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Multilayer hazes over Saturn's Hexagon from Cassini ISS limb images

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Saturn's atmosphere has a unique and long-lived hexagonal wave at latitude +73º in the northern polar atmosphere traced by hazes and clouds at a pressure level about 0.5 – 3 bar. In June 2015, following Saturn's northern spring equinox, the Cassini spacecraft obtained images of the planet limb at a phase angle of 29° and at a high spatial resolution of 1-2 km/pixel. The wavelength coverage extends from 225 nm to 950 nm, including methane absorption bands. Their analysis shows a system of at least 6 stacked hazes above the hexagon's main upper cloud. Their vertical extent ranges from 7 to 18 km (about 0.2 – 0.5 scale height) spanning vertically from a pressure 0.5 bar up to 0.01 bar. Above that level a vertically extended thin aerosol layer extends up to pressures < 0.001 bar. We complete the work with an analysis of images taken almost simultaneously at low phase angles using the Hubble Space Telescope in a similar spectral range. We present a radiative transfer modeling for spherical and nadir geometry of the spectral reflectivity to retrieve the haze layer properties. The nature of these hazes is consistent with hydrocarbon ice condensates including acetylene and benzene at higher altitudes. We propose that the vertical distribution of the hazes can be due to vertically propagating gravity waves generated at the hexagon base.