UNITED NATIONS
Office for Outer Space Affairs

INFORMATION NOTE

United Nations/Croatia Workshop on the Applications of Global Navigation Satellite Systems

Organised jointly by
The United Nations Office for Outer Space Affairs and the Faculty of Maritime Studies of the University of Rijeka

Co-organized by
The International Committee on Global Navigation Satellite Systems

Hosted by
The Faculty of Maritime Studies of the University of Rijeka

Baška, Krk Island, Croatia

21 – 25 April 2013

1. Introduction

A five-day workshop on global navigation satellite systems (GNSS) technology and its applications in Baška, Croatia, from 21 to 25 April 2013 is being organized by the United Nations Office for Outer Space Affairs (OOSA) in cooperation with the Faculty of Maritime Studies of the University of Rijeka as part of the activities of the United Nations Programme on Space Applications, for the benefit of the countries in Europe. The Workshop will be hosted by the Faculty of Maritime Studies of the University of Rijeka.

Workshop participants will discuss how GNSS-enabling technology can strengthen a network of national reference stations and promote the interoperability of navigation, positioning and timing systems in the region. An overview of a wide range of GNSS applications existing today and prospects for the future will have to be given to developments aiming to the following:

- all aspects of the agriculture industry, from basic rural cadastre and surveying to advanced precision agriculture, benefit from the use of GNSS. Agro-climatic and ecologic-economical zonings, crop inventory, monitoring and forecasting are examples of agricultural activities where positioning and timing are of paramount importance. In the area of climate change, different factors and mechanisms drive land use and transformation. In many cases, climate, technology and economics appear to be determinants of land use. At the same time, land conversion is an adaptive feedback mechanism that farmers use to smooth the impact of climate variability, especially during extremely wet or dry periods;

- monitoring and observing the Earth and its weather systems. Satellites gather data for global climate models, and efforts continue in developing refined models that can be used in regional and national settings. The use of GNSS has been significant in making detailed observations of key meteorological parameters, whose measurement stability, consistency and accuracy could make it possible to quantify long-term climate change trends; and

- the area of transport, studies have shown that civil aviation will significantly benefit from the use of GNSS. These benefits include: improved navigation coverage in areas currently lacking conventional tracking aids, accurate and reliable information about aircraft positions and routes that enables safe and efficient management of air traffic, (particularly on airport approaches). Road transport applications can automatically revise a route to account for traffic congestion, changes in weather conditions or road works. Similarly, at sea, GNSS technologies can provide efficient route planning, collision avoidance and increased efficiency in search and rescue situations. For rail transport, GNSS offers enhanced cargo monitoring and assists track surveying. In addition, communication systems, electrical power grids, and financial networks all rely on precision timing for synchronization and operational efficiency. For example, wireless telephone and data networks use GPS time to keep all of their base stations in perfect synchronization. This allows mobile handsets to share limited radio spectrum more efficiently.

2. Background

GNSS refers collectively to all of the satellite navigation systems in operation or being developed around the world known as the Global Positioning System (GPS) of the United States of America, the Global Navigation Satellite System (GLONASS) of the Russian Federation, Galileo of the European Union and Compass/BeiDou of China. In addition, these systems are supplemented by space-based augmentation systems (SBAS) or ground-based augmentation systems (GBAS). Examples of SBAS are the United States of America wide-area augmentation system (WAAS), the Russian system of differential correction and monitoring (SDCM), the European geostationary navigation overlay service (EGNOS), or the Indian GPS-aided geo augmented navigation (GAGAN) and the Japanese multi-functional transport satellite (MTSAT) space-based augmentation system (MSAS). These systems augment the existing medium earth orbit (MEO) satellite constellations with geostationary (GEO) or geosynchronous satellites signals or other environmental factors, which may impact the signal received by the users. Using several or all of the GNSS satellites in orbit, productivity typically increases as well as accuracy compared to using only one system.

In an attempt to build a system of systems in the coming decade, the ICG was established in December 2005 in an international meeting at the United Nations Office at Vienna as an informal, voluntary forum to promote cooperation, as appropriate, on matters of mutual interest related to civil satellite based positioning, navigation, timing and value-added services, as well as the compatibility and interoperability of GNSS, while increasing their use to support sustainable development, particularly in developing countries.

