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10 Years of Mapping the Icy Saturnian Satellites

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1. Introduction

The Cassini spacecraft started its tour through the Saturnian system in July 2004. The Imaging Science Subsystem onboard the orbiter consists of a high-resolution Narrow Angle Camera (NAC) with a focal length of 2000 mm and a Wide Angle Camera (WAC) with a focal length of 200 mm [1]. One of the main objectives of the Cassini mission is to investigate the icy Saturnian satellites. These satellites were imaged in many flybys during the nominal mission between 2004 and 2008. The imaging campaign continued during the first extended mission (‘‘Equinox mission’’) between 2008 and 2010 and continues during the current second extended mission (‘‘Solstice mission’’). It is now possible to image also the Northern parts of the Icy satellites which were not illuminated during the nominal mission.

2. Mosaicking

The image data processing chain consists of the same steps as described in [2]: radiometric calibration, geometric correction, map projection, and mosaicking. Spacecraft position and camera pointing data are available in the form of SPICE kernels (http://naif.jpl.nasa.gov). While the orbit information is sufficiently accurate to be used directly for mapping purposes, the pointing information must be corrected using limb fits (semi-controlled mosaics) or by photogrammetric bundle adjustment (controlled mosaics).

3. Carthographic Maps

Three different quadrangle schemes were used for the generation of the maps and the atlases [3, 4]: synoptic map, a quadrangle scheme with 15 tiles, and a quadrangle scheme with 3 tiles. The individual maps and tiles were extracted from global mosaics and reprojected into the defined map projections. We added resolution maps and index maps for every individual tile of the atlas, showing the image resolution, the image numbers and the location of the images for every map, respectively. The entire atlases are available to the public through the Imaging Team’s website: http://ciclops.org/maps. The map tiles are also archived as standard products in the Planetary Data System (PDS): http://pds.jpl.nasa.gov/.

4. Nomenclature

The nomenclature proposed by the Cassini-ISS team was approved by the IAU (http://planetarynames.wr.usgs.gov/). By international agreement, the features must be named after people or locations in

- „Le Morte d’Arthur“ for Mimas
- „The Thousand Nights and a Night“ for Enceladus
- „The Odyssey of Homer“ for Tethys
- „The Aeneid of Virgil“ for Dione
- Creation myths (with Asian emphasis) for Rhea
- „The Song of Roland“ for Iapetus
- “The Argonautica” for Phoebe

5. Future Work

The Cassini Equinox mission ended in 2010. Cassini is now operating in the Solstice mission hopefully until September 2017. Several additional close satellite flybys are scheduled for this time frame e.g. for Enceladus in October 2015 and for Mimas in January 2017. These upcoming flybys will help to replace the low-resolution parts of these atlases with higher resolution images. The northern polar regions will be illuminated during the extended mission providing an opportunity to obtain high-resolution Cassini coverage of high northern latitudes.

References

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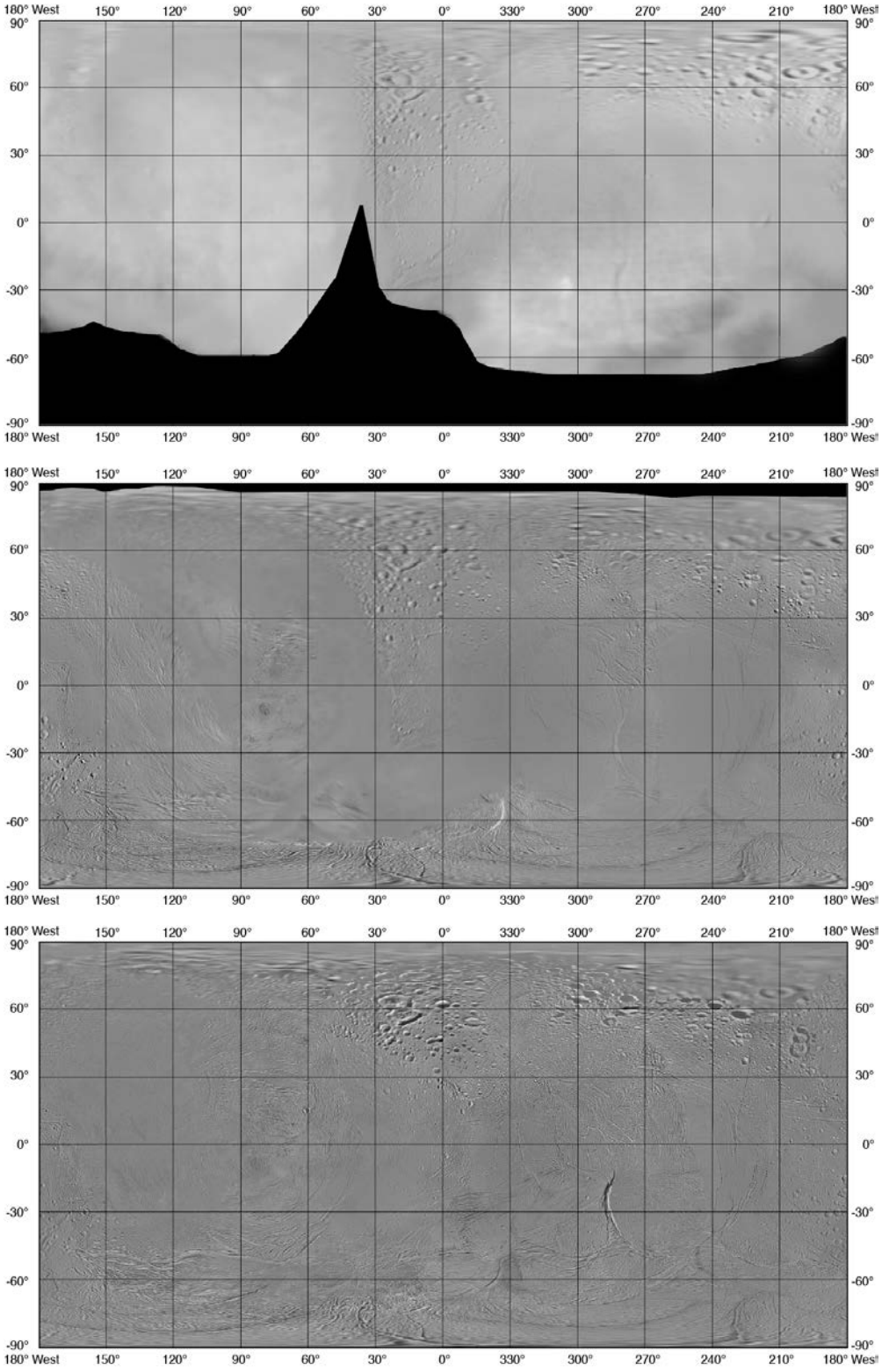

Figure 1: From top to bottom, Voyager 1982, Cassini 2006, Cassini 2011, the figure is showing the improvement of the global Cassini ISS image mosaics using the example of Enceladus.