

Chemistry and Circulation Occultation Spectroscopy Mission (CCOSM)

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CCOSM is the first alternate mission for NASA's Earth System Science Pathfinder series. CCOSM would provide the first space-based, simultaneous measurements of more than 30 trace gases and aerosol properties using the complete spectrum from the ultraviolet to the infrared. The instrument combines the ATMOS and SAGE heritage of solar occultation limb sounders, providing high accuracy, high vertical resolution (~2 km) for a limited number of profiles each day. Every month the CCOSM orbit would sample the composition of the upper troposphere and lower stratosphere over much of the globe (e.g., 40S to 55N in July). Existing data from ATMOS and the JPL balloon-borne Mark-IV FTIR demonstrate the unique sensitivity of IR measurements of tropospheric ozone and its precursors, such as NO_x and the combustion products CO, C₂H₂, C₂H₆, and HCN, as well as thin clouds like cirrus. SAGE has demonstrated the usefulness of ultraviolet and visible extinction data to measure aerosol sizes. CCOSM has the unique capability of measuring all of these constituents and many more in the same air parcel. The correlation of different chemical tracers has proven a most powerful tool in analyzing atmospheric chemistry AND circulation. CCOSM measurements are detailed fingerprints that allow us to examine the sources of pollutants, to define the atmospheric circulation and mixing, and overall to test current chemistry-transport models. The CCOSM data, even a year or two, would document the state of the atmosphere as a reference point for global change in a way unique to all of the anticipated EOS measurements.