66th International Astronautical Congress 2015

SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Novel Concepts and Technologies to Enable Future Building Blocks in Space Exploration and Development (3)

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THE IMPORTANCE OF SPACE-BORNE AUTOMATIC DEPENDANT SURVEILLANCE-BROADCAST (ADS-B) MONITORING

Abstract

The main focus of this paper is to discuss the potential use of a space-borne Automatic Dependant Surveillance-Broadcast (ADS-B) system for international airspace safety, security and defence interests. The recent catastrophic events of 2014 involving Malaysian aviation demonstrate that air -traffic surveillance using static radar methods require significant improvements. By nature, air transportation safety is a global issue that requires global coverage and as a result lends itself to a space-based solution.

ADS-B is a technology developed to track the position and movement of aircraft through intermittent broadcasts of their identity, itinerary and position state vectors to ground based receivers and other aircraft within range. ADS-B networks that monitor air traffic have already been deployed around the world in high volume air-traffic areas to supplement and eventually replace radar. The current lack of coverage over oceanic and high latitude airspace could be alleviated by deploying ADS-B receivers on a constellation of satellites. This could result in an ameliorated air traffic flow picture, permitting controllers to concentrate on anomalies which may help identify aircraft that are in distress and/or discriminate between friendly/enemy aircraft. This system could be used in remote areas, e.g. Canada's high Arctic, where radar surveillance of air traffic is not practical using ground-based assets.

In addition to the operational purpose, the launch of a CubeSat carrying an ADS-B receiver will present a unique opportunity to study the propagation of 1090 MHz radio waves through the ionosphere and enhance space situational awareness, enabling use as a dual-purpose payload. The modification of radio waves as they propagate through the ionosphere can be used to characterize the medium and reveal a better understanding of ionospheric structure and magnetoionic wave propagation, which are direct inputs to space situational awareness.

Both the benefits to aviation and potential exploitation of the signals for the secondary purpose of ionospheric sounding are highly valuable future space capabilities. More communication between the various stakeholders and collaboration would promote dramatic advancement in these global space goals and objectives; improved aviation safety, reduction of greenhouse gas emissions, and space situational awareness.