

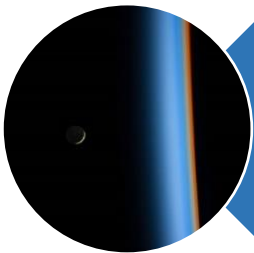
Recent developments within the International Committee on GNSS on the use and applications for PNT

24th PNT Board Meeting
Cocoa Beach, Florida, United States, 20 - 21 November 2019

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United Nations Office for Outer Space Affairs



UNOOSA: Unique Roles



CAPACITY-BUILDER: UNOOSA brings the benefits of space to humankind by building space capacity of non-space-faring countries.



GLOBAL FACILITATOR: UNOOSA plays a leading and facilitating role in the promotion of the peaceful uses of outer space.



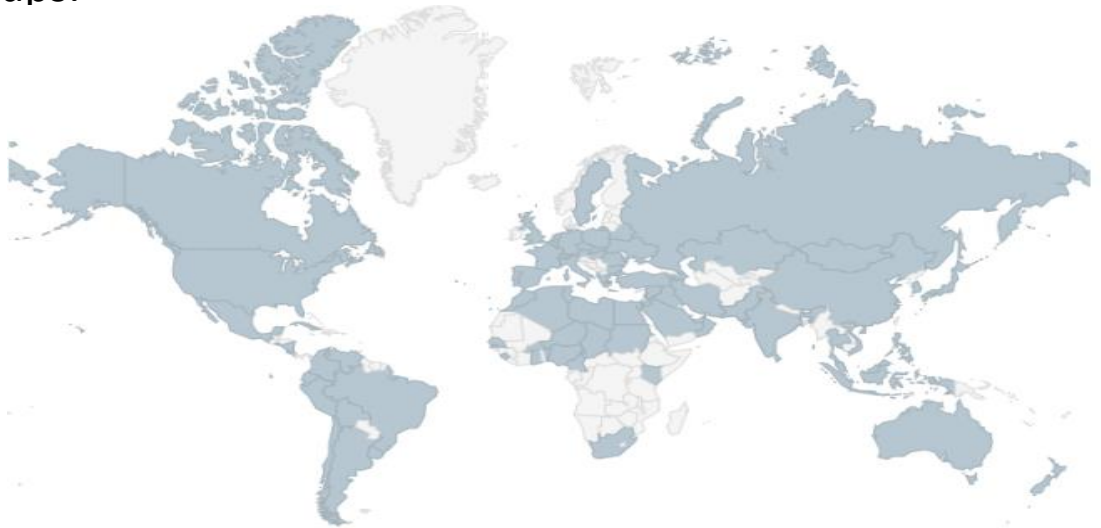
GATEWAY TO SPACE: UNOOSA is the main UN agency on space matters and facilitates the coordination of UN activities using space technology to improve lives around the world.



Committee on the Peaceful Uses of Outer Space



UNOOSA supports **the Committee on the Peaceful Uses of Outer Space (COPUOS)**, its Scientific and Technical Subcommittee, Legal Subcommittee, and related working groups.



COPUOS was established by the General Assembly in 1959 with 24 members. Since then, the Committee's membership has continued to expand (currently 92 members), though the Office serves all 193 Member States of the UN).



STSC and LSC



The **Legal Subcommittee (LSC)** discuss **legal matters** related to the exploration and use of outer space. Topics include the status and application of the **five United Nations treaties on outer space**, the definition and delimitation of outer space, national space legislation, legal mechanisms relating to **space debris mitigation**, and **international mechanisms for cooperation** in the peaceful exploration and use of outer space

The **Scientific and Technical Subcommittee (STSC)** discuss matters related to the scientific and technical aspects of space activities. Topics for discussion include **space weather**, **near-Earth objects**, the use of **space technology for socioeconomic development**, or for **disaster management support**, **global navigation satellite systems**, and the **long-term sustainability** of outer space activities.





