

International Committee on Global Navigation Satellite Systems

**United Nations International Meeting on GNSS
5 – 9 December 2022, Vienna**

**Sharafat Gadimova
Office for Outer Space Affairs**



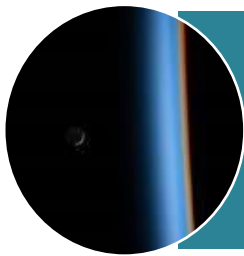
International Committee on GNSS (ICG)

- 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
- Assure GNSS **interoperability and compatibility** among providers and enhanced services and applications
- Membership: 13 Members and 21 International Organizations
- *Open to all countries and entities that are either GNSS providers or users of GNSS services, and are interested and willing to actively be engaged in ICG work*





UNOOSA: Supporting Member States



Capacity Builder: UNOOSA provides access to cutting edge space-data and information and builds capacity to use such data to accelerate sustainable development



Convener: UNOOSA facilitates international cooperation among UN Member States to develop new space policy



Gateway: UNOOSA - the sole UN agency dedicated to space affairs - coordinates UN activities using space-related technology to support sustainable development



ICG: Working Groups

- **Systems, Signals and Services (*United States & Russian Federation*):** Compatibility and spectrum protection; interoperability and service standards; system-of-system operations
- **Enhancement of GNSS Performance, New Services and Capabilities (*India, China & ESA*):** Future & novel integrity solutions; implementation of interoperable GNSS Space Service Volume (SSV) examination of performance of atmospheric models, establish dialogue with space weather/RS community and its evolution;
- **Information Dissemination and Capacity Building (*UNOOSA*):** Focused on education and training programmes, promoting GNSS for scientific exploration (incl., space weather and its effects on GNSS)
- **Reference Frames, Timing and Applications (*IAG, IGS & FIG*):** Focused on monitoring and reference station networks
- **16th Meeting of ICG, 4 – 9 October 2022, Abu Dhabi, United Arab Emirates**



Working Groups Recommendations (WG S)

■ **Incorporating Resilience into GNSS Interference Detection and Mitigation:**

To increase critical infrastructure resilience to GNSS disruptions and interference and consider the reinforcement of IDM policy based on a three-prong approach:

- *(Service Aspect)*: National GNSS spectrum protection and enforcement and implementation of IDM capabilities;
- *(Hardware Aspect)*: PNT systems designed with resilient system architectures and systems incorporating cybersecurity principles for a holistic approach to threats;
- *(End-User Aspect)*: End Users plan for and know how to respond to, operate through, and recover from PNT disruptions and interference, as well as understand and minimize the impact of PNT disruptions in downstream systems



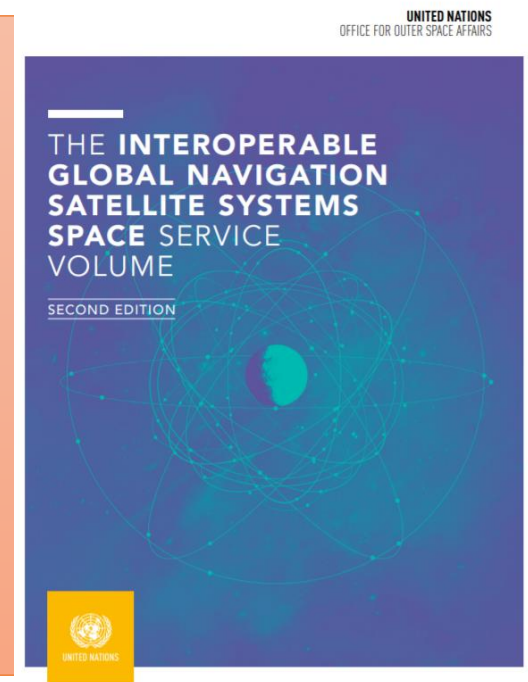
Working Groups Recommendations (WG B)

- **Inclusion and Coordination of Lunar Search and Rescue in Lunar PNT Architecture**
 - Ensuring that search and rescue as a service is included in discussions of interoperability, compatibility and availability will be essential to ensure search and rescue services are maintained consistently among providers intending to offer such services.
 - Considering the successful collaboration between GNSS providers in providing interoperability within the MEOSAR system, and the importance of search and rescue around and on the surface of the moon
 - Developers of lunar communication and navigation services consider the integration of interoperable and easily accessible search and rescue services



Interoperable GNSS Space Service Volume

- All providers have agreed on the information presented in this booklet, and on several recommendations to continue development, support, and expansion of the multi-GNSS SSV concept.
- This publication, and the work of WGB, show the significant value of GNSS SSV for a much wider scope of future space exploration activities for countries all over the world.
- GNSS SSV and its potential augmentations can enable ambitious future missions and activities in the context of space exploration going beyond low-Earth orbit to the Moon, Mars and other celestial bodies.



https://www.unoosa.org/res/oosadoc/data/documents/2021/stspace/stspace75rev_1_0.html/st_space_75rev01E.pdf



Working Groups Recommendations (WG D)

Creation of a WG-D Task Force, “**Applications of GNSS for Disaster Risk Reduction**”

(lead by IGS (ICG WG-D), China (ICG WG-B), Japan)

- To establish new collaborations – between international organizations, space agencies, member countries, and GNSS/RNSS providers – on the topic of using GNSS for disaster risk reduction and natural hazard early warning systems
- The scope of activities for this TF includes
 - fostering international recommendations and policies,
 - developing solid science connections to the strategic plans of relevant space agencies and GNSS/RNSS providers, and
 - facilitate collaboration on the development of operational tools.

