Geophysical Research Abstracts
Vol. 15, EGU2013-11009, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

Regional geology and stratigraphy of Saturn's icy moon Tethys

Roland Wagner (1), Katrin Stephan (1), Nico Schmedemann (2), Thomas Roatsch (1), Elke Kersten (1), Gerhard Neukum (2), and Carolyn C. Porco (3)

(1) German Aerospace Center (DLR), Institute of Planetary Research, Berlin, Germany (roland.wagner@dlr.de), (2) Institute of Geosciences, Freie Universitaet, Berlin, Germany, (3) Space Science Institute, Boulder, CO., USA

Tethys, with a diameter of 1060 km one of the 6 mid-sized icy moons of Saturn, was imaged for the first time in the early 1980ies by the cameras aboard the two Voyager spacecraft at resolutions of 1 km/pxl and lower [1][2][3]. These images show that most of Tethys is densely cratered and displays two major landmarks: the $\sim$ 400 km large impact structure Odysseus and the huge graben system of Ithaca Chasma [1][2]. Since July 2004, Cassini has been in orbit about Saturn and has made several close passes at Tethys, providing an almost complete global image coverage at regional scale (200 – 500 m/pxl). However, varying viewing geometries between images taken during different orbits still impede the identification and mapping of geologic units. In this work we present an update of Tethys' regional geology and stratigraphy, based on Cassini ISS images. Crater distribution measurements, by us and in comparison with measurements of other groups [4], are used to support stratigraphic findings. Most of Tethys' surface consists of a hilly, rugged, heavily cratered plains unit, as identified in Voyager images [1][2][3]. A smooth, less densely cratered plains unit in the trailing hemisphere was previously observed by [2] which is also identifiable in Cassini ISS, but its exact boundaries are difficult to map due to varying viewing geometries of ISS observations. Another sparsely cratered plains unit not seen in Voyager images can be located to the south of Odysseus. It features remnants of highly degraded large craters superimposed by younger fresher craters with a lower crater density compared to the heavily cratered plains. Its distinct linear northern contact with the heavily cratered plains suggests an origin related to tectonism. Again, varying viewing conditions hamper to map the exact boundaries of this unit. The prominent graben system of Ithaca Chasma represents fractured cratered plains. The high resolution of Cassini ISS images reveals that tectonism on Tethys is more widespread. Numerous fractures can be identified locally in the heavily cratered plains. Impact crater materials can be subdivided into three degradational classes. Oldest crater forms are heavily degraded impact structures, such as Telemus. Odysseus is a fresh to partly degraded large impact structure with a central peak complex, wall terraces, secondary crater chains, and slivers of smooth deposits within the heavily cratered plains, possibly impact ejecta. According to previous ISS-based crater measurements, Odysseus is younger than Ithaca Chasma and possibly did not cause the formation of this graben system [5]. The youngest and freshest craters are represented by Telemachus, characterized by a sharp crater rim, well-discernible ejecta blankets, and a low superimposed crater frequency. Locally, features of mass wasting, e.g. landslides, can be observed in craters. References: [1] Smith B. A. et al. (1981), Science 212, 163-191. [2] Smith B. A. et al. (1982), Science 215, 504-537. [3] Moore J. M. and Ahern J. L. (1983), JGR 88 (suppl.), A577-A584. [4] Kirchoff M. R. and Schenk P. M. (2010), Icarus 206, 485-497. [5] Giese B. et al. (2007), GRL 34, doi:10.1029/2007GL031467.