



International Committee on Global Navigation Satellite Systems: Space Weather

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The International Committee on Global Navigation Satellite Systems (ICG), as an optimal cooperation mechanism, offers the benefit of providing a flexible forum, where global navigation satellite system (GNSS) providers and users come together to discuss all matters regarding the use of multiple GNSS signals. This multilateral coordination mechanism has allowed GNSS technology to evolve over time, while still providing the structure necessary to achieve efficient interaction in one of the most important fields of space applications. Since its inception in 2005, ICG has met annually to discuss matters regarding GNSS on a worldwide scale. Among the core missions of ICG are to encourage coordination among providers of GNSS, regional systems and augmentations in order to ensure greater compatibility, interoperability and transparency, and to promote the introduction and utilization of those services and their future enhancements, including in developing countries, through assistance, if necessary, with the integration into their infrastructures. ICG also serves to assist GNSS users with their development plans and applications by encouraging coordination and serving as a focal point for international information exchange.

The ICG working group on information dissemination and capacity building and the Centre for Spatial Information Science at the University of Tokyo, Japan is organizing a series of online training programmes on GNSS data processing for high-accuracy positioning using low-cost receiver systems. Through hands-on practice, the programme participants familiarize themselves with GNSS data processing for high-accuracy positioning using real-time kinematic positioning software and Multi-GNSS Advanced Demonstration Tool for Orbit and Clock Analysis (MADOCA) precise point positioning software. Sample GNSS data logged by base stations and field receivers (both static and dynamic) and GNSS data from Android devices is provided to increase understanding of issues regarding data quality and accuracy and related problems.

A series of capacity-building workshops on space weather and GNSS are organized in cooperation with the Abdus Salam International Centre for Theoretical Physics (ICTP) in Italy and the Institute for Scientific Research at Boston College in the United States of America. The main scientific and technical topics covered at these workshops are GNSS generalities, space weather and Sun-Earth coupling, ionospheric monitoring and modelling, ionospheric irregularities, and space weather services and programmes.

A project team on “space weather monitoring using low-cost GNSS receiver systems” of the ICG working group on information dissemination and capacity-building is (a) exploring low-cost GNSS receivers that could be used to compute total electron content-related parameters; (b) exploring software that could be used to process data from low-cost GNSS receivers in order to compute total electron content; and (c) design a prototype low-cost GNSS receiver for space weather related applications. The team is currently focusing on the Fleury software to test and understand how to compute total electron content from Receiver Independent Exchange Format (RINEX) observation data.