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The Saturnian satellite Tethys observed by the Cassini-VIMS instrument

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In order to further our understanding of the Saturnian system we studied the variations in spectral properties across the surface of Saturn's satellite Tethys using Cassini/VIMS data and their relationships to geological and/or morphological characteristics as seen in the Cassini/ISS images. Despite the spectral dominance of water ice on Tethys' surface distinct spectral variations could be detected, which are surprisingly very different from what was expected from the visible albedo derived from Voyager and Cassini data. The abundance of water ice usually follows the visible surface albedo as seen on many other satellites. Thus, the weakest water ice signature could be also measured on the trailing hemisphere of Tethys, as known from Dione and Rhea [1-3]. The detailed mapping, however, shows a more complex pattern. Two relatively narrow N/S-trending bands, interpreted to be composed of larger ice particle sizes rather than the higher abundance of water ice, separate the Saturn-facing and the anti-Saturnian hemisphere of Tethys. So far, larger ice particles could only be found in geologically young, less weathered portions of the surfaces of the icy Saturnian satellites [2,3]. On Tethys, however, the observed variations might be more complex due to the influence of fine particles from the E-ring coating the surface. In contrast to the prominent graben systems on Dione and Rhea, which show fresh ice exposed on steep walls, no spectral properties could be exclusively associated to Tethys' extended graben system Ithaca Chasma supporting its geologically old age and that its formation was not caused by the impact event that created Odysseus [4].

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