



International Committee on Global Navigation Satellite Systems

58th Meeting of CGSIC

**At the Institute of Navigation GNSS+ 2018 Conference
24 – 25 September 2018, Miami, Florida**

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ICG Executive Secretariat, UNOOSA



UNITED NATIONS
Office for Outer Space Affairs



Space in the UN system

UNOOSA is the only UN office with a number of General Assembly mandates to bridge access to space technologies and space-based information for Member States and other UN agencies and to build capacity in the use of such technologies.



UNITED NATIONS
OFFICE FOR OUTER SPACE AFFAIRS

For the attainment of all 17 SDGs and 169 targets **space tools** carry significant relevance:

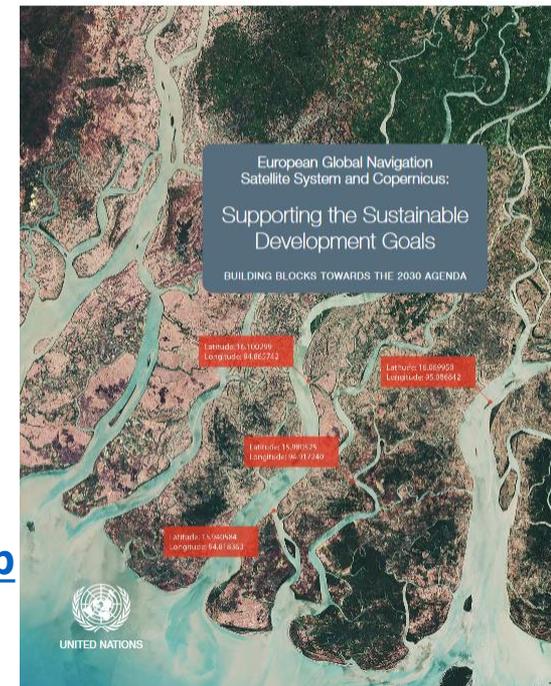
Direct — as enablers and drivers for sustainable development

Indirect — as an integral part of the indicators for monitoring progress

UNOOSA and the European GNSS Agency (**ST/SPACE/71**):

**European Global Navigation Satellite Systems and Copernicus:
Supporting the Sustainable Development Goals**

http://www.unoosa.org/res/oosadoc/data/documents/2018/stspace/stspace71_0.html/stspace71E.pdf





Committee on the Peaceful Uses of Outer Space

Space and
climate change

Disaster
Management

Space debris
mitigation

National space
legislation

International
mechanisms for
cooperation

Definition and
delimitation
of outer space

Space
applications for
socioeconomic
development

Near-Earth
objects

Global Navigation
Satellite Systems

Space
Weather

GGE-report and
TCBM's



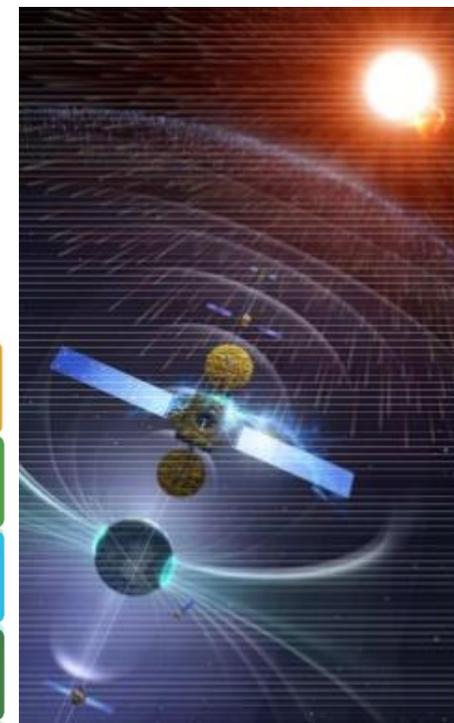
2013: Agenda item at COPUOS

2014: Establishment of the “Expert Group on Space Weather”

