Abstract for IAMAS Symposium 10

Jovian haze and cloud: evolving ideas on structure and physical properties

During the last few years data from ground-based telescopes, from the Hubble Space Telescope, Galileo and Cassini have put us in a good position to re-examine ideas about Jupiter's clouds and haze. The Galileo Probe provided in situ measurements which quieted some of the previous controversy. The water abundance and existence of the water cloud was one of the most contentious issues prior to the Galileo encounter. On one extreme the models of Carlson et al. (Ap.J., 388, 648-668, 1992) called for a greater than solar water abundance just below the condensation level and a substantial water cloud in hot spot regions. But there were many other analysis of ground-based 5-micrometer spectra which argued that hot spots are desiccated regions with no water cloud. The Galileo Probe results were consistent with the latter models, at least for one of the jovian hot spots, while the Galileo Orbiter NIMS data which cover many regions show a great variety of relative humidity variations in hot spots, but none of the hot spots contain the substantial water cloud proposed by Carlson et al. Ideas about cloud structure at higher altitudes are evolving. Analysis of Galileo SSI images led Banfield et al. (Icarus 135, 230-250, 1998) to propose models where all the contrast seen in methane and continuum images below 1 micrometer wavelength is due almost entirely to optical thickness variations in the deepest part of the ammonia cloud with no role for an ammonium hydrosulfide cloud and no role for a variation in continuum single scattering albedo. The absence of an ammonium hydrosulfide cloud in these models conflicts with results derived from Galileo NIMS data. At still higher altitudes previously unseen features in Jupiter's polar stratospheric haze are now available for study thanks to images at ultraviolet wavelengths from the Hubble Space Telescope and the Cassini ISS experiment. With their broad wavelength coverage, polarization capability and good phase angle coverage, instruments on Cassini are providing new and important data to constrain cloud and haze physical properties.

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