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Evolution on Saturn's rings spokes observed by Cassini-VIMS

G. Filacchione (1), F. Capaccioni (2), P. Cerroni (2), A. Coradini (3), R.N. Clark (4), P.D. Nicholson (5), M. M. Hedman (5), D.P. Cruikshank (6), B.J. Buratti (7), R.H. Brown (8)

(1) INAF-IASF, Rome, Italy (gianrico.filacchione@iasf-roma.inaf.it), (2) INAF-IASF, Rome, Italy, (3) INAF-IFSI, Rome, Italy, (4) USGS, Denver, CO, USA, (5) Cornell University, Ithaca, NY, USA, (6) NASA-AMES, Moffett Field, CA, USA, (7) JPL, Pasadena, CA, USA, (8) LPL-UA, Tucson, AZ, USA

Abstract

With the approach of the Saturn's Equinox (September, 4th 2009) the visibility of the spokes, forming and propagating in azimuth across the B ring, will increase. During the Cassini nominal mission (2004-2008) these radial markings were almost absent while during the last months are becoming more and more frequent. In this paper we'll analyze some spokes captured during temporal sequences made by the VIMS experiment, Visual and Infrared Mapping Spectrometer aboard Cassini. Saturn's odd ring spokes were first discovered by the Voyager missions [1], which swung-by the planet in the 1980s, and later observed by the Hubble Space Telescope [2]. Respect to these observations, VIMS has the opportunity to analyze the spokes on a wide spectral range (0.35-5.0 μm) and from both sides (lit and unlit) of the ring plane. The spectral behavior of the spokes in forward and back-scattering will help us to infer the dimensions and composition of the particles while their dynamics can unveil the interaction of the particles with the magnetosphere. This research is supported by an Italian Space Agency (ASI) grant.

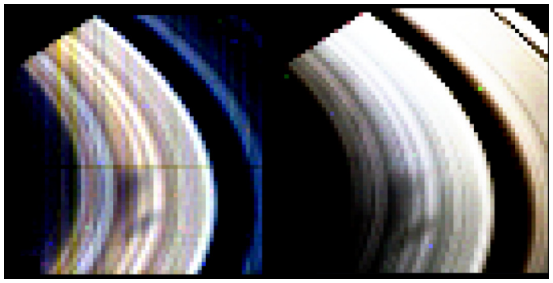

Figure 1: High resolution VIMS image of spokes (S46 APOMOSL114) in the VIS (left) and in the IR (right) (same RGB colors of Fig. 2).

Spokes observed by Cassini-VIMS

As in these months the observations of the spokes is an ongoing activity and new features are observed every few weeks, in this abstract we includes just some preliminary sequences of spokes captured by Cassini-VIMS. As an example one of the first spoke's sequence was obtained last December 12th 2008 (S46-APOMOSL114 in Figure 1 and S46-SUBMS10LP001in Figure 2).

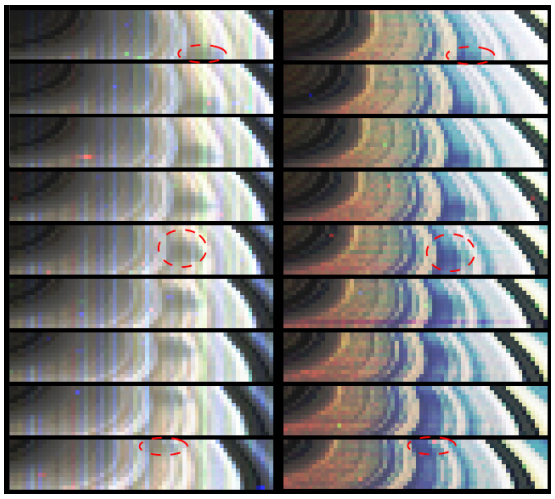

Figure 2: 17 minutes long spokes movie observed by VIMS (December 12th 2008). The spoke, indicated by a red circle, moves along azimuth in the central B ring. Left panel: RGB images at VIS wavelengths (R@700 nm, G@550 nm, B@440 nm). Right panel: RGB images at IR wavelengths (R@2.581 μm, G@2.35 μm, B@2.223 μm).

References

[1] Smith, B. A. et al. (1981), Science, vol. 212, Apr. 10, 163-191.
[2] McGhee et al. (2004), DPS meeting #36, #19.06, AAS Bulletin, Vol. 36, 1110.