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ICG: The Way Forward to Provide Positioning Navigation and Timing Globally

Sharafat Gadimova
Office for Outer Space Affairs
ICG Executive Secretariat



UNITED NATIONS
Office for Outer Space Affairs

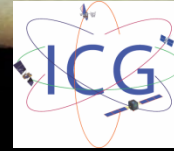


International Committee on
Global Navigation Satellite Systems



United Nations Office for Outer Space Affairs: **Mandate**

- The Office **implements** the decisions of the **General Assembly** and of the United Nations **Committee** on the Peaceful Uses of Outer Space (COPUOS);
- Performs **functions** of substantive **Secretariat** of the Committee on the Peaceful Uses of Outer Space and its Scientific & Technical Subcommittee and Legal Subcommittee;
- **Coordinates** the inter-agency cooperation within the United Nations on the use of space technology (**UN-SPACE**);
- **Maintains** coordination and cooperation with space agencies and intergovernmental and non-governmental organizations involved in space-related activities;
- **Implements** the United Nations **Programme on Space Applications**;
- Serves as **Executive Secretariat** for the **International Committee on Global Navigation Satellite Systems (ICG)**



International Committee on GNSS (ICG): **Mission Statement**

- Promote voluntary cooperation on matters of mutual interest related to civil satellite-based positioning, navigation, timing, and value added services
- Contribute to the sustainable development of the world
- Encourage coordination among GNSS Providers to ensure greater **compatibility, interoperability, and transparency**
- Promote the introduction and utilization of GNSS services in developing countries, by assisting with the integration into their infrastructure
- Assist GNSS users with their development plans and applications, by encouraging coordination and serving as a focal point for international information exchange

ICG-8 Meeting, 2013, Dubai, United Arab Emirates



Background

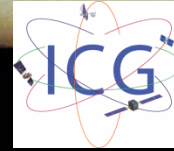
- 2001 – 2004: Action Team on GNSS (Italy and the United States)
 - An international framework to support operational coordination and exchange of information among system operators and national and international user communities would be important
 - The assumption was that current and future system operators would soon move from a competitive to a collaborative mode where there is a shared interest in the universal use of GNSS services regardless of the system
- 2005: Establishment of the ICG (noted by UNGA 61/111 of 14 December 2006)
 - Promote the use of GNSS and its integration into infrastructure, particularly in developing countries;
 - Encourage **compatibility and interoperability** among global and regional systems
- Main challenge is to provide assistance and information for those countries seeking to integrate GNSS into their basic infrastructure, including at governmental, scientific and commercial levels



Membership

- Members: 9 nations and the European Union
- Current and future core, regional or augmentation systems providers: China (BeiDou), EU (Galileo/EGNOS), Russia (GLONASS/SDCM), United States (GPS/WAAS), India (IRNSS/GAGAN), and Japan (QZSS/MSAS)
- 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
- Associate Members and Observers: 21 organizations
- International & regional organizations and associations dealing with GNSS services and applications: UN system entities, IGOs, NGOs

ICG participation is 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 activities



Annual Meetings

- UNOOSA (2006), India (2007), United States (2008), Russian Federation (2009), Italy & European Union (2010), Japan (2011), China (2012), United Arab Emirates (2013), European Union (2014), United States (2015), Russian Federation (2016), Japan (2017)
- 2006: Terms of Reference and Workplan
- **Compatibility and Interoperability (United States & Russian Federation):** Focused discussion on compatibility and interoperability, encouraging development of complimentary systems; Exchange detailed information on systems and service provision plans
- **Enhancement of GNSS Service Performance (India and European Space Agency):** Focused discussion on system enhancements (multipath, integrity, interference, etc.) to meet future needs
- **Information Dissemination and Capacity Building (UNOOSA):** Focused on education and training programmes, promoting GNSS for scientific exploration (space weather specifically)
- **Reference Frames, Timing and Applications (IAG, IGS & FIG)** Focused on monitoring and reference station networks



