

Low Atmospheric Propagation System (LATPROP) Measurement Results on CASPER-west

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CASPER-west campaign is the second half of Coupled Air-Sea Processes and EM Ducting Research (CASPER) that aims to exploring the EM wave propagation over maritime atmospheric boundary layers. CASPER-west was conducted off Point Mugu, California during September to October 2017.

Meteorological measurement data such as air temperature, humidity, sea surface temperature, pressure, etc. were collected on the platform R/P FLIP, R/V Sally Ride, wave Glider and the shore. The bulk measurement data are used as ground truth to evaluate the RF measurement.

Lower Atmospheric propagation (LATPROP) system was deployed during the campaign to measure the propagation loss of two links, R/P FLIP to shore and R/V Sally Ride to shore. The UWB transmitter was installed on R/P FLIP and UWB receiver was on shore. Three selected frequency sources were installed on R/V Sally Ride. The frequencies of UWB transmitter and receiver are locked by GPS frequency reference.

The signal generator can generate short pulse with 1 Hz pulse length. Small resolution band width is set on receiver side to keep high SNR. Two dish antennas were installed on different height to form a simple vertical array for frequency 2-18 GHz. For frequency 18-40 GHz only one antenna is utilized. Electromechanical switches are controlled by computer to select among antennas. Two types of measurement were conducted: fast sweeping and zero-span. The system does fast sweeping from 2-40 GHz continuously to measuring the mean field. zero span mode is set the system to staying at one frequency and keeping recording for scintillation and turbulence measurement.

The received signal data are calibrated with system loss and platform movement. Surfaced based duct (SBD) happened at more than half time of the campaign. Due to the complex profiles of SBD, a global inversion method has been applied to retrieve the environment parameters with all the measured frequencies. The inversion results will be presented.