



A novel de-noising technique for space based ADS-B receivers

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Automatic Dependent Surveillance - Broadcast (ADS-B) systems play a vital role in identifying aircraft to ground based systems. A significant fraction of air traffic is currently not monitored due to flight paths being over uninhabited terrain (forests , oceans, etc). It is vital to monitor flight position, velocity and other parameters over such regions to ensure better response to catastrophe. Space based ADS-B monitoring can support ground monitoring of air traffic as they have greater visibility and can cover regions not accessible by ground systems. Primary challenges in space based ADS-B monitoring are mainly a) low signal strength b) signal overlap from multiple aircraft.

In this paper, we demonstrate a novel wavelet denoising technique to improve the signal strength, eliminate signal overlap from multiple air and mitigate doppler effects by effectively sampling the signal in a wavelet transformed space. We also propose a direct compressed sensing of the received signal based on the information received from the wavelet transform in order to conserve onboard resources.

A ground based demonstration using a low cost software defined radio (SDR) ADS-B receiver. The algorithm is demonstrated here on ground received signals to prove correctness after which space signal conditions are simulated.