



International Civil Aviation Organization

THE SECOND MEETING OF IONOSPHERIC STUDIES TASK FORCE (ISTF/2)

15 – 17 October 2012, Bangkok, Thailand

Agenda Item 5: Review progress of Tasks

IONOSPHERIC STUDIES FOR GAGAN

(Presented by India)

SUMMARY

India had shared the recent results and information related to ionospheric studies for GAGAN – an Indian SBAS during the First Meeting of Ionospheric Study Task Force (ISTF) held at Tokyo, Japan from 27 to 29 February 2012. The alarming threat of ionospheric scintillation to GNSS applications was brought to notice of the members by sharing its results of solar active period of October 2011.

The ISTF/1 had identified the various technical tasks along with their task leads to expedite the work for achieving the objective of characterizing and modeling the ionosphere over Asia and Pacific Regions for implementation of GNSS service. Web portal on ICAO website was opened for discussion among members to support the tasks.

The paper highlights the Ionospheric data collection & analysis activities and urges the ISTF to take note of the results while standardizing regional ionospheric model.

India is committed to provide the full cooperation to every technical tasks identified by Ionospheric Studies Task Force to pursue its objectives.

1. INTRODUCTION

1.1 The First Meeting of Ionospheric Study Task Force (ISTF) held at Tokyo, Japan from 27 to 29 February 2012 recommended to create the technical tasks based on the activities carried out in support of characterizing the ionosphere over Asia and Pacific region for implementation of GNSS. The task leads were identified for each task which may be assisted by members of ISTF through a web forum.

1.2 ICAO APAC started the web portal on ICAO website for discussion within the ISTF members. India had posted its comments on the task of 'Data Collection' providing the information and clarification on the data types, format and sampling interval. This assisted the task lead in preparing the summary of data sources which will be useful for data collection activities.

1.3 India is keen to play a major role in Ionospheric Study Task Force by sharing the results of ionospheric studies carried out under GAGAN system.

1.4 India brought to notice the alarming threat of scintillation on GNSS applications by sharing the results of ionospheric scintillation which occurred in solar active period of October 2011 during the First Meeting of Ionospheric Study Task Force (ISTF).

1.5 Considering the vast amount of ionospheric data and the results thereof, India proposes to share the results of important ionospheric events among the data sharing States.

2. UPDATE ON IONOSPHERIC STUDIES

2.1 India is continuously monitoring the ionospheric behavior as the solar activity is peaking up. An increase in iono delay (TEC) is observed in 2012 compared to 2011. Ionospheric scintillation continues to be at alarming level especially in equinoctial months resulting in loss of lock of GPS as well as GEO signals.

2.2 A major milestone was achieved when Factory System Acceptance Test (FSAT) of GAGAN was conducted successfully in July 2012.

2.3 GPS-TEC receivers are optimally utilized by logging the GAGAN messages especially WAAS18 and WAAS26 transmitted by GSAT-8 (PRN-127). This may serve as independent network for testing the performance of GAGAN system.

2.4 The Grid Ionospheric Vertical Delay (GIVD) and Grid Ionospheric Vertical Error (GIVE) values are extracted and decoded from WAAS18 and WAAS26 to analyze the GAGAN iono model incorporated in the system.

2.5 In order to monitor the performance of GAGAN, the availability contours of GIVD and GIVE are generated and their animated movies are developed.

2.6 The regional TEC map is constructed utilizing the TEC data from GPS-TEC network. This will be useful to verify and compare the GIVD values transmitted by GAGAN satellite.

2.7 The SBAS satellites of EGNOS (ARTEMIS, PRN- 124; Inmarsat 4-F2, PRN-126) and MSAS (MTSAT-2, PRN-129) are also tracked for logging the scintillation data on experimental basis. The MTSAT-2 is at very low elevation therefore couldn't be used in scintillation analysis. ARTEMIS and Inmarsat 4-F2 are at approx 30 degree elevation but lot of interruption is observed intermittently.

2.8 India is committed towards sharing of vast ionospheric data collected and the results thereof, among APAC States for better utilization and understanding of ionospheric behavior for GNSS implementation.

2.9. CONCLUSION

2.9.1 India proposes to identify the nominal, moderate and stormy days from different regions i.e. different longitude sectors as there is a longitudinal difference in ionospheric behavior. This will help in collecting the optimal data set from APAC States instead of collecting huge volume of data.

2.9.2 The criteria for deciding the nominal, moderate and stormy days may be discussed in Second Meeting of ISTF. India may share its identified dates for the said purpose.

2.9.3 India is committed to support the various identified task in the first meeting of ISTF by sharing the data, results and expertise in its domain among the APAC States for better characterization of ionosphere in the South Asia and Pacific region to develop the region specific model for implementation in GNSS applications like SBAS and GBAS.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note:

- a) India's continued support in sharing the results of ionospheric studies for GAGAN and urges the ISTF to take note of the results while standardizing regional ionospheric model; and
- b) Identify the nominal, moderate and stormy dates along with their criteria for data collection and analysis to achieve the objective of ISTF.
