

2nd ICAO/UNOOSA Symposium, 15 – 17
March 2016, Abu Dhabi, UAE

International Committee on Global Navigation Satellite Systems

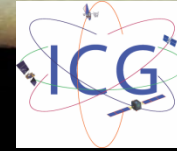
Sharafat Gadimova
Office for Outer Space Affairs
ICG Executive Secretariat



UNITED NATIONS
Office for Outer Space Affairs



**International Committee on
Global Navigation Satellite Systems**



2005 - 2015: 10 Years of Achievement

UNITED NATIONS
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International Committee on Global
Navigation Satellite Systems

The Way Forward

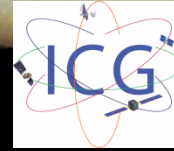
10 YEARS OF ACHIEVEMENT 2005-2015

“The establishment of ICG in 2005 ushered in an unprecedented era of cooperation for the United Nations. Over the past decade, ICG has achieved tangible and wide ranging progress”, *United Nations Secretary General , Ban Ki-moon.*

“Looking ahead, as co-chairs of the Action Team on GNSS, we believe that ICG will continue to strengthen its role as a major player in the multilateral arena, given that satellite positioning becomes more and more a multinational cooperative venture”,
Co-chairs of the Action Team on GNSS (2001 – 2004)

“ICG has encouraged tangible international cooperation, and leading global satellite operators have coordinated their GNSS services to provide global coverage in satellite-based PNT, for the benefit of all”, *Director, Office for Outer Space Affairs*

<http://www.unoosa.org/oosa/en/ourwork/icg/documents/publications.html>



Annual Meetings

- Since 2006 (UNOOSA) - **United States of America (2015)**, **Russian Federation (2016)**, Japan (2017), China (2018), India (2019)
- **2006**: Terms of Reference and Workplan
- **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 & European Space Agency)**: Future & novel integrity solutions; monitoring of techniques considered by application developers & external service providers; implementation of interoperable GNSS Space Service Volume (SSV) and its evolution; examination of performance of atmospheric models, establish dialogue with space weather/RS community
- **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
- **2016: Sixteenth meeting, 6 June, Vienna, Austria**
 - Open service information dissemination; Service performance monitoring; Spectrum protection, including IDM; Orbital debris; Space weather



Working Groups: Recommendations

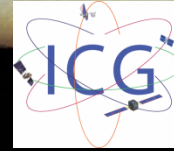
▪ Interference Detection and Mitigation (IDM)

- To establish a multi-year agenda item at STSC that will focus on national efforts to protect RNSS spectrum, and pursue GNSS IDM in States members in order to raise awareness of this issue among States members of COPUOS as part of efforts to achieve the overall goal of promoting effective use of GNSS open services by the global community, *53rd Session of the Scientific and Technical Subcommittee of COPUOS, 15 – 26 February 2016*
- *International GNSS IDM Workshop, 17 May 2016, Changsha, China* - The 2016 China Satellite Navigation Conference (CSNC2016), 18 - 20 May 2016
 - Update of IDM status by current providers; Interference detection and Geo-location techniques; Cell-phone crowdsourcing method; Spoofing detection



Working Groups: Recommendations

- **International GNSS Monitoring and Assessment (IGMA)**
 - To initiate a joint trial project with the International GNSS Service (IGS) to demonstrate a global GNSS monitoring and assessment capability after the completion of several preliminary items
- **Interoperable GNSS Space Service Volume (SSV)**
 - To implement an interoperable GNSS SSV and provide recommendations to Service Providers regarding possible evolution needs arising from users/application developers - **Providers will develop a booklet defining the characteristics of a fully interoperable space service volume**
 - **SSV** simulations will be carried out in a phased approach (3 phases in total)
- **Interim Meeting of the Working Group, 8 June 2016, Vienna, Austria**
 - SSV, Space Weather (Examine the performance of atmospheric models to correct single frequency measurements; To identify how GNSS can better support the advancement of Space Weather/RS products and vice versa)



ICG Working Groups: **Recommendations**

▪ **Utilization of GNSS satellites in Eccentric Non-Nominal MEO Orbits**

- Providers will report to the Working Group on their experience utilizing satellites that are in eccentric, non-nominal MEO orbits in order to build a survey of these satellites for scientific research and Position, Velocity and Time (PVT) applications