International Committee on GNSS (ICG)

- UNOOSA serves as the executive secretariat of ICG
- Established in 2005, ICG provides a mechanism for multilateral discussion and coordination on GNSS issues of concern
- Encourages **coordination** among GNSS providers
- **Promotes** the introduction and utilization of GNSS services in developing countries
- **Assists** GNSS users with their development plans and applications
- Contributes to the **sustainable development** of the world
- Assure GNSS **interoperability and compatibility** among providers and users globally for enhanced services and applications





ICG: Membership and Annual Meetings

- **Members:** Current and future core, regional or augmentation systems providers:
 - China (BeiDou), EU (Galileo/EGNOS), Russia (GLONASS/SDCM), United States (GPS/WAAS), India (IRNSS/GAGAN), Japan (QZSS/MSAS), Nigeria (NIGCOMSAT)
 - **State Members of the United Nations** with an active programme in implementing or promoting a wide range of GNSS services and applications: Italy, Malaysia, United Arab Emirates, *Australia (satellite based augmentation system)*
- **Associate Members and Observers:** 21 organizations
- **Annual Meetings:** UNOOSA (2006), India (2007), ... China (2018), **India (2019), Vienna (2020)**, UAE (2021)
- **Providers' Forum: 22nd Meeting, 10 June 2019, Vienna, Austria:** *Open Service Information Dissemination, Open Service Performance, Spectrum Protection*
 - *ICG-14 meeting, Bengaluru, INDIA, 8 – 13 December 2019*



Working Group Systems, Signals and Services (S)

The subgroup on compatibility and spectrum protection:

- continued its campaign to promote adequate protection of GNSS spectrum through education and outreach;

<http://www.unoosa.org/oosa/en/ourwork/icg/working-groups/s/IDMIndex.html>

- continued to investigate methods of implementing interference detection and mitigation capabilities through permanent network-based solutions and through crowdsourcing techniques;

The subgroup on interoperability and service standards:

- focused on open service performance standards and international GNSS monitoring and assessment. A dedicated team of experts completed a document defining guidelines for developing open service performance standards, completing work that has been under way since 2012

<https://www.unoosa.org/oosa/en/ourwork/icg/working-groups/s/PSindex.html>

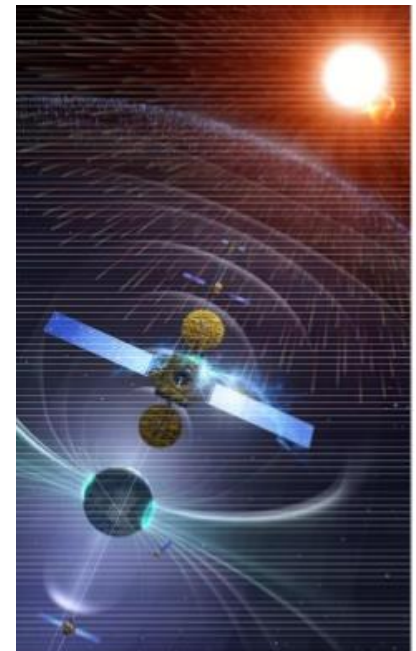
Orbital Debris and Orbital De-confliction:

- ICG working with IADC to review debris guidelines for MEO/IGSO satellites



Working Group Enhancement of GNSS Performance, New Services and Capabilities (B)

- The importance of exploiting the multitude of signals broadcast by GNSS enabling better monitoring of **space weather phenomena** and progressing the understanding of the ionosphere is continued to be addressed
 - Examine the performance of atmospheric models to correct single frequency measurements and recommend models for implementation to Service Providers;
 - Establish a dialogue with Space Weather/Remote Sensing community in order to identify how GNSS can better support the advancement of Space Weather/Remote Sensing products and vice versa.
- **Search and Rescue**: Discussion about compatibility and interoperability of MEOSAR systems





Working Group Reference Frames, Timing and Applications (D)

- Specific progress in the following areas:
 - the refinement of the alignment of GNSS reference frames to the International Terrestrial Reference Frame (ITRF); and
 - information on GNSS timing references and the inter-comparison of GNSS time offsets.
 - the templates on geodetic and timing references will be updated by the GNSS providers to reflect the changes.
- A joint meeting with WG B & S to discuss *“Interoperability of GNSS precise point positioning services”*





