Geophysical Research Abstracts
Vol. 21, EGU2019-3188, 2019
EGU General Assembly 2019

Jupiter's High-Altitude Hazes as Observed by JunoCam

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The JunoCam instrument on the Juno mission at Jupiter has detected several types of atmospheric hazes that are demonstrably higher than the main cloud deck. The overwhelming majority of these hazes have been detected near Jupiter's terminator, although brown bands are sometimes also seen under full sunlight. Others, such as the main polar hoods, are detected by their prominence in images taken at 889 nm, where methane has a strong absorption feature, identifying them as high-altitude particles. Some are detected as patterns that overlay other cloud patterns in the main desk, such as bands that run directly across major vortex features without being perturbed by them. Others, associated with edges of the polar haze, are detected under conditions of high viewing angles that benefit from strong forward scattering; these observations have revealed hazes with a highly elaborate "filigree" appearance. One of these waves was detected on Juno's first perijove pass by its illumination beyond the terminator, estimated as being on the order of two atmospheric scale heights above the main cloud deck (Orton et al. 2017, Geophys. Res. Lett., 44, 4599; Adriani et al. 2018 Nature 555, 216). Many of these hazes are in the polar regions, and they are present in all of Juno's perijoves. At visible wavelengths, some haze bands are white and others appear darker and brownish. We expect the darker areas to be clear or shadowed regions rather than compositionally different than the lighter ones. Some hazes are "rainbow bands", appearing as bright bands that are fringed with blue on one side and rad on the other. The morphology of the hazes varies substantially with latitude. The lighting conditions associated with Juno's closest approaches to Jupiter on perijove 14 (and to a lesser extend) on perijove 13, provide evidence for discrete layering in Jupiter's cloud deck by detecting particles at Jupiter's limb that are some 80 km (∼3 scale heights) above the main cloud deck, ranging from continuous to detached in appearance.