Near IR observations of Europa's opposition surge during the Cassini Flyby

B. Buratti, T. McCord, R. Clark, C. Hibbitts, G. Hansen, D. Simonelli, J. Hillie

In December and January 2000-2001, the Cassini spacecraft made a gravity-assist flyby of the Jovian system which included detailed studies of the Galilean satellites. During the encounter the Visual Infrared Mapping Spectrometer (VIMS) gathered measurements of these bodies at unique geometries and new spectral ranges. Among these results were an observation of Europa's opposition surge over the 0.9 to 3.0 micron range. Between a phase angle of 0.38 and 0.60 degrees, 16 observations of the satellite were obtained, and between 1.5 and 7 degrees, four measurements were obtained. In the near IR, Europa's solar phase curve exhibits a much steeper rise below one degree. The phase coefficient between 7 and 1.5 degrees is ~0.01 magnitudes/degree, similar to values determined from visible ground-based and Voyager results. However, below one degree, the phase coefficient has values ranging from 0.2 magnitudes/degree at 2.6 microns to 0.25 magnitudes/degree at 0.9 microns: Europa exhibits a huge opposition surge in the near-IR. We find a wavelength dependence to the surge at these small phase angles: As the wavelength (or albedo) increases, the phase coefficient decreases. No clear trend was observed between solar phase angles of 1.5 and 7 degrees.

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