ICG: Programme on GNSS applications

- ❖ **United Nations Regional Workshops/training courses on the use and applications of GNSS:** *2019: Workshop on the applications of GNSS, 24 – 28 June, Suva, Fiji*
- **GNSS spectrum protection and interference detection and mitigation (WGS):** to engage with spectrum regulators and decision makers within their respective countries in order to do the following:
 - Ensure that there is a solid understanding of the processes and organizations involved in the regulation of the GNSS spectrum in respective countries;
 - Develop actions to ensure that there is adequate protection for the GNSS spectrum.
- **Standards and interoperability of precise point positioning services (WGS&B&D):** to increase the user benefits and opportunities to support PNT applications in developing countries.



ICG: Programme on GNSS applications

- **Sustainability and modernization of GNSS continuously operating reference stations and geospatial infrastructure through capacity development (WGD):** to provide information on the importance of planning and its link to the “why, what and how” of developing long-term capability with respect to GNSS and geospatial infrastructure and related activities:
- There was a need for standards and procedures that were “fit for purpose” , including consolidated checklists that would serve to ensure consistent and sustainable use of GNSS, and related activities in the regions;
- Engagement with the private sector, especially for training, data provision and processing, was encouraged.
- ***2020: United Nations/Mongolia Workshop on the applications of GNSS, 13 -17 April, Ulaanbaatar***



ICG: Programme on GNSS applications

❖ Reference frames and timing (WGD)

- To benefit operational geodesists or surveyors involved in positioning and measurement. It is open to government, private sector, academic or graduate students in surveying or a related discipline (IAG, FIG, IGS)
- **Technical Seminars on Reference Frames in Practice, FIG Working Week 2019, 20 – 21 April, Hanoi, Vietnam**
 - Objective: Vertical and geometric reference frames with a focus on examples for the Asia-Pacific region
- **International Workshop on the Implementation of the Global Geodetic Reference Frame (GGRF) in Latin America, 16 – 20 September 2019, Buenos Aires, Argentina**
 - Objective: Dissemination of knowledge, data and information on geoscience topics



ICG: Programme on GNSS applications

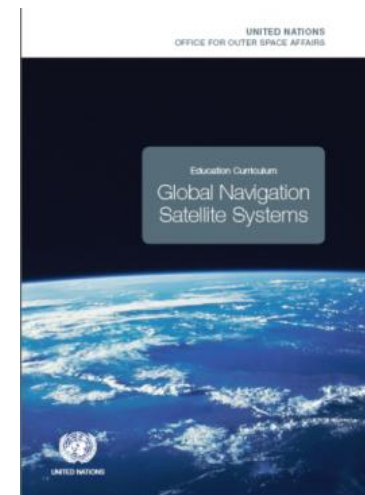
❖ Space Weather and GNSS (WGB&C)

- Promotes the use of GNSS for scientific applications and space weather in developing countries
- Increased number of students and young scientists studying and using GNSS, including increasing participation by women, and many opportunities for research (improved imaging of the ionosphere over the equatorial region, ionospheric effects on augmentation systems...)
- *In cooperation with the Institute for Scientific Research at Boston College, the United States, and the Abdus Salam International Centre for Theoretical Physics, Italy: A series of outreach workshops on space weather effects on GNSS operations*
- *2019: Workshop on Ionospheric Forecasting for Global Navigation Satellite Systems Operations in Developing Countries: Findings and Challenges, 27 - 31 May, Trieste, Italy*
- **2020: African Workshop on GNSS and Space Weather, Rabat, Morocco, 5 – 16 October**
 - To provide updated knowledge of how GNSS operate and their applications; to describe the science of SW; and how to perform ionospheric and SW research with GNSS data



Information Centres for ICG

The Programme of Space Applications established regional centres (**also acting as the ICG information centres**) in each region covered by the United Nations Economic Commissions: Africa, Asia and the Pacific, Latin America and the Caribbean, and Western Asia