Providers' Forum

■ 2007: Establishment

- Members: Current and future global and regional satellite navigation systems and Satellite-based Augmentation Systems (SBAS) providers
- PF provides ways and means of promoting communication among system providers on key technical issues and operational concepts such as the GNSS spectrum protection, orbital debris, and orbit de-confliction
- Scientific and Technical Subcommittee of UNCOPUOS (UN GA Res. 62/217 of 1 February 2008) started consideration of an agenda item "Recent developments in GNSS"

■ 2008: Terms of Reference and Workplan

- Agreement that all GNSS signals and services must be compatible and open signals and services should be interoperable to the maximum extent possible in order to maximize benefit to all GNSS users;
- Consensus reached on Principle of transparency - every GNSS provider should publish documentation that describes the signal and system information, the policies of provision and the minimum levels of performance offered for its open services

■ 2015: Fifteenth meeting, 1 – 6 November, Boulder, Colorado, United States

- Open Service Information Dissemination, Open Service Performance, Spectrum Protection (interference detection and mitigation)



Working Groups: Recommendations

▪ Interference Detection and Mitigation (IDM)

- To evaluate & implement existing/emerging **IDM capabilities** and work with the telecom industry on standards for crowdsourcing IDM techniques
- To organize workshop on **RNSS spectrum protection** and IDM for user community member nations
- IDM Task Force initiated a discussion on **GNSS as critical infrastructure**

▪ International Multi-GNSS monitoring (IGMA)

- Existing civil service centres should establish a link to the ICG Information portal allowing users to easily find GNSS monitoring information and products: **open service monitoring information portal**
- IGMA task force and system providers should continue to assess industry feedback received at 4 interoperability workshops (China, EU, Japan, Russian Federation)



ICG Working Groups: Recommendations

- Interoperable GNSS Service Volume (SSV) Characterization Outreach
 - Providers should develop a booklet defining the characteristics of a fully **interoperable space service volume**
- NeQuick Ionospheric Model
 - To assess the performance and usability of a **NeQuick ionospheric correction algorithm for the single frequency users** similar to the one adopted by Galileo in view of its expected good performance compared with other models, i.e. at low latitudes: http://www.gsc-europa.eu/system/files/galileo_documents/Galileo_Ionospheric_Model.pdf
- Market Access
 - Providers will continue discussing the topic of **fair “Market Access”**



Programme on GNSS applications

- United Nations Regional Workshops/training courses on the use and applications of GNSS
 - These activities increase awareness among decision and policy makers of the benefits of GNSS, and develop regional and national pilot projects on GNSS applications
 - These activities bring together a large number of experts, including those from developing countries, to discuss and act on issues that are also of high relevance to the ICG
 - [United Nations/Russian Federation Workshop, May 2015, Krasnoyarsk](#)
- ICG Experts Meeting: GNSS Services, 14 – 18 December 2015, Vienna
 - To focus on identifying the needs of users with respect to the compatibility and interoperability of global and regional systems, and space-based augmentations providing and planning to provide GNSS service
 - To incorporate useful user and application sector views and inputs into the Working Groups work plans
 - Seminar on GNSS Spectrum Protection and IDM

