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Water and Ammonia Abundances with Juno Microwave Radiometer

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The abundances of heavy elements (> 4He) are important for constraining models of the formation of Jupiter and the origin of its atmosphere. However, the abundance of water in the well-mixed atmosphere, hence O/H, is unknown, and the N/H is poorly determined after the Galileo Probe mission. The Juno New Frontiers Mission to Jupiter, scheduled to be launched in 2011, would include a passive microwave remote sounding instrument, designed to measure global abundances of water and ammonia to atmospheric pressures in excess of 100 bars. Here we present the models and algorithms for retrieving the abundances of these volatiles. Numerical simulations of the microwave experiment, using model atmospheres with a wide range of nitrogen and oxygen enrichment factors (1 - 20 x solar) were carried out. The best estimate of the instrument noise was also included. The focus of the study was characterization of the statistical uncertainties in the retrieved water and ammonia abundances. We find that we can discriminate between 1, 3 and 10 x solar abundances of water and ammonia. In the future, we plan to explore a larger parameter space in the retrievals, by inclusion of clouds and non-equilibrium thermodynamical effects.