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Title: (OA1) Microwave Remote Sensing of Deep Planetary Atmospheres from Orbiting Spacecraft

Abstract:
Microwave remote sounding from an orbiting spacecraft or a flyby reconnaissance offers new possibilities for retrieving important properties of deep planetary atmospheres such as those of Venus and the outer planets. From a close orbit or flyby, measurements of relative brightness temperature as a function of off-nadir emission angle can be made with much higher precision than absolute brightness temperatures by perhaps a factor of twenty. Such relative measurements, made at wavelengths from 1.5 and combined with corresponding absolute brightness temperature measurements, can allow us to study unknown and important features of these atmospheres such as the distribution of microwave-active constituents with altitude, global abundances of oxygen and nitrogen in the outer atmosphere and the dynamics and deep circulations beneath the clouds. Also, a microwave sounding experiment can complement a probe by placing the detailed measurements possible from an in situ measurement into a global context. Examples of the microwave sounding approach will be shown for Jupiter. At Jupiter and the other gas giant planets, global mapping of temperature contrasts, deep stratification, and the water abundance at various zone scales can distinguish between deep cylindrical vs. shallow flow patterns for the global circulation, and warm (~150K) vs. cold (<30K) formation scenarios for their volatile constituents.

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