



Agenda Item 2: Review of Global and CAR/SAM CNS/ATM Developments

Monitoring of Ionosphere Activity

(presented by Chile)

Summary

This working paper presents the action taken by the DGCA of Chile in order to conduct a ionosphere evaluation for the implementation of a GBAS system for the Arturo Merino Benítez Airport in Santiago, and proposes that ionosphere studies be conducted at a regional level.

1. Background

1.1 Since 1998, Chile has participated in the collection of ionosphere data, and has three reference stations and one master station as part of the WAAS-type SBAS, FAA CAR/SAM Test Bed (CSTB). This activity continued under Project RLA/00/009 – *Regional GNSS augmentation trial*, with a view to developing a plan for testing and assessing the technical and operational benefits of the FAA wide area augmentation system (WAAS) in the CAR/SAM Regions.

1.2 The final results obtained under Project RLA/00/009 showed that the SBAS solution was not feasible for the CAR/SAM Regions, since it is not cost-effective, and especially because of the effect of the ionosphere on GNSS signals.

1.3 Feasibility studies conducted by Chile for the implementation of a GBAS system for the Arturo Merino Benítez airport made use of the information collected by Project RLA/00/009, but highlighted the need to continue monitoring ionosphere activity on an on-going basis.

1.4 Consequently, the DGCA has decided to conduct the corresponding studies for early implementation of a GBAS system at the Arturo Merino Benítez airport. To this end, through USTDA, ISI is providing technical assistance for project “Implementation of local area augmentation systems (LAAS) at aerodromes of the airport network of Chile”.

2. Discussion

2.1 Some of the tasks for the implementation of this GBAS system involved the development of an appropriate strategy for monitoring the integrity of a GBAS (LAAS) system like the one intended. Consequently, a ionosphere assessment was required to characterise the anomalous ionosphere gradients in the area of influence of the GBAS system.

2.2. In order to verify the continuous ionosphere comparisons carried out using the Threat Model created for GBAS systems, which was validated by the FAA and presented to the DGCA by the consulting firm ISI, it is necessary to identify an appropriate mechanism to monitor solar activity affecting ionosphere behaviour, especially during solar activity peaks.

2.3. In order to attain the objectives of GBAS implementation, the DGCA has proposed the FAA to sign a Memorandum of Cooperation to monitor the ionosphere and scintillation trends in order to determine the effects of ionosphere disturbances on the global positioning system (GPS) signal, establishing reference stations in Chile. These stations would collect data on L1 and L2 signals, and/or any other relevant data, in order to determine the effects that these disturbance will have on the operational implementation and use of SBAS and GBAS augmentation systems.

2.4. In addition to this initiative, it should be noted that the next solar cycle is estimated to start in 2011. Therefore, it is necessary to identify anomalous ionosphere data; for instance, the typical performance range *versus* the performance during solar storms.

3. **Suggested Action**

3.1. The Meeting is invited to:

- a) analyse this working paper and take note of the Chilean experience in the search for processes for properly monitoring ionosphere activity;
- b) analyse that stated in paragraphs 2.2, 2.3 and 2.4, regarding the new solar cycle peak; and
- c) identify the necessary mechanisms to obtain international cooperation and thus ensure a new collection of ionosphere data at regional level, during the 2011-2014 period.

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