UNITED NATIONS
Office for Outer Space Affairs

International Committee on
Global Navigation Satellite Systems

**57th Meeting of CGSIC, Portland, Oregon, 25 – 26 September 2017**

# International Committee on Global Navigation Satellite Systems (ICG): SPACE WEATHER

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# Background

- 2001 – 2004: Action Team on GNSS (Italy and the United States) – *in implementation of the recommendations of UNISPACE-III, 1999, Vienna*
  - 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 (ITU, BIPM, ICAO, IMO), 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 work***

# 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),** China (2018), India (2019), Vienna (2020)
- 2006: Terms of Reference and Workplan
- **Systems, Signals and Services (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 Performance, New Services and Capabilities (India, China 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

# Twelfth Meeting of the ICG, Kyoto, Japan


**2 – 7 December 2017**

**Kyoto, Japan**

**Cabinet Office, Government of Japan**

# 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*
- **2017: Eighteenth Meeting, 6 June 2017, Vienna, Austria**
- Open Service Information Dissemination, Open Service Performance, Spectrum Protection (interference detection and mitigation)

**UNOOSA: Executive Secretariat (ICG and Providers' Forum)**

# Working Groups: Recommendations/Observations

- **Interference Detection and Mitigation (IDM):** Request for voluntary reporting on national RNSS spectrum protection practices and GNSS IDM capabilities (A/AC.105/C.1/2017/CRP.18):

*STSC agreed that, a general exchange of information should be included on issues related to GNSS IDM, with a view to raising awareness of efforts to achieve the overall goal of promoting effective use of GNSS open services by the global community.*

- **Interoperable GNSS Service Volume (SSV):** Providers will develop a booklet defining the characteristics of a fully **interoperable space service volume**
- **Space Weather:** To be addressed showing improvements that are achievable by advanced ionospheric modelling and receiver technologies

# 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, space weather effects, and develop regional and national pilot projects on GNSS applications, space weather research
- **United Nations/United States of America Workshop on the International Space Weather Initiative: The Decade after the International Heliophysical Year 2007, 31 July – 4 August 2017, Boston**
- A high level international forum on the economic and societal effects of extreme space weather: *to discuss issues and policies for acknowledging space weather as a global challenge; and to focus on international framework for space weather services*
- International Space Weather Initiative session: *Instrumentation, Solar effects, modelling, SW and its effects on GNSS*
- 10th anniversary of IHY, a mission to advance space weather science through instrument deployment, analysis of data, and communication of results to the public.

***2007 – 2008: IHY - to understand planetary environments; 2009 – 2012: ISWI – to focus on space weather (Instrument deployments, data analysis); 2012 : Space Weather Agenda item at STSC***

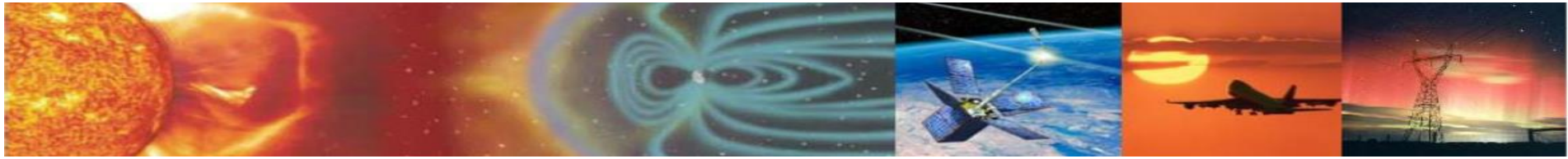
# ISWI Instrument Sites: 1000s trained


- Scientists from developing and developed nations work together in deploying and operating space weather instruments (currently there are more than 1000 deployments in more than 100 countries)
- Students and faculty participate at all levels of the instrument project and science
- 18 instrument networks from 8 countries (USA, Germany, Japan, Brazil, France, Israel, Armenia, Switzerland)

www.iswi-secretariat.org

# Workshop: Recommendations/Observations

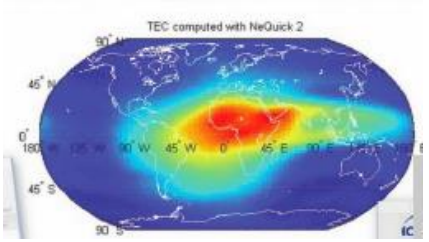
- **Important Role of a coordinating body to prepare for severe space weather events and mitigate their impacts**
  - International coordination was essential to mitigate the threat posed by space weather to the modern interconnected and interdependent society
- **Recognizing and building on prior and continuing work by space weather stakeholders**
  - Consideration of socioeconomic impact studies for space weather, taking into account that different nations have different space weather vulnerabilities and needs, but also recognizing that all nations are vulnerable to impacts on technological systems and the global economy
- **UNISPACE+50 and the international framework for space weather services (thematic priority 4)**
  - To build on the current three-dimensional focus (*science, capacity-building and outreach*) with the addition of "*services*", thereby creating a four-dimensional focus.

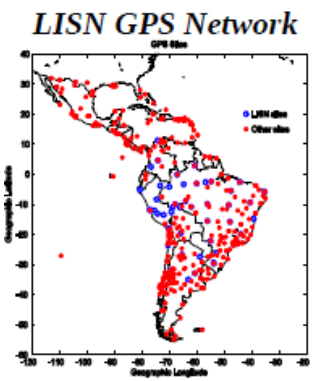


# UNOOSA: Programme on GNSS applications

- **Space Weather and its effects on GNSS**
  - The series of activities are carried out since 2009 in order to give theoretical and practical training on the physics of space weather and its main effects on the GNSS operations with particular emphasis on the low latitudes ionospheric processes

- **Many opportunities for training courses/regional workshops and research**
  - ICTP and Boston College: Workshop on Space Weather Effects on GNSS Operations at Low Latitudes, 23 April – 4 May 2018, Trieste, Italy
  - Improved imaging of the ionosphere over the equatorial region
  - Increased number of young scientists, including participation by women



# ICG Information Portal



WWW.UNOOSA.ORG

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

# Conclusion

ICG has encouraged tangible international cooperation, and leading global satellite operators have coordinated their GNSS services to provide global coverage in satellite-based positioning, navigation and timing, for the benefit of all.

**2018: UNISPACE+50 years of space cooperation and development**

UNISPACE+50 will take stock of the contributions of the three UNISPACE conferences (UNISPACE I, held in 1968, UNISPACE II, held in 1982 and UNISPACE III, held in 1999) to global space governance

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**UNISPACE+50 high-level segment:**
**20-21 June 2018**
as part of the 61st session of the Committee
(20-29 June 2018)

**Special events and symposia**:
18-19 June
Vienna International Centre
Vienna, Austria

More information:
**www.unoosa.org**

# THANK YOU

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