To support the work of ICG, the Office for Outer Space Affairs, as the ICG Executive Secretariat, is focusing on promoting the use of GNSS technologies as tools for scientific applications, including space weather effects on GNSS, education and training on GNSS, and utilizing regional reference systems and frames. Additional information is available at: www.unoosa.org

Globally there is growing interest in better understanding solar-terrestrial interactions, particularly patterns and trends in space weather. This is not only for scientific reasons, but also because the reliable operation of ground-based and space-based assets and infrastructures is increasingly dependent on their robustness against the detrimental effects of space weather. Currently, more than 1,000 instruments are operational in 14 ground-based world-wide instrument arrays (GPS receivers, radio antennas, magnetometers, cosmic ray detectors) for research on climate change, space weather, and ionospheric phenomena. These instrument arrays are utilized to constitute the International Space Weather Initiative (ISWI) in the period of time from 2010 to 2012. The details on the ISWI are available at: http://www.iswi-secretariat.org/

Efforts to build capacity in space science and technology are considered a major focus of the Office for Outer Space Affairs and are of specific interest to ICG with particular reference to GNSS. In the coming year, the Office for Outer Space Affairs will assist the process of the establishment of the ICG information centres for training and information dissemination on global applications of GNSS and their socio-economic

benefits for humanity based on existing educational and research institutions, and hence to connect the institutions involved or interested in GNSS applications with GNSS providers.

Through regional workshops, expert meetings, pilot projects and training opportunities, the Office for Outer Space Affairs, as part of the United Nations Programme on Space Applications, is implementing a global navigation, timing and positioning satellite systems thematic area so that GNSS could be used more widely to support sustainable development, in particular in developing countries.

3. Objectives and Expected Outcomes

The main objective focuses on the importance and need of cooperation to apply GNSS solutions through the exchange of information and the scaling up of capacities among countries in the region.

The specific objectives of the workshop are to: (a) update on-going activities related to the use of GNSS technology in participating countries; (b) enhance institutional and human capacity on utilizing GNSS technology using case studies, lessons learned, and experiences from other countries; (c) identify the specific needs of individual plans and projects on GNSS at the regional and international levels for near-, medium-, and long-term applications, taking into consideration the local institutional settings, including specific training and capacity-building needs; (d) develop a regional plan of action that would contribute to the wider use of GNSS technology and its applications, including the possibility of one or more national or regional pilot projects, or both, in which interested institutions could incorporate the use of GNSS technology; (e) define recommendations and findings to be forwarded as a contribution to the ICG.

The expected outcomes of the workshop are: (a) recommendations and findings on discussed topics; (b) preliminary agreement of cooperation between countries in the region and the GNSS continuously operating reference station (CORS) networks, such as the European Position Determination System (EUPOS) and the International Association of Geodesy (IAG) Subcommission for Europe (EEUREF); (c) action plan addressing identified issues/concerns.

4. Preliminary programme of the Workshop

The Workshop programme will include plenary sessions and sufficient time for discussions among participants to identify the priority areas where pilot projects should be launched and examine possible partnerships that could be established. As a preliminary suggestion the following sessions will be organised:

Tutorials

RINEX-based global navigation satellite systems (GNSS) performance data analysis

Thematic Sessions

Session 1: Current and planned global and regional navigation satellite systems and satellite-based augmentation systems

- Programme updates-GNSS: Global Positioning System (GPS), GLObal NAvigation Satellite System (GLONASS), European Satellite Navigation System (GALILEO), COMPASS/BeiDou Navigation Satellite Systems (CNSS), Indian Regional Navigation System (IRNSS), Quasi-Zenith Satellite System (QZSS)
- GNSS space-based augmentation systems: Wide-Area Augmentation System (WAAS), System of Differential Correction and Monitoring (SDCM), the European Geostationary Navigation Overlay Service (EGNOS), GPS Aided Geo-Augmented Navigation (GAGAN), the Multi-functional Transport Satellite Satellite-based Augmentation System (MSAS)

