[P-034/SS-1] Characteristics of the Clouds near the North Polar Vortex of Saturn Observed by Cassini/VIMS

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We present an analysis of clouds near the hexagonal vortex around the North Pole of Saturn. These clouds have recently encountered sunlit conditions as northern winter wanes. We performed radiative transfer modeling in order to derive the characteristics of clouds near the Saturnian North Polar "Hexagonal" Vortex. The clouds were observed with the Visual Infrared Mapping Spectrometer (VIMS) onboard Cassini on Dec. 17, 2008(UT), during the S46 Flyby of the Cassini spacecraft. We analyzed visual-near-infrared spectral and imagery data of the daylit hexagon vortex of Saturn, allowing us to derive the characteristics of the clouds from both visible and near-infrared spectra.

The vortex near 76 degrees N. latitude (planetocentric) has two boundaries; an inner and an outer one. At a wavelength of 5 micron, which - with the very low sun angle - views the clouds in silhouette against the relatively bright background thermal glow of Saturn, the region inside the vortex is darker than the outside. In sunlit views at shorter, non-thermal, wavelengths, this region is brighter than the surrounding lanes. We infer that the Vortex is comprised of at least one lane of clouds surrounded by relatively clear lanes. We modeled the Near-IR and Visible spectra of five clouds; inside the inner hexagon boundary, the edge of the outer boundary, the edge of the inner boundary, between the boundaries, and outside the outer hexagon boundary. We infer that all of these clouds are thick, extending from near 0.4 bar down to several bars because of the similar appearance of the clouds in both near-infrared and visible light. We derive the morphological differences in cloud structures between clouds within the hexagonal feature and those outside and inside of it. As well, we also derive the differences of the polar cyclone clouds and clouds in non-polar regions. Differences in cloud heights and mass column densities of the cloud condensates will give us clues on Saturn's polar dynamics, particularly the relative amount of vertical transport in an around the hexagon.