

# EMPIRICAL LOOK-UP TABLES FOR POLARIMETRIC PHASE DELAY TO PRECIPITATION LIKELIHOOD USING ROHP-PAZ POLARIMETRIC RADIO OCCULTATION AND SSMIS/GMI MICROWAVE-BASED ESTIMATES OF WATER PATHS.

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Results from forward propagation ray tracing of Radio Occultation (RO) through the atmosphere were compiled from coincident observations from the ROHP-PAZ experiment and the SSMIS/GMI passive microwave radiometer (MWR). DPR were inverted into precipitation profiles before using Bayesian retrievals of passive MWR water vapor at the location of PAZ RO. The MWR based information was used to estimate the total water path traversed by the RO ray trajectories. RO temperatures were used to separate between ice and liquid water. With those classifications empirical look-up-tables were created to relate water path, ice path, and polarimetric phase difference,  $\Delta\phi$ , observable is presented as a function of height.

The results were fitted to several functions that relate  $\Delta\phi$  with water path for each value of refractivity at each height. A logistic function provided the best analytical approach to describe polarimetric phase differences to precipitation likelihood at each height.

For retrieval purposes, where one does not know a priori the type of cloud encountered, nor the phase of the water droplets, a cluster analysis was explored to find ways to discriminate the different types of precipitating clouds. This cluster classification uses only retrieved quantities like  $\Delta\phi$  and refractivity to establish criteria that would help separate ice from liquid water contributions to the polarimetric phase difference.

Finally, we explored profiles that did not match these empirical look-up-tables. We try to find criteria to identify the cause in either uncertainties in the MWR retrieval, or actual anomalous behavior in PRO profiles.