GLOBAL COLOR AND CARTOGRAPHIC MAPPING OF SATURN'S MIDSIZE ICY MOONS.

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Cassini mapping of Saturn's icy moons is now complete to 250-400 m/pixel for Mimas, Tethys, Dione, and Rhea and Iapetus (except gaps there), and to ~100 m/pixel for Enceladus. Simultaneous mapping mosaics acquired during the numerous encounters with these moons included color imaging at resolutions similar to that of the clear-filter images or (more commonly) in summation mode. Initial analyses of these data have already produces significant discoveries, including high-energy electron bombardment coincident with thermal pac-man features, and ring deposits on Rhea [1, 2]. With the completion of targeted and untargeted icy moon flybys during 2015, the priority for the remainder of the mission will be north polar gap coverage, though these will rarely exceed 1 km is resolution. Here we highlight the global color mosaics, which are available for download to the public [http://lpi.usra.edu/icy_moons/]

Map Production: The production of these basemaps involved the manual selection of several thousand tiepoints per moon, used to make a bundle-adjustment to the camera vectors for each image. Images used include all clear and color filters typically down to 5 km resolution (and sometimes down to 10). The most commonly used filters were IR3 (0.94), Green (0.56) and UV3 (0.33 microns). Only polarized filter images have not been included to date though plans are set to begin integrating those later this year. The images were then mosaicked in a two-step process involving formation of an albedo map and then placing mosaics within this first map.

Color Features: The icy moons, especially Enceladus, proved to be much more colorful than suggested by Voyager analyses, largely because of Cassini's NIR capabilities. Voyager observed a cryptic darkening along the equatorial zone of Tethys. Cassini color mapping revealed this to be a prominent lens–shaped color anomaly on both Tethys and Mimas [1], and subsequent IR mapping by CIRS [2] revealed a coincident thermal anomaly indicating a difference in thermal inertia. These features are likely due to surface microstructure alterations triggered by high-energy electrons bombardment [5]. Global color patterns are related to magnetospheric implantation /alteration and E-ring dust populated by Enceladus.

Local color features include recent fracture scarps and fresher crater rims. Cassini observed rayed craters for the first time, many of which have distinct color signatures, including the prominent Inktomi rayed crater system on Rhea. The fresh 400-km basin Odysseus reveals a bluish fracture system within its central pit. One of the biggest surprises from Cassini is evidence for surface alteration due to (extinct) rings around moons. On Rhea, Blue Pearls, or IR-dark patches, formed on high-standing topography along the equator [5].

On Enceladus, the global color pattern is dominated by plume fallout [1] but locally geologic units can be identified with distinct color signatures, including funiscular terrain. The tiger stripes have UV-bright color patterns but fresh fracture walls also have similar color signatures Analysis of these data sets should provide much further insight in the geology of these complex worlds.

REFERENCES: [1] Schenk, P. et al. (2011) *Icarus*, 211, 740. [2] Howett, C. et al. (2011), *Icarus*, 216, 221.

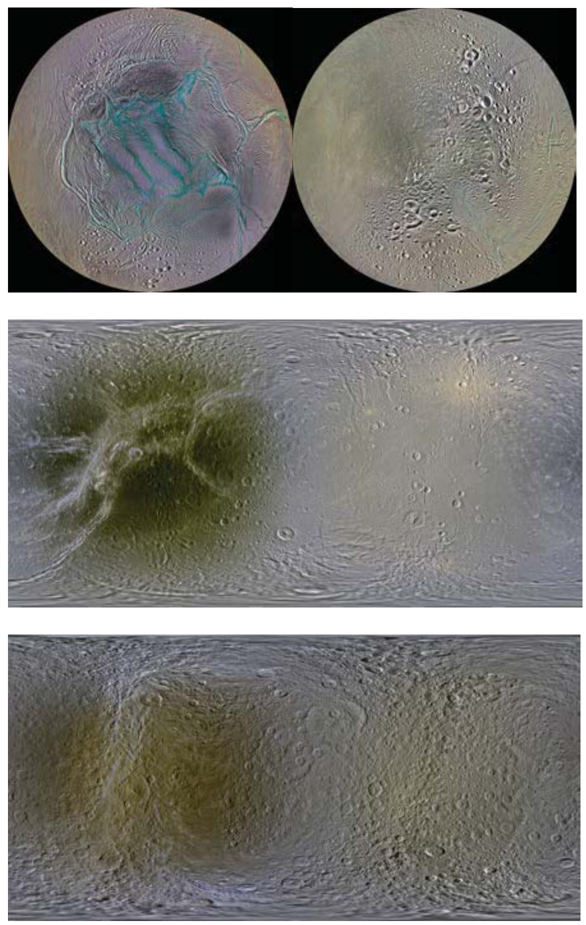

Figure 1. Basemaps of the icy Saturnian moons, in three colors (UV3, Grn, IR3). Top to bottom: Orthographic projections of Encleadus basemap showing south and north polar regions; Simple cylindrical maps of Dione; and Rhea.