▪ **Geodetic and Timing References for GNSS**

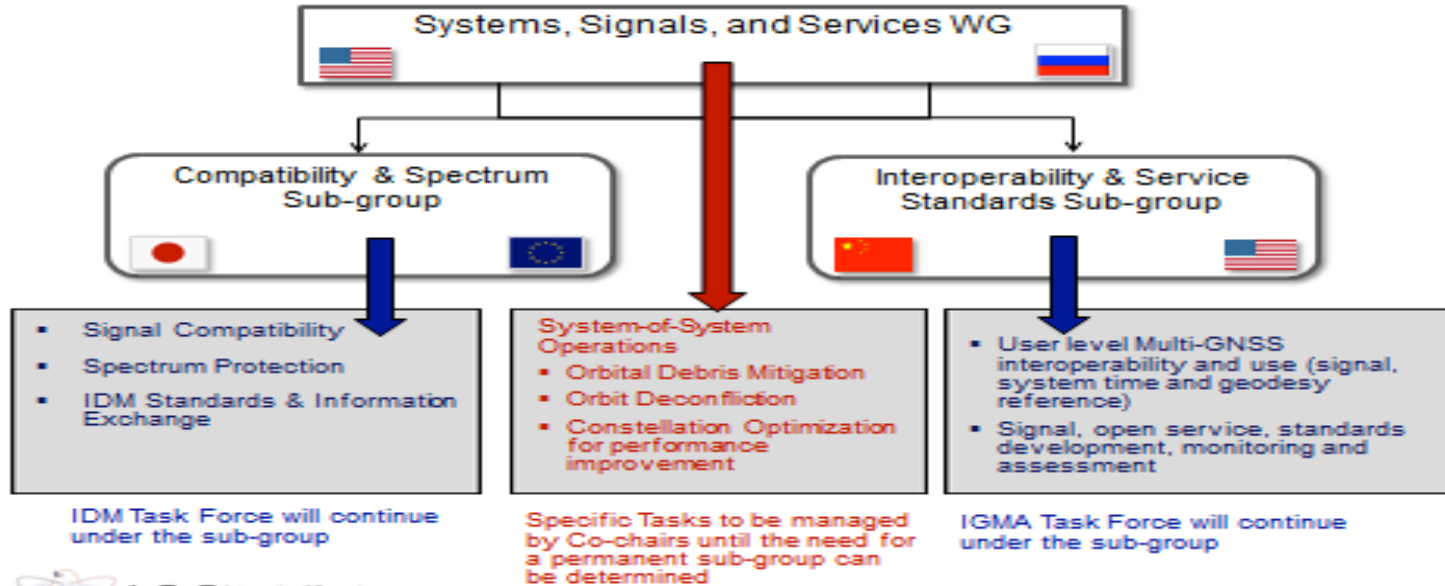
- The alignments of GNSS associated reference frames to the realization of the International Terrestrial Reference Frame (ITRF2008)
- Timing References in relation to Rapid Coordinated Universal Time (UTC_r)

ICG Information Portal: <http://www.unoosa.org/oosa/en/ourwork/icg/working-groups.html>

ICG-10 Meeting, 2015, Boulder, Colorado, United States: Joint Statement



WG Architecture





Programme on GNSS applications

▪ United Nations Regional Workshops 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

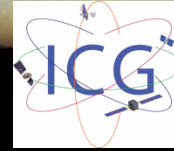
▪ United Nations/Nepal Workshop, 5 – 9 December 2016, Kathmandu

▪ ICG Seminar: Space Weather and its effects on GNSS

- Part I: General space weather phenomena;
- Part II: Ionospheric physics and how the ionosphere affects GNSS signals under quiet and disturbed conditions;
- Part III: Illustrate the effects that space weather has shown on GNSS systems and applications

▪ Seminar on GNSS Spectrum Protection and IDM

Information Portal: <http://www.unoosa.org/oosa/en/ourwork/icg/activities.html>



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, 1- 2 May 2016**
- **Space Weather and its effects on GNSS**
 - **ICTP and Boston College: Use of Ionospheric GNSS Satellite Derived Total Electron Content Data for Navigation, Ionospheric and Space Weather Research, 20 – 24 June 2016, Trieste, Italy**
- **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



▪ **ICG Side Event: The ICG, Multifunction GNSS signals and how to protect them, 1 June 2016** - European Space Solutions, 30 May – 3 June 2016, The Hague, The Netherlands

- To learn about the multi-GNSS cooperation;
- To focus on IDM and GNSS applications;
- To draw up findings and recommendations to be forwarded to the ICG

