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Stratigraphy and surface ages on Iapetus

N. Schmedemann (1), T. Denk (1), R. Wagner (2), G. Neukum (1)

(1) Dept. of Earth Sciences, Freie Universität Berlin, Germany, (2) Institute of Planetary Research, DLR Berlin, Germany (nschmede@zedat.fu-berlin.de)

Introduction: The examination of the geologic history of Iapetus is a major goal of the Cassini imaging experiment (ISS). Crater counting for the determination of model ages is a powerful tool to understand stratigraphic relationships between different terrain units (e.g., Neukum 1983, Neukum *et al.* 1998). In the case of Iapetus (Porco *et al.* 2005), the situation is unusual because this moon has a very large semi-major axis, resulting in unusually low relative velocities of planetocentric impactors. Nevertheless, the surface of Iapetus is heavily cratered, indicating a rather old surface. The shapes of the measured crater-size frequency distributions follow very closely the distribution of Earth's moon (after correction for the different impact conditions) (Neukum et al. 2006), justifying its usage here for model age determinations. Castillo-Rogez et al. (2007) suggest that the formation of Iapetus has occurred very precisely between 4.5622 and 4.5647 Ga ago. Assuming it took roughly 100 Ma for formation of a rigid surface which is able to hold the cratering record, absolute surface (model) ages can be calibrated to these boundary conditions.

Stratigraphy: At the time of this writing, four different surface areas were investigated so far for stratigraphic comparison: 1. A small part of the ridge near 96˚W longitude; 2. an "average" dark terrain sample north of the ridge; 3. the "landslide" crater (diameter $\sim$ 120 km; 6˚N/36˚W) in the south western part of a huge basin, and its surroundings; 4. a large, 420 km diameter basin on the leading side of Iapetus (34˚N, 80˚W). Following the models of Castillo-Rogez and Neukum, an age of 4.4 Ga is expected for the oldest parts of Iapetus' surface, which is actually found at the equatorial ridge and on the "average" terrain north of the ridge. The "landslide crater" and the landslide partly covering the crater and a neighboring area in the northwest are a few hundred million years younger ($\sim$4.1 Ga). Thus, the idea that the impact event might

have triggered the landslide is consistent with the data. The surroundings of the "landslide crater" are covered by its ejecta blankets to different degrees. Further away from the crater, the ejecta blanket is thinner, and the former underlying surface (especially the larger craters) is still visible. This results in a mixed age from the blanket and the former surface. The model age of the investigated basin on the leading side of Iapetus is 4.3 Ga. The crater statistics of the outer part of the basin, which is characterised by multiple ring structures, shows evidence of surviving of larger craters in the course of basin formation.

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