ICG Information Portal



Our Work - ICG

International Committee on Global Navigation Satellite Systems (ICG)

MISSION STATEMENT

The International Committee on Global Navigation Satellite Systems (ICG), established in 2005 under the umbrella of the United Nations, promotes voluntary cooperation on matters of mutual interest related to civil satellite-based positioning, navigation, timing, and value-added services. The ICG contributes to the sustainable development of the world. Among the core missions of the ICG are to encourage coordination among providers of global navigation satellite systems (GNSS), regional systems, and augmentations in order to ensure greater compatibility, interoperability, and transparency, and to promote the introduction and utilization of these services and their future enhancements, including in developing countries, through assistance, if necessary, with the integration into their infrastructures. The ICG also serves to assist GNSS users with their development plans and applications, by encouraging coordination and serving as a focal point for information exchange.



International Committee on
Global Navigation Satellite Systems

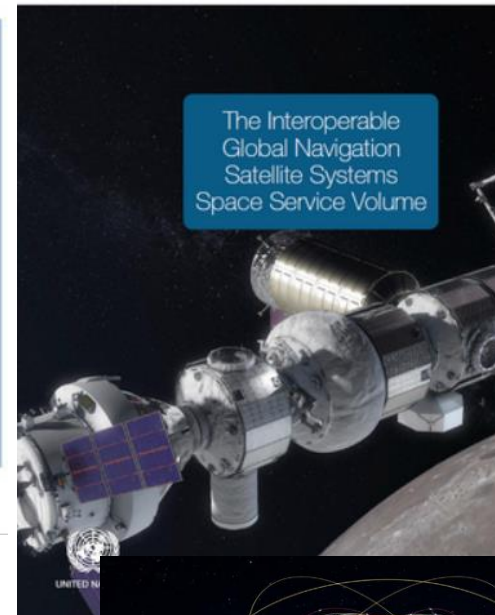
VISION STATEMENT

The International Committee on Global Navigation Satellite Systems (ICG) strives to encourage and facilitate compatibility, interoperability and transparency between all the satellite navigation systems, to promote and protect the use of their open service applications and thereby benefit the global community. Our vision is to ensure the best satellite based positioning, navigation and timing for peaceful uses for everybody, anywhere, any time.

At the "United Nations International Meeting for the Establishment of the International Committee on Global Navigation Satellite Systems (ICG)" held on 1-2 December 2005 in Vienna, Austria, the ICG was established on a voluntary basis as an informal body for the purpose of promoting cooperation, as appropriate, on matters of mutual interest related to civil satellite-based positioning, navigation, timing, and value-added services, as well as compatibility and interoperability among the GNSS systems, while increasing their use to support sustainable development, particularly in the developing countries. The participants in the meeting agreed on an establishment of the ICG information portal, to be hosted by UNOOSA, as a portal for users of GNSS services.

Our Work

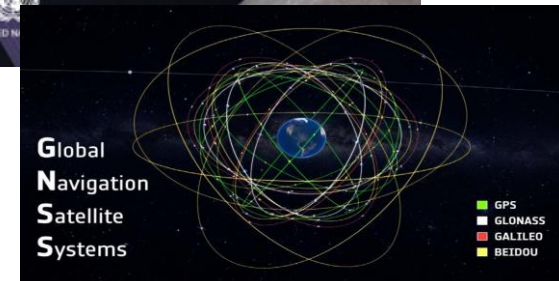
- Secretariat of COPUOS
- Programme on Space Applications
- UN-SPIDER
- ICG
 - Members
 - Providers' Forum
 - Working Groups
 - ICG Annual Meetings
 - ICG Programme on GNSS Applications
 - Resources
 - ICG Documents
 - Space Weather & GNSS
 - Other Events
 - ICG Timeline
- UN-Space
 - Space Law
 - Topics
 - Photo Gallery



The Interoperable
Global Navigation
Satellite Systems
Space Service Volume

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THANK YOU



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