2016: Seven UNISPACE+50 Thematic Priorities

- International Framework for Space Weather Services

Space weather research and collaboration may help promote sustainable development through the prevention of catastrophic disruptions, space critical infrastructure and space-based services





Annual Meetings

- UNOOSA (2006) - Japan (2017), China (2018), India (2019), Vienna (2020), UAE (2021)

2017: 19th Meeting of the Providers' Forum, Kyoto, Japan, 2 – 7 December

- **Adjacent Band Compatibility:** The providers emphasized that it was necessary to protect the use of GNSS, which had been one of the goals pursued by ICG;
 - the adjacent-band issue could arise not only in the L1 frequency band, as there were concerns about potential deployments of wireless microphone applications in the band below 1,164 MHz, which could impact the L5 frequency band. Therefore, the providers agreed that it was important to follow these issues closely.
- **Space Service Volume (SSV):** The providers agreed that ICG should stay relevant to the wider space sector by ensuring the future contribution of GNSS to SSV. One possible way to do so was to improve GNSS system interoperability by transmitting intersystem timing offsets.
- **Space Weather:** Specialized SW data collected by GPS satellite over the preceding 16 years released to be used to improve our understanding of SW:
<http://www.lanl.gov/discover/news-release-archive/2017/January/01.30-space-weather-science.php>

2018: 20th Meeting, 18 June 2018, Vienna, Austria: Open Service Information Dissemination, Open Service Performance, Spectrum Protection; *Development of next generation of GNSS (PNT Service)*



Working Groups

WGS: Systems, Signals and Services

- Completed its 2016-2017 activities using its organizational structure and workplan (adopted in 2015):
 - *This structure includes a subgroup on compatibility & spectrum protection and a subgroup on interoperability and service standards*
- The Compatibility and Spectrum Protection subgroup decided
 - *to continue addressing the need for worldwide GNSS spectrum protection through a recommendation for ICG members to encourage national regulators to protect Radio-Navigation satellite Service spectrum from the unwanted emissions*
- Continued outreach and education efforts on spectrum protection by holding an expert seminar on GNSS spectrum (*3rd seminar at the UN/Argentina Workshop, May 2018*)
- To discuss follow-up work on performance standards & interoperability, the subgroup organized a workshop on GNSS system time and agreed to coordinate its work with the ICG WG D

