Airborne L-band Radio Frequency Interference Studies with the L-band Interference Suppressing Radiometer (LISR) and PALS

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Radio Frequency Interference (RFI) is a major concern for L-band microwave radiometry. An airborne mission to observe L-band RFI was conducted in September-October 2008, and included approximately fifty hours of flight time. Observations included testflights in the vicinity of Grand Junction, Colorado, observations over soil moisture ground truth sites in Iowa and Maryland, outbound and return transit flights from Colorado to Maryland, and dedicated RFI observing missions over urban areas on the US East coast. The Passive/Active L/S-band sensor (PALS) of the Jet Propulsion Laboratory (JPL) served as the radiometer front end in the campaign, and IF signals from PALS were coupled to an "Advanced Digital Detector" (ADD) subsystem that included three RFI observing backends. The L-band Interference Suppressing Radiometer (LISR) of Ohio State is one of these backends, and records spectrograms of observed brightnesses at 0.1 MHz frequency resolution and 350 usec time resolution. The system also includes a pulse detection flag operating at 0.64 usec time resolution.

Results from LISR observations will be reported in the presentation, including information on the RFI types observed, their frequency of occurrence, and their temporal and spectral properties. An analysis of the performance of pulse and cross-frequency algorithms in detecting these sources will also be provided. Plans for intercomparisons with other RFI detection strategies (primarily kurtosis based algorithms) implemented in the other ADD systems will also be discussed. Implications of the experiment for the design of future spaceborne L-band radiometers will be summarized, with a focus on the NASA Soil Moisture Active/Passive (SMAP) mission currently in the planning phase.