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Methods of Retrieving the Ammonia Abundance Profile from Data Taken with the Juno Microwave Radiometer

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The Juno Microwave Radiometer (MWR) has six channels ranging from 1.36–50 cm and the ability to peer deep into the Jovian atmosphere. Various retrieval methods are being implemented to advance the understanding of Jupiter's atmospheric composition, structure, and dynamics through microwave radiometry. This work includes laboratory measurements which have been used to refine previously-existing models for the microwave opacity of gaseous ammonia and water vapor.

Utilizing these models a Support Vector Machine algorithm has been developed to rapidly perform inversion for the deep abundance profiles of ammonia and water vapor. This algorithm is "trained" by using simulated emissions at the six wavelengths computed using the Juno atmospheric microwave radiative transfer model (Janssen et. al. 2013, Icarus, 226, 522–535). By exploiting the emission measurements conducted at six wavelengths and at various incident angles, the Support Vector Machine can provide results to a useful precision in a computational method hundreds of times faster than conventional methods. This can quickly provide important insights into the variability and structure of the Jovian atmosphere.

The Juno MWR has probed as deep as 1000 bars, well beneath the water clouds. Results will be presented giving insight into the vertical and latitudinal distribution of ammonia, water vapor, and potential condensates.