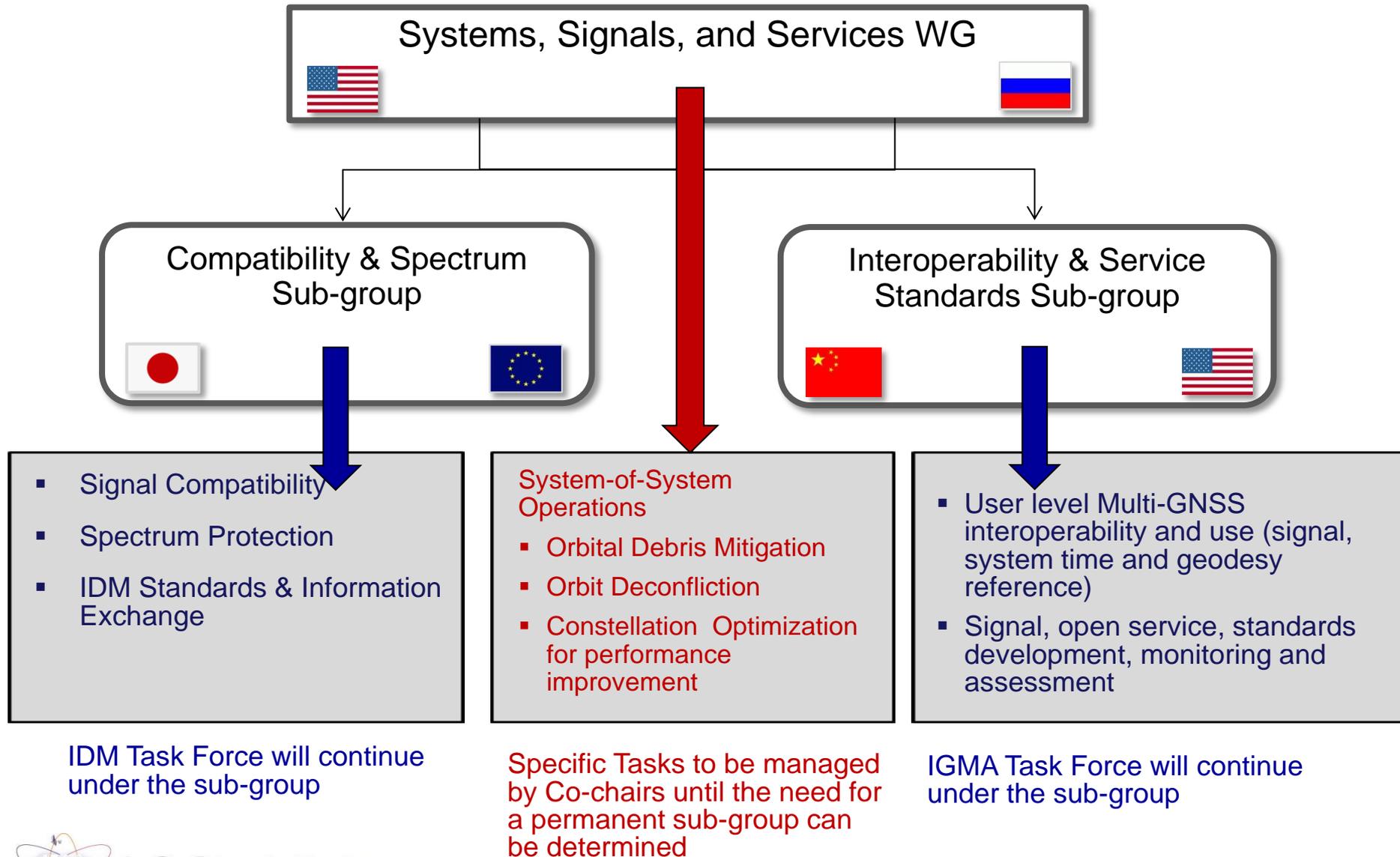


Working Groups

WGS: Systems, Signals and Services

- The series of workshops by the interference detection and mitigation (IDM) Task Force (7th workshop, Croatia, May 2018)
 - *To work with the 3rd Generation Partnership Project (3GPP) process and organization on measures to implement crowd sourcing through mobile phones as a way to detect GNSS interference.*
- The international GNSS monitoring and assessment (IGMA) Task Force
 - *focused on the joint trial project activity with IGS to demonstrate a global GNSS Monitoring and Assessment capability for a limited set of GNSS parameters*
- System-of-systems operations discussed, with briefings on orbital debris mitigation for GNSS constellations and agreed to continue these discussions, working with experts from each GNSS provider. All Working Group activities will be addressed at one or more intersessional meetings

Systems, Signals, and Services WG (WG-S)





Working Groups

WGB: Enhancement of GNSS Performance, New Services and Capabilities

- Establishing an interoperable GNSS Space Service Volume (SSV):
 - *Joint simulations conducted by the WG B for multiple mission profiles demonstrated that for space users at high altitude no single constellation is able on its own to provide a sufficient level of GNSS signal availability. By exploiting the interoperability between all systems allows to achieve GNSS signal availability very close to 100%*
- The work demonstrated the importance and relevance of the GNSS interoperability:
 - *The significant value of GNSS SSV for a much wider scope of future space exploration activities of various nations around the world*



Working Groups

WGB: Enhancement of GNSS Performance, New Services and Capabilities

- GNSS SSV and potential augmentations can be seen as enabler for many ambitious missions and activities in the context of space exploration going beyond low Earth orbit to the Moon, Mars and other celestial bodies
 - New concepts such as the Deep Space Gateway could use the SSV capability to serve humankind in its next phase of space exploration