<http://www.european-space-solutions.eu/>





Eleventh Meeting of the ICG, Sochi, Russian Federation

6 – 11 November 2016

ICG-11 PROGRAMME AT-A-GLANCE

| | SUNDAY 6 NOVEMBER | MONDAY 7 NOVEMBER | TUESDAY 8 NOVEMBER | WEDNESDAY 9 NOVEMBER | THURSDAY 10 NOVEMBER | FRIDAY 11 NOVEMBER |
|---------------------------|---|---|---------------------------|--|--|----------------------------|
| AM sessions (9:00-12:30) | Registration | Registration 1st Plenary Session of ICG | Registration WG A WG C | Registration Joint WG A, WG B WG C, WG D Meeting WG B WG D | WG A WG B WG C WG D 2nd Plenary Session of ICG | 3rd Plenary Session of ICG |
| PM sessions (14:00-18:00) | 1st Providers' Forum Meeting Meeting with the Working Groups Co-Chairs | Lunch 1st Plenary Session of ICG (continued) Applications & Experts Session Welcome Dinner | Lunch WG A WG C | Lunch WG B WG D City Tour Banquet | Lunch 2nd Plenary Session (continued) 2nd Providers' Forum Meeting | |



11th MEETING
SOCHI ICG
2016



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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 seeks 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
- Secretariat
- Programme on Space Applications
- UN SPIDER
- ICG
- Members
- Associate Members
- Observers
- ICG Documents
- Space Weather & GNSS
- Other Events
- ICG Timeline
- UN Space
- UNISPACE+50
- Space Law
- Topics
- Photo Gallery

International Committee on Global Navigation Satellite Systems (ICG): Members

The International Committee is open to States Members of the United Nations, international organizations or international entities that are responsible for GNSS and their augmentations operating under governmental authority or involved in implementing or promoting GNSS services and applications. There are three categories of participants in the Committee: Members, Associate members and Observers.



Members

Current and future core system providers, including China (Compass/BelDou Navigation Satellite System (CNSS)), the European Union (European Satellite Navigation System (Galileo)), the Russian

Associate Members

International and regional organizations and associations dealing with GNSS services and applications, including the Office for Outer Space Affairs of the United Nations Secretariat, the Civil GPS Service Interface

Observers

The Arab Institute of Navigation (AIN), the Committee on Space Research (COSPAR), the Bureau International des Poids et Mesures (BIPM), the European Space Policy Institute (ESPI), the International

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
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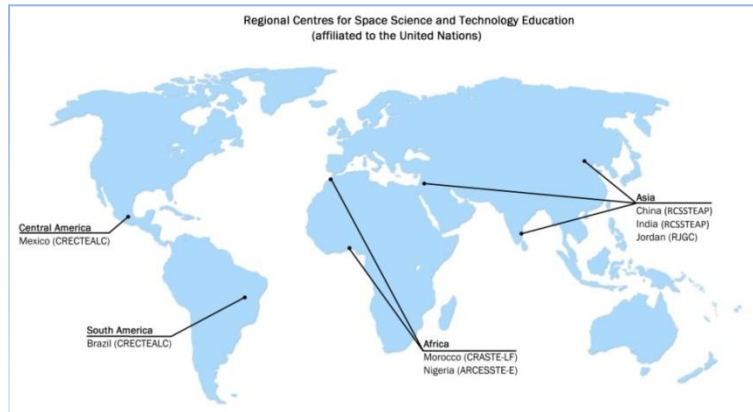
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- Topics
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Information Centres for ICG



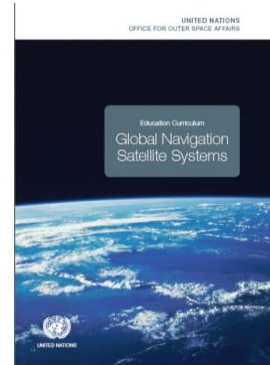
United Nations-affiliated Regional Centres for Space Science and Technology Education

Africa: Morocco and Nigeria

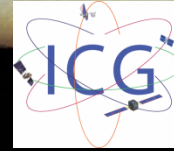
Latin America and the Caribbean: Brazil/Mexico

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



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
- 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



Towards UNISPACE+50 in 2018

- **2018** marks the 50th anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE), held in Vienna in 1968
- **UNISPACE+50 will articulate a long-term vision for Space:** from a domain of States towards a domain of a commonly shared human experience
 - UNISPACE III (1999), the Vienna Declaration put forth 33 recommendations
 - Recommendation on GNSS: “...to improve the efficiency and security of transport, search and rescue, geodesy and other activity by promoting the enhancement of, universal access to and compatibility of space-based navigation and positioning systems”
 - **The work of ICG** is growing rapidly in line with anticipation that GNSS applications will continue to grow in the coming years

High Level Forum on Space as a driver for socio-economic sustainable development, 20 – 24 November 2016, Dubai, United Arab Emirates

- The Forum aims to become a platform for providing updates and recommendations on the potential of space innovations to address new and emerging sustainable development challenges
- The Forum seeks to address the cross-sectoral benefits of integrating economic, environmental, social, policy and regulatory dimensions of space in pursuance of global sustainable development

Thank you

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