for the definition of the International Height Reference System (IHRS), and the International Height Reference Frame (IHRF).

## Agreement on ITRS/ ITRF

The UN-GGIM Committee of Experts also supported at its Ninth session the Subcommittee's agreement on the adoption of the International Terrestrial Reference System (ITRS) and the International Terrestrial Reference Frame (ITRF) as the standard for scientific, geospatial, and operational geodetic applications.

The motivation of the agreement is to formalize the adoption of the ITRS and ITRF by the Committee of Experts in the definition of their national reference frames and geo-referencing applications.

ANNE JØRGENSEN

UN-GGIM Subcommittee on Geodesy's Outreach and Communication Working Group

## Meeting Announcements

*COSPAR 2020, 43rd Scientific Assembly*
*August 15-22, 2020, Sydney, Australia*

https://www.cospar-assembly.org
http://www.cospar2020.org

The next COSPAR meeting will attract about 2500 scientists and engineers from the world over. More than 100 symposia will cover all areas of space science: Space studies of the Earth's surface, meteorology and climate, Space studies of the Earth-Moon, Planets and small bodies of the solar system, Space studies of the upper atmospheres of the Earth and Planets including reference atmosphere, Space plasmas in the Solar system, including planetary magnetospheres, research in astrophysics from space, life sciences as related to space, material sciences in space, fundamental physics in space, and several Panel meetings.

Interdisciplinary lectures will also be given by key scientists and several associated events are planned, such as a meeting organized by Elsevier for young scientists to help them publish or review scientific articles.

In particular, we would like to draw the attention of geodesists to a meeting, organized by the COSPAR Panel on Satellite Dynamics, in close cooperation with IAG Commission 1 (identical to COSPAR Sub-Commission B2 "International Coordination of Space Techniques for Geodesy").

The aim of the Panel on Satellite Dynamics is to support activities related to the detailed description of the motion of artificial celestial bodies. This goal should be achieved by improving the current theories of motion and by evaluating their determining forces in a more sophisticated way. Detailed theoretical understanding of the dynamics of satellites should coincide with the results of precise tracking in order to obtain the most precise knowledge possible of the orbit and the corresponding orbital positions.

The scope of the Panel on Satellite Dynamics entails the positioning of a wide range of objects in space, including Earth orbiting satellites for Earth observation such as GRACE-FO, Swarm, Jason-3, and the Copernicus Sentinels, and navigation satellite systems such as GPS, GLONASS, Galileo, Beidou, QZSS or tracking systems such as SLR and DORIS. In addition, positioning plays an important role in the success of the continuously growing number of today's and tomorrow's missions to explore the Solar System. Recent and future missions have to deal with complex trajectories and innovative propulsion and breaking techniques to visit multiple bodies (e.g., Cassini, Dawn, JUICE), small unconventional bodies (e.g., Rosetta, OSIRIS-REx, Lucy), and harsh and unknown environmental conditions challenging our technical capabilities (e.g., Messenger, Venus Express, BepiColombo, JUNO). Both advances in the modeling of spacecraft dynamics and the theoretical understanding of space observables (e.g., range, Doppler, VLBI, optical) are required to allow for a more efficient exploration and a deeper understanding of our Solar System.

Limiting errors in Precise Orbit Determination (solar radiation pressure, time variable gravity fields, phase center corrections, attitude variations, etc...) are of critical interest for many stakeholders. Moreover, formations of satellites are being realized and proposed for Earth observation and fundamental sciences, that impose very severe constraints on (relative) positioning and orbit and attitude control solutions (e.g. micro-propulsion). Mini-satellites and cubesats also represent a new frontier for both Earth and planetary exploration, posing new challenges as well as new opportunities.

Satellite orbit determination requires the availability of tracking systems, well established reference frames and accurate station coordinate solutions, detailed force and satellite models, and high-precision time and frequency standards.

Contributions covering all recent developments and plans in ground, satellite or probe positioning and navigation are solicited as well as contributions on current progress on establishment, maintenance and improvement of reference systems in Geosciences.

Important dates:
14 February 2020: Abstract submission deadline
16 May 2020: end of early registration fees and presenter registration deadline

Heike Peter, Adrian Jäggi
Convenors of the Satellite Dynamic Panel sessions
https://cosparhq.cnes.fr/scientific-structure/psd

## *EGU Session on "Modern Concepts for Gravimetric Earth Observation"*

Dear colleagues,

we - that are Jürgen Müller, Wenbin Shen, Arnaud Landragin, Michel van Camp and Sergei Kopeikin - want to invite you to submit an abstract to our session G4.2 on "Modern Concepts for Gravimetric Earth Observation" at the EGU General Assembly 2020 in Vienna, Austria (3–8 May 2020).

The deadline for abstract submission is **15 January 2020**!

