



*International Civil Aviation Organization*

**THE THIRD MEETING OF IONOSPHERIC  
STUDIES TASK FORCE (ISTF/3)**

15 – 17 October 2013, Seoul, Republic of Korea



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**Agenda Item 2: Review of outcome of relevant meetings/conferences**

- a) ICAO 12th Air Navigation Conference

**12<sup>TH</sup> AIR NAVIGATION CONFERENCE ON IONOSPHERIC AND  
SPACE WEATHER ISSUES**

(Presented by the Secretariat)

**SUMMARY**

This paper presents information on the outcome of Twelfth Air Navigation Conference on the ionospheric and space weather related issues in support of international air navigation.

**1. INTRODUCTION**

1.1 The Twelfth Air Navigation Conference held in Montreal from 19 to 30 November 2012 recognized that space weather information is essential as part of the Global Air Traffic Management (ATM) and noted that space weather information is to be included in Block 1 of the Aviation System Block Upgrades (ASBU).

1.2 The Conference also reviewed the sources of GNSS vulnerabilities including effects of the ionosphere and solar activity and others.

**2. DISCUSSION**

Mitigating GNSS vulnerabilities

2.1 AN Conf/12 noted that the very low strength of GNSS signals received from satellites makes GNSS vulnerable to interference and other effects that have the potential to affect multiple aircraft over a wide area. The sources of GNSS vulnerabilities include unintentional interference, intentional interference, effects of the ionosphere and solar activity (space weather) and others. On the basis of the discussions, the following recommendations were adopted by the Conference:

**Recommendation 6/7 – Assistance to States in mitigating global navigation satellite system vulnerabilities**

That ICAO:

- a) continue technical evaluation of known threats to the global navigation satellite system, including space weather issues, and make the information available to States;
- b) compile and publish more detailed guidance for States to use in the assessment of global navigation satellite system vulnerabilities;
- c) develop a formal mechanism with the International Telecommunication Union and other appropriate UN bodies to address specific cases of harmful interference to the global navigation satellite system reported by States to ICAO; and
- d) assess the need for, and feasibility of, an alternative position, navigation and timing system.

2.2 Following the general discussion on GNSS vulnerabilities, the AN Conf/12 considered a Proposal specifically addressing the vulnerabilities associated with ionosphere and space weather aspects and adopted following recommendation:

**Recommendation 6/9 – Ionosphere and space weather information for future global navigation satellite system implementation**

That ICAO:

- a) coordinate regional and global activities on ionosphere characterization for global navigation satellite system implementation;
- b) continue its effort to address the global navigation satellite system (GNSS) vulnerability to space weather to assist States in GNSS implementation taking into account of long-term GNSS evolution as well as projected space weather phenomena; and
- c) study the optimum use of space weather information that is globally applicable from low to high magnetic latitude regions for enhanced global navigation satellite system performance at a global context.

That States:

- d) consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system implementation.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to note the information in this paper.

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## APPENDIX A

### UNITED STATES SPACE WEATHER PREDICTION CENTER

- The Space Weather Prediction Center (SWPC) is one of nine Centers that provides specialized services as part of the United States National Centers for Environmental Prediction (NCEP) of the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service. SWPC provides real-time monitoring and forecasting of solar and geophysical events which impact satellites, power grids, communications, navigation, and many other technological systems SWPC is designated as a National Critical System of the United States Government, afforded the highest level of security and supportability for its services.
- SWPC staff are on duty 24/7, monitoring space weather activity and issuing a suite of products and services. A sample of products and services for aviation can be found at: <http://www.swpc.noaa.gov/aviation/index.html>.
- SWPC has facilities on site to download real-time satellite data from NOAA's Geostationary Operational Environmental Satellites (GOES) and the National Aeronautics and Space Administration's (NASA's) Advanced Composition Explorer (ACE) satellites, each critical to forecasting and specification of the near-earth space environment.
- Real-time space weather operations require a robust chain of procedures and capabilities to quickly serve a wide variety of users. SWPC ingests real-time satellite data (i.e., solar wind magnetic field, speed, density; solar x-rays; magnetospheric charged particles and magnetic field, to cite a few key ingredients), and then in-house processing and display systems make the information available to forecasters and in-house research staff.
- SWPC also has a unique focus to understand and serve highly technical user communities. SWPC staff has supported aviation for over 20 years. SWPC participates in the Cross Polar Working Group (CPWG), and has hosted airline space weather conferences for more than 15 years.
- SWPC has a backup center at the National Weather Service facility in Cheyenne, Wyoming, which ensures that critical operations can be continued in the event of a disruption of capabilities at the Boulder facility. SWPC serves as the World Warning Agency of the 14 State International Space Environment Service, an International Union of Radio Science (URSI)-chartered organization to share data and forecasts of space weather globally.

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