

A LEO-LEO OCCULTATION OBSERVING SYSTEM FOR CHARACTERIZING ATMOSPHERIC HUMIDITY, TEMPERATURE, GEOPOTENTIAL, OZONE, AND CLOUDS

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Our continual quest towards a deeper understanding of weather and climate and a significantly improved skill to predict their future behavior depends critically on our knowledge of the present structure of the atmosphere and its variations. Here we present and discuss a particular implementation of the spacecraft radio occultation technique designed to characterize the thermodynamic and compositional structure of the atmosphere. We have referred to this concept by several names depending on our emphasis. Our initial intense effort to develop this concept was the Atmospheric Moisture and Ocean Reflection Experiment (AMORE) proposal submitted to the Earth System Science Pathfinder (ESSP) AO in 1998. The Active Tropospheric Ozone and Moisture Sounder (ATOMS), submitted in 1998 as well, is an ongoing Instrument Incubator Program (IIP). In the present context, we will use the acronym, BRIGHTOC, standing for Bi-static Radar Imaging of Geopotential, Humidity, Temperature, Ozone and Clouds, similar to the acronym used by Kursinski et al. (2002). We will summarize the history of the US effort in developing this technique. We will summarize the results of Kursinski et al. (2002a) who focused primarily on clear sky conditions and then extended the evaluation of these observations to cloudy conditions (Kursinski et al., 2002b). We will also briefly describe expected accuracies and applications of the technique for a mission concept at Mars.

References:

Kursinski, E. R., S. Syndergaard, D. Flittner, D. Feng, G. Hajj, B. Herman, D. Ward, and T. Yunck, A microwave occultation observing system optimized to characterize atmospheric water, temperature and geopotential via absorption, JTECH, in press, 2002a.

Kursinski, E. R., D. Flittner, B. Herman, D. Feng, S. Syndergaard, and D. Ward, "An Active Microwave Limb Sounder for Profiling Water Vapor, Ozone, Temperature, Geopotential of Pressure Surfaces and Clouds", NASA's Earth System Technology Conference (ESTC), Pasadena, CA, June 12, 2002b.