

SPACE SYSTEMS SYMPOSIUM (D1)  
Space Systems Architectures (4)

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## CUBESAT CONSTELLATION DESIGN FOR AIR TRAFFIC MONITORING

**Abstract**

Global and local air traffic can be tracked and used for control from ground-based stations by receiving the Automatic Dependent Surveillance-Broadcast (ADS-B) signal. The ADS-B signal, emitted from the aircraft's Mode-S transponder, is currently tracked by terrestrial based receivers but not over remote oceans or sparsely populated regions such as Alaska or the Pacific Ocean. Lack of real-time aircraft time/location information in remote areas significantly hinder optimal planning and control because bigger "safety bubbles" (lateral and vertical separation) are required around them until they reach radar-controlled airspace. Moreover, it presents a search-and-rescue bottleneck. Aircrafts in distress, e.g. Air France AF449 that crashed in 2009, take days to be located or cannot be located at all, e.g. Malaysia Airlines MH370 in 2014. In this paper, we describe a tool for designing a constellation of small satellites based on real-world air traffic data which demonstrates, through high-fidelity simulation and modeling, the value of space-based ADS-B monitoring and provides recommendations for cost-efficient deployment of a constellation of small satellites to increase safety and situational awareness in currently poorly-served surveillance areas.