

Cassini Imaging of Jupiter's Atmosphere, Satellites, and Rings

Carolyn C. Porco,^{1*} Robert A. West,² Alfred McEwen,³
 Anthony D. Del Genio,⁴ Andrew P. Ingersoll,⁵ Peter Thomas,⁶
 Steve Squyres,⁶ Luke Dones,¹ Carl D. Murray,⁷
 Torrence V. Johnson,² Joseph A. Burns,⁶ Andre Brahic,⁸
 Gerhard Neukum,⁹ Joseph Veverka,⁶ John M. Barbara,⁴
 Tilmann Denk,¹⁰ Michael Evans,¹ Joseph J. Ferrier,⁴
 Paul Geissler,³ Paul Helfenstein,⁶ Thomas Roatsch,¹⁰
 Henry Throop,¹ Matthew Tiscareno,³ Ashwin R. Vasavada¹¹

The Cassini Imaging Science Subsystem acquired about 26,000 images of the Jupiter system as the spacecraft encountered the giant planet en route to Saturn. We report findings on Jupiter's zonal winds, convective storms, lowlatitude upper troposphere, polar stratosphere, and northern aurora. We also describe previously unseen emissions arising from Io and Europa in eclipse, a giant volcanic plume over Io's north pole, disk-resolved images of the satellite Himalia, circumstantial evidence for a causal relation between the satellites Metis and Adrastea and the main jovian ring, and information on the nature of the ring particles.

[...]

Cassini obtained disk-resolved images of Himalia, an outer satellite of Jupiter (Fig. 7) (1). The measured size range of Himalia, taken from a distance of 4.44 million km and an image scale of 27 km/pixel, is 4 to 6 narrow-angle pixels, indicating an irregular shape that is not dominated by gravity. These values correspond to radii of 75 ± 10 km by 60 ± 10 km, if the principal axes (or dimensions close to them) were measured (54), and are close to the mean ground-based radius of 85 km (55). The surface albedo, scaled from the ground-based flux measurements and the new size determination, is 0.05 ± 0.01 , which, together with the gray color (56), is consistent with a C-type (carbonaceous) asteroidal surface and a possible capture origin for Jupiter's outer prograde satellites.

[...]

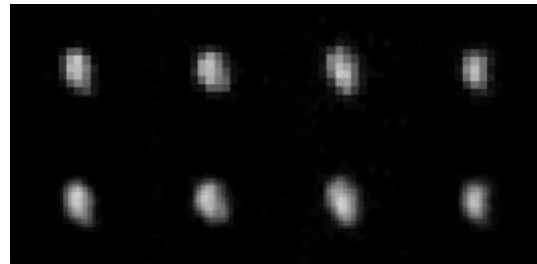


Fig. 7. The disk of Himalia illuminated from the left at a phase angle of 70° and observed by the Cassini ISS over ~ 4.5 hours. One unprocessed image, taken through the BL1 (451 nm) filter, from each of four observation sequences is shown in the top row. The observation UTC times were (from left to right) 18 December 2000, 20:30, 22:00, and 23:30, and 19 December 2000, 01:04. The bottom row shows the same data, but smoothed by bicubic interpolation.

References and Notes

1. See supporting data on *Science Online*.

[...]

54. T. Denk *et al.*, paper presented at the conference on Jupiter: The Planet, Satellites, and Magnetosphere, Boulder, CO, 25 to 30 June 2001.

55. D. P. Cruikshank, *Icarus* **30**, 224 (1977).

56. J. Degewij *et al.*, *Icarus* **44**, 520 (1980).

[...]