Link to EGU 2020 website: https://www.egu2020.eu/
Link to the abstract submission: https://egu2020.eu/abstracts_and_programme/how_to_submit_an_abstract.html

Session Description:

Current developments in quantum physics will enable novel applications and measurement concepts in geodesy and Earth observation. In this Session, we will discuss new sensors and mission concepts that apply advanced techniques for the study of the gravitational field of the Earth on ground and in space. Terrestrial gravity anomalies will be determined by observing free-falling atoms (quantum gravimetry) gradually replacing the falling corner cubes. This technique can also be applied for future gradiometric measurements in space. According to Einstein's theory of general relativity, frequency comparisons of highly precise optical clocks connected by optical links give access to differences of the gravity potential (relativistic geodesy) for gravity field recovery and height determination. In future, precise optical could clouds be applied for defining and realizing height systems in a new way, and moreover, help to improve the accuracy of the International Atomic Time scale TAI. They are important for all space geodetic techniques as well as for the realization of reference systems and their connections.

Additionally, laser interferometry between test masses in space with nanometer accuracy – which has been realized in the GRACE-FO mission – belongs to these novel concepts, and in the future even more refined concepts (tracking a swarm of satellites, space gradiometry) will be realized.

Finally, changes in the gravity field can be derived from GNSS displacements which play an increasingly important role due to the relatively cheap and easy deployment of new GNSS receivers and the large number of available stations.

These techniques will open the door for a vast bundle of applications such as fast local gravimetric surveys and exploration, and the observation of Earth system processes from space with high spatial and temporal resolution.

We invite presentations to illustrate the principles and state of the art of those novel techniques and the application of the new methods for terrestrial and satellite geodesy (where local and global mass variations and surface deformations will be observed with substantially improved accuracy and resolution, variations that reflect changes in the Earth system), navigation and fundamental physics. We also welcome papers for further applications and invite contributions covering the theoretical description of the new methods, introducing novel theoretical concepts as well as new modelling schemes.

If you have any further questions please contact us at any time,

Best regards,

Juergen, Arnaud, Michel, Wenbin and Sergei

## Meetings Calendar

### IAG Sponsored Meetings

*11th IVS General Meeting*

*March 22 –28, 2020, Annapolis, MD, USA*
URL: https://ivsgm2020.com/

*19th International Symposium on Geodynamics and Earth Tides (G-ET Symposium 2020)*

*June 7 –11, 2020, Wuhan, China*
URL: http://get2020.csp.escience.cn/dct/page/1

*IGS Workshop "IGS 2020: Science from Earth to Space"*

*August 10 –14, 2020, Boulder, CO, USA*
URL: https://www.igscb.org/event/

*43rd COSPAR Scientific Assembly*

*August 15 –22, 2020, Sydney, Australia*
URL: http://www.cospar2020.org/

*2nd International Symposium of Commission 4: Positioning and Applications*

*September 7 –11, 2020, Potsdam, Germany*
URL: https://www.iag-aig.org/events/17

*International Workshop on GNSS Ionosphere (IWGI2020)*

*October 19 –21, 2020, Shanghai, China*
URL: http://202.127.29.4/geodesy/iwgi2020/index.html

*International DORIS Service Workshop*

*October 19 –21, 2020, Venice, Italy*
URL: http://ostst-altimetry-2020.com/home/

*22nd meeting of the Consultative Committee for Time and Frequency (CCTF)*

*October 26 –30, 2020, Sèvres, France*
URL: https://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html

*22nd International Workshop on Laser Ranging*

*November 2 – 6, 2020, Kunming, China*
URL: https://ilrs.cddis.eosdis.nasa.gov/about/meetings.html

*IAG Scientific Assembly*

*June 28 – July 3, 2021, Beijing, China*
URL: http://www.iugg.org/meetings/assemblies.php

### IAG Related Meetings

*Space VLBI 2020: Science and Technology Futures*

*January 28-30, 2020, Charlottesville, VA, USA*
URL: https://ilrs.cddis.eosdis.nasa.gov/about/meetings.html

*3rd UN GGIM Subcommittee on Geodesy Plenary Meeting*

*April 20-22, 2020, Windsor, United Kingdom*
URL: http://ggim.un.org/meetings/2020/6th_HLF

*6th High Level Forum on UN GGIM*

*April 20-22, 2020, Windsor, United Kingdom*
URL: http://ggim.un.org/meetings/2020/6th_HLF

*EGU General Assembly 2020*

*May 3-8, 2020, Vienna, Austria*
URL: https://egu2020.eu/

*FIG Working Week 2020*

*May 10-14, 2020, Amsterdam, the Netherlands*
URL: http://www.fig.net/fig2020/

*AOGS2020 17th Annual Meeting*

*June 28 – July 4, 2020, Gangwon, South Korea*
URL: http://www.asiaoceania.org/aogs2020/public.asp?page=home.html