An Overview of the EOS Microwave Limb Sounder Experiment

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The Microwave Limb Sounder (MLS) experiments provide vertical profiles of atmospheric composition, temperature, and pressure by measuring millimeter- and submillimeter-wavelength thermal emission from the limb of Earth's atmosphere. The first MLS experiment in space was launched on the NASA Upper Atmosphere Research Satellite (UARS) in September 1991. Although designed primarily to measure stratospheric abundances of ClO, O3, and H2O, UARS MLS also provided profiles of HNO3, SO2 (when enhanced following volcanic eruptions), and CH3CN in the stratosphere and H2O in the upper troposphere. A follow-on MLS experiment is now being built for NASA's Earth Observing System (EOS) CHEMISTRY mission, currently scheduled for launch in December 2002. EOS MLS is a greatly enhanced version of the UARS MLS instrument, with better spatial resolution and coverage (82N to 82S on each orbit), better precision and an extended vertical range for many species, and measurement of additional chemical constituents in both the stratosphere and troposphere. Overall scientific objectives for EOS MLS include determining whether stratospheric ozone is recovering as expected, improving knowledge of processes that affect climate variability, and helping understand ozone pollution in the upper troposphere. EOS MLS will have radiometers in five broad spectral bands centered near 118, 190, 240, 640, and 2500 GHz to measure key species in the upper troposphere, stratosphere, and mesosphere. Measurements in the stratosphere include O3, H2O, OH, HO2, CO, HCN, CH3CN, N2O, HNO3, HCl, HOCl, ClO, BrO, volcanically-injected SO2, temperature, and geopotential height. Measurements in the upper troposphere include H2O, O3, CO, HCN, N2O, HCl, cirrus ice, temperature, and geopotential height. Measurements in the mesosphere include H2O, OH, HO2, O3, HCl, CO, and geopotential height. All of these measurements are obtained both day and night and even in the presence of dense volcanic aerosol and ice clouds. This talk will present an overview of the EOS MLS instrument and measurement capabilities, its data products with their expected vertical ranges, and their role in attaining the overall science goals.

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