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Title:

Enceladus Plumes: Velocity Distribution, Mass Flux, and Particle Properties from ISS Images

Author Block:

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Abstract:

The Imaging Science Subsystem (ISS) on Cassini has been observing the plumes of Enceladus intensively for the past several years over a broad range of phase angles (up to 178 degrees), image scales (down to 80 m per pixel) and wavelengths (from 338 nm to 918 nm). Cassini's February 2010 Enceladus flyby has returned the highest spatial resolution yet, ten times better than that reported in Porco et al. (2006). From this one set of images, we have derived profiles of brightness and plume width vs. altitude. From the former, we can get a better estimate of the vertical velocity distribution. From the latter, we can estimate the horizontal spreading rate and interaction of particles with the gas. The higher resolution allows us to study individual jets close to the vent, revealing the slow-moving particles that are falling back to the surface. Eventually, from the phase angle and filter coverage over the entire data set and the inclusion of VIMS spectral data we will be able to estimate particle size, number density, and temporal variability. Comparing with UVIS observations of the gas phase, we can estimate the solid-to-vapor ratio. Together these data provide important constraints on conditions below the surface. We will report on the progress made so far in the analysis of this extensive data set and implications for or against liquid water and what depth it might occur.

Category:

12. Enceladus

Facility Keywords:

Additional Information (Complete):

Did you give a contributed presentation in 2008 (Ithaca)?: Yes - oral

Did you give a contributed presentation in 2009 (Puerto Rico)?: No

Student Status: None

I am willing to serve as a Chair: No

Newsworthy?: No

I have a video for Press Officer review,: No

Status: Complete

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