This dissertation focuses on development of the MicroWave Radiometer (MWR) brightness temperature (Tb) algorithm and the on-orbit validation using on-orbit MWR Tb measurements. This research is sponsored by the NASA Earth Sciences Aquarius Mission, a joint international science mission, between NASA and the Argentine Space Agency (Comision Nacional de Actividades Espaciales, CONAE).

The MWR is a CONAE developed passive microwave instrument operating at 23.8 GHz (K-band) H-pol and 36.5 GHz (Ka-band) H- & V-pol to compliment Aquarius L-band radiometer/scatterometer which is the prime sensor. MWR measures brightness temperature Tb and provides simultaneous spatially collocated environmental measurements (such as surface wind speed, rain rate, water vapor, and sea ice) to derive an accurate sea surface salinity (SSS).

This research addressed several areas including development of: 1) a signal processing procedure for determining and correcting radiometer system non-linearity; 2) an empirical method to retrieve switch matrix loss coefficients during thermal-vacuum radiometric calibration test; and 3) an antenna pattern correction (APC) algorithm using Inter-satellite radiometric cross-calibration of MWR with the WindSat satellite radiometer. The validation of the MWR counts-to-Tb algorithm was performed using two years of on-orbit data, which included special deep space calibration measurements and routine clear sky ocean/land measurements.

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The public is welcome to attend.