Session 2: GNSS user applications

- New capabilities in efficiency and safety across all modes of transportation: aviation, maritime, rail and highway
- Applications in surveying and mapping, geodesy, science and timing, environment, agriculture, and remote sensing with GNSS and integrated sensors
- Space and atmospheric weather: observation of space weather phenomena through the deployment of ground-based world-wide instrument arrays such as GPS receivers, magnetometers, solar telescopes, very low frequency (VLF) monitors, solar particle detectors, and data analysis and the sharing of recorded data

Session 3: GNSS reference station networks and services

- Regional and national reference frames/systems implementation
- International GNSS Service (IGS) and other initiatives, multi-GNSS environment

Session 4: Capacity building, training and education in the field of GNSS

- Education and training programmes
- GNSS education tools

Discussion Sessions

- Issues, concerns and approaches for pilot projects/initiatives, requirements of implementing, mechanisms and resources of implementing
- Possible follow-up projects and initiatives and proposals for future workshops/training courses

5. Working Methods

Participants of the workshop are requested to deliver a presentation paper and materials covering information on the use of GNSS technology, case studies/projects in GNSS applications in their respective countries. Each speaker is allocated 20 minutes for the presentation and is requested to submit a copy of the presentation in Microsoft PowerPoint format at least two weeks before the commencement of the workshop. It is also necessary to submit an abstract of presentation with a maximum of 600 words including the following details: Paper Title, Author (s) Name(s), Affiliation(s), and e-mail address for the presenting author.

Presentations made at the workshop will be published on the website of the Office for Outer Space Affairs (www.unoosa.org) approximately two weeks after the workshop.

6. Sponsorship of the workshop

The Office for Outer Space Affairs of the United Nations and the Faculty of Maritime Studies of the University of Rijeka are responsible for organizing the workshop. The United State of America through the ICG is co-sponsor of the workshop. **Sponsorship of the workshop is still open to the ICG membership and interested entities.**

7. Expected participants

The Workshop is being planned for a total of 75 participants including scientists, engineers, university educators, and policy-and-decision makers and senior experts from the following groups: international, regional, national and local institutions, United Nations agencies, non-governmental organizations, research and development institutions, and also from industry.

8. Participation requirements

Participants should be in senior managerial or decision-making responsibility at governmental agencies, national and regional institutions, non-governmental organizations or industry. **Equally qualified female applicants are particularly encouraged.**

9. Language of the Workshop

The working language of the Workshop will be English.

10. Financial support

Within the limited financial resources available, a limited number of selected participants will be offered financial support to attend the Workshop. This financial support will defray the cost of travel (a round trip ticket – most economic fare – between the airport of international departure in their home country and Baska, Croatia) and/or the room and board expenses during the duration of the Workshop.

11. Deadline for Submission of Applications and Abstracts

The completed application form together with the presentation abstract, properly endorsed by the applicant's Government/institution, should be submitted to the Office for Outer Space Affairs, United Nations Office at Vienna, Vienna International Centre, P.O. Box 500, A-1400, Vienna, Austria, **no later than Friday, 8 February 2013.** Please note that on-line application form is available on the web site of the Office for Outer Space Affairs at the following address:

http://www.oosa.unvienna.org/oosa/en/SAP/act2013/croatia-gnss/index.html

All candidates are strongly encouraged to apply for the workshop online, as it helps to streamline the processing of applications as well as helps applicants to save their time.

12. Life and health insurance

Life/major health insurance for each of the selected participants is necessary and **is the responsibility of the candidate or his/her institution or Government.** The co-sponsors will not assume any responsibility for life and major health insurance, nor for expenses related to medical treatment or accidents.

13. Further Information and Contact Details

For information regarding the submission of nominations for attendance and funding, please contact **Ms. Ayoni Oyeneyin**, United Nations Office for Outer Space Affairs, at the following e-mail address: ayoni.oyeneyin@unvienna.org

The focal point for Croatia will be **Mrs. Marija Šimić-Hlača**, who can be contacted at the following e-mail address: uncroatia2013@pfri.hr