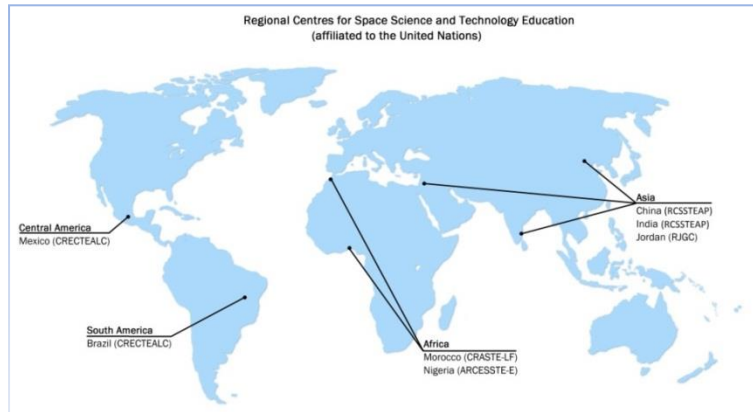


Programme on GNSS applications

- Promoting the use of GNSS technologies as tools for scientific applications
 - These activities are to provide technical knowledge on the operational and practical aspects and issues relating to reference frames, in particular to facilitate a regional forum for geodetic agencies, improve data sharing (GNSS leveling, tide gauge, gravity)
 - Technical Seminars on Reference Frames in Practice, FIG Working Week 2016, Christchurch, New Zealand
- Space Weather and its effects on GNSS
 - ICTP and Boston College: Workshops on Ionospheric Effects on SBAS and GBAS Applications at Low Latitudes
- United Nations/Italy Long-term Fellowship Programme: Master in Navigation and Related Applications (MNA), Politecnico di Torino, Turin, Italy
 - The curriculum is structured to meet effectively work market demands for high-level technicians endowed with a broad vision of the navigation/localization state-of-the-art



Information Centres for ICG



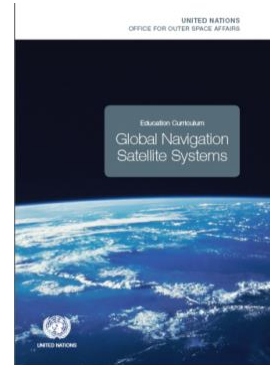
United Nations-affiliated Regional Centres for Space Science and Technology Education

Africa: Morocco and Nigeria

Latin America and the Caribbean: Brazil/Mexico

Asia and the Pacific: India and China

Western Asia: Jordan



- The Technical Level: explore the benefits of GNSS technologies for regions and to spread their applications; exchange information and knowledge
- The Cooperative level: facilitate collaboration with the GNSS providers (seminars/trainings and educational material), as well as communication and outreach to the wider community through the ICG information portal



ICG Information Portal

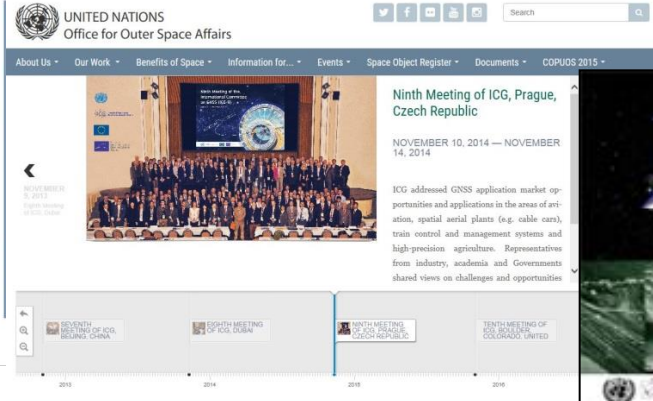


International Committee on Global Navigation Satellite Systems (ICG)

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 operations, by encouraging coordination and serving as a focal point for information exchange.

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.



2010: Report on planned and existing global navigation satellite systems and their policies and procedures

■ WWW.UNOOSA.ORG

■ WWW.UNOOSA.ORG/OOSA/EN/OURWORK/ICG/ICG.HTML



Conclusion

- Significant progress continues to be made through ICG, and the results of this work not only promote the capabilities of GNSS to support sustainable development, but also promote new partnerships among members of ICG and institutions of the broader user community, particularly in developing nations
- As we move forward, governments and business in developing and industrialised countries are exploring potential growth areas for their national economies. Almost without exception, the most promising option seems to be outer space, and in particular satellite positioning, navigation and timing, and its potential and future almost universal applications
- 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

E-mail: oosa@unoosa.org



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