The GNSS Space Service Volume (SSV) is the region of space extending to approximately the geostationary altitude or even beyond where terrestrial GNSS performance standards may not be applicable. The SSV defines GNSS system performance for space users by specifying at least three parameters:

1. Pseudorange Accuracy
2. Received Power and
3. Signal Availability



Working Groups

WGB: Enhancement of GNSS Performance, New Services and Capabilities

- Search-and-rescue (SAR) services are implemented by Galileo and GLONASS and will be implemented by GPS and BDS in accordance with the COSPAS-SARSAT standards. Matters of signal-level compatibility of search-and-rescue downlink signals will be followed up by the compatibility and spectrum subgroup of WG S;
- 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 will be 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.



Working Groups

WGD: Reference Frames, Timing and Applications

- Significant progress on geodetic and timing references by GNSS providers:
 - the recent establishment of the subcommittee on geodesy by the Committee of Experts on Global Geospatial Information Management as part of the work under the United Nations Initiative on Global Geospatial Information Management (UN-GGIM).
 - the evaluation of the quality of the new release of the International Terrestrial Reference Frame (ITRF2014) and the significant contribution of GNSS data;
 - the refinement of the alignments of GNSS reference frames to the ITRF, and



Working Groups

WGD: Reference Frames, Timing and Applications

- the information on the GNSS timing references and the inter-comparisons of GNSS time offsets. There is the need to update some of the geodetic and timing templates.

WGC: Information Dissemination and Capacity-Building

- Strengthening and delivering targeted capacity-building and technical advisory activities with the goal of sharing ideas and expertise regarding GNSS technology and its applications, particularly encouraging the participation of women and young professionals;



Programme on GNSS Applications

United Nations Regional Workshops/training courses on the use and applications of GNSS: [United Nations/Argentina Workshop on GNSS, 19 – 23 March 2018, Falda Del Carmen](#)

- **WGS:** Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation

Promoting the use of GNSS technologies as tools for scientific applications (WGD): [Technical Seminars on Reference Frames in Practice, FIG Working Week 2018, 4 – 5 May, Istanbul, Turkey](#)

- [10th Multi-GNSS Asia Conference: Creating Solutions, Driving Innovation, Connecting Industry, 23 - 25 October 2018, Melbourne, Australia](#)

Space Weather (WGC): [Workshop on Space Weather Effects on GNSS Operations at Low Latitudes, 23 April - 4 May 2018, Trieste, Italy](#)

- [The International Space Weather Initiative \(ISWI\) School on Space Weather and Global Navigation Satellite Systems \(GNSS\), 8 - 12 October 2018, Baku, Azerbaijan](#)



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

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.

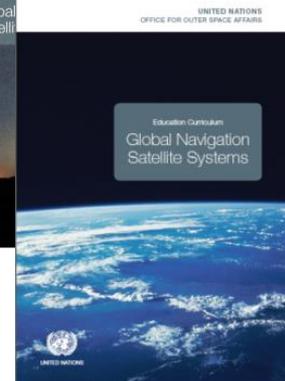
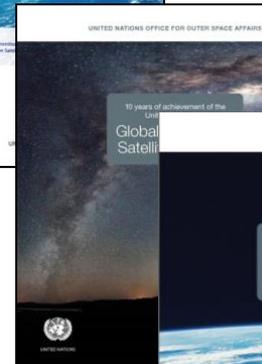
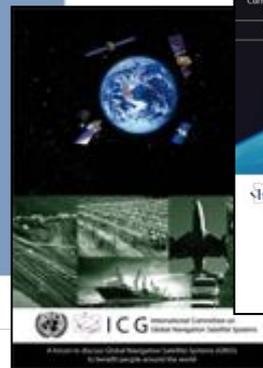
Our Work

- 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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UNITED NATIONS
Office for Outer Space Affairs



13th Meeting of ICG, Xi' an, China

4 – 9 November 2018



www.icg13.beidou.gov.cn



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

UNISPACE
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THANK YOU



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