USING GROUND-BASED GNSS OBSERVATIONS TO IMPROVE AVIATION TURBULENCE MONITORING AND PREDICTION

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According to the U.S National Transportation Safety Board, atmospheric turbulence is the number-one cause of injuries to passengers and crew in nonfatal aviation accidents and is responsible for about 75 percent of all weather-related incidents and accidents each year. Significant improvements in discriminating and localizing turbulence events are required to meet the FAA's long-range Aviation Research Program objectives.

Atmospheric turbulence in the boundary layer and free atmosphere is frequently associated with rapid fluctuations in the radio refractivity of the neutral atmosphere. These fluctuations have been detected (Naudet, 1996; Williams et al. 1998) and attributed to atmospheric turbulence by Nilsson et al. 2009 and others. The question is, is it possible to use GNSS observations to reliably detect these events wherever suitably dense networks of GNSS receivers are established?

An experiment sponsored by NASA's Earth Science Technology Office will upgrade the ability of about 26 GNSS sites in Southern California to transmit large quantities of raw data back to a central facility for processing into higher-order products. The goal of this effort is to establish a real-time geodetic station sensor web for natural hazards research, and one possible application of this unique data source will help NOAA's Earth System Research Laboratory determine if it is possible to use high rate GNSS estimates of the zenith neutral signal delay to improve turbulence predictions and guidance for the aviation community.