If interested, please contact

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GNSS-Based Remote Sensing

- Natural hazards generate atmospheric waves.
- These waves propagate through the atmosphere (up to the ionosphere), and cause perturbations along the way.
- These perturbations can be detected using various GNSS-based remote sensing techniques, at next-to-no cost, in near-real-time, and with a worldwide coverage.

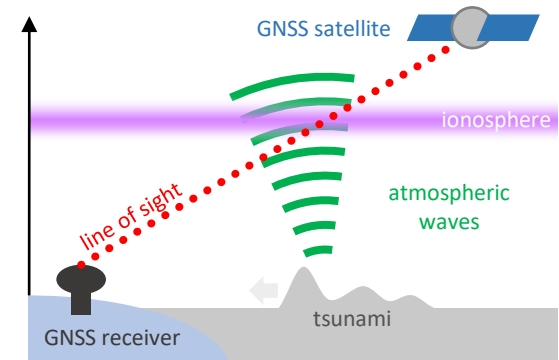


Figure: schematic of tsunami-induced atmospheric waves and ground-based GNSS measurements.

technique	probing region	relevant to
GNSS Reflectometry	surface conditions (soil moisture)	earthquakes
GNSS Radio Occultation (RO)	surface to mid-stratosphere (temperature + moisture)	storms
GNSS Polarimetric RO	surface to mid-stratosphere (temp. + moist. + heavy precipitation)	floods
GNSS-Based Ionospheric TEC	ionosphere (100-1500 km) (Total Electron Content - TEC)	tsunamis
		wildfires
		volcanic eruptions
		solar storms
		CMEs

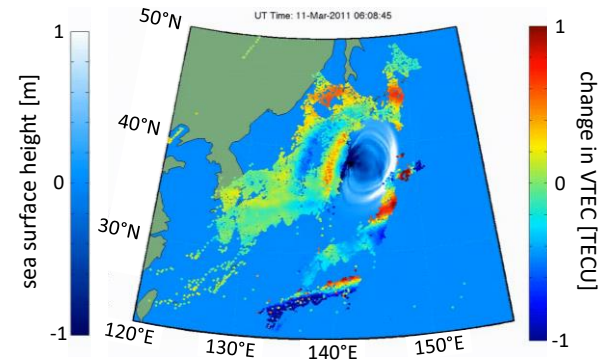
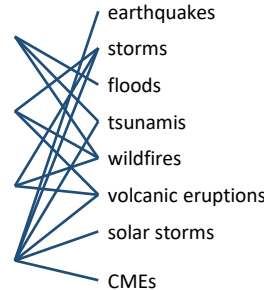


Figure: Ionospheric TEC and sea surface height map for the 2011 Tōhoku-Oki event (Galvan *et al.*, 2012).

- Objective: use GNSS to augment monitoring capabilities and early warning systems for natural hazards.



Working Group on Information Dissemination and Capacity Building



Wildlife Conservation



Land Navigation



Precision Farming



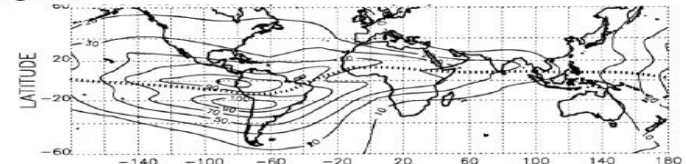
Water Navigation



Air Navigation



Disaster Relief



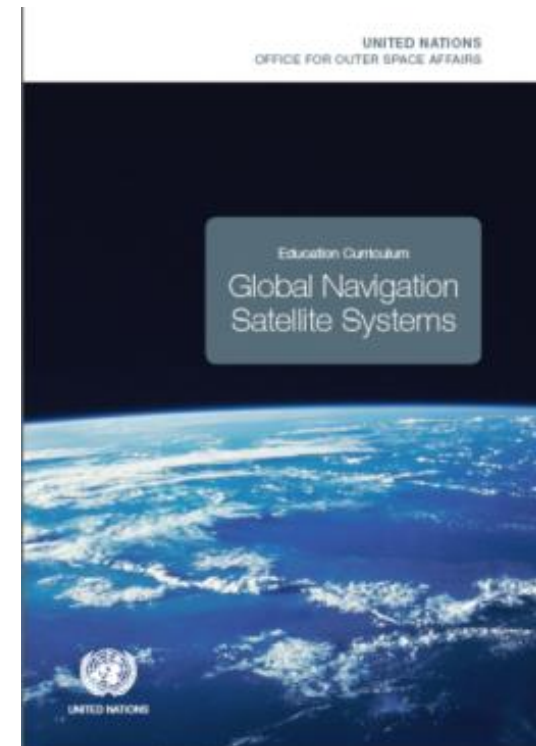
Scientific Exploration

- **Regional Workshops/training Courses:** 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
- to prepare a **handbook on high-accuracy GNSS data processing**, summarizing data processing techniques, error analysis and various concepts relating to the set-up of base stations, rover units and software
- A project team on “*Space weather monitoring using low-cost GNSS receiver systems*” that would develop prototype systems to explore the possibilities of using low-cost receiver systems for space weather monitoring



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



- About Us ▾
- Our Work ▾
- Benefits of Space ▾
- Information for... ▾
- Events ▾
- Space Object Register ▾
- Documents ▾
- COPUOS 2015 ▾

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

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.

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

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Conclusion

- The activities and opportunities provided through the ICG result in the development and growth of capacities that will enable each country to enhance its knowledge, understanding and practical experience in those aspects of GNSS technology that have the potential for a greater impact on its economic and social development, including the preservation of its environment
- The ICG is an important vehicle in the multi-lateral arena, as satellite-based positioning, navigation and timing becomes more and more a genuine multinational cooperative venture

THANK YOU



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