

Cassini Radar Observations of Titan: Passes Ta and T3

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If Cassini's excellent performance continues, Titan will have been observed twice by the Cassini Titan Radar Mapper before the presentation of this talk. As this abstract is written, it is impossible to predict what additional information the second pass will produce, but we now expect to be continually surprised by each additional observation of this intriguing body. Because of the temperature regime, the materials expected to be present, and the unique surface-atmosphere interactions, an understanding of the observations will be challenging. In this paper we will review the instrument capabilities and the data acquired by the radar on its first two passes and offer preliminary interpretation of structures and materials.

The Titan Radar Mapper can produce microwave (2 cm) radiometry, scatterometry, altimetry, and synthetic aperture radar (SAR) images at spatial resolutions varying from near-global to 500 m on any Titan pass closer than 4000 km from the surface. In both close encounters to date, all modes are exercised; in the next encounters, coincident SAR coverage with optical-wavelength sensors should be obtained.

Previous measurements of atmospheric content require interchange with surface liquids or near-liquids. Ta radar and other data suggest that some material flows or has flowed at or near the surface, but a single model of surface processes that predict all of the observed features remains elusive. Discrete units have been identified based on SAR brightness distribution and will be extended with the new data; candidates for liquid and "sludge" flows, impact and/or volcanic constructs, and channels exist, but no positive identification of impact features has been made. Radiometry and scatterometry data are suggestive of porous materials but include specular returns as well.

Plans for SAR and multimode coverage will be explained, and data production plans and schedules will be shown. We will discuss surface composition modeling efforts, unit identification and candidate processes.

The Cassini Project is a joint endeavor of the National Aeronautics and Space Administration (NASA), the European Space Agency (ESA), and the Italian Space Agency (ASI). Cassini is managed by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with NASA.