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TITLE: Spectral and morphological properties of various geological types of Titan’s surface with Cassini VIMS and RADAR

ABSTRACT BODY:

Abstract Body: Cassini’s VIMS and the RADAR have been investigating Titan’s surface since 2004. Both instruments unveiled the dynamic and complex surface expressions of this Saturnian moon, suggesting exogenic and endogenic processes [1;2;3]. In order to evaluate the atmospheric contribution and thereafter extract surface information, a Radiative transfer code is used to analyse different regions and to monitor their spectral behaviour over time [4;5;7]. We furthermore use RADAR despeckled SAR images to infer information on the morphology [6]. We find that temporal variations of surface albedo occur for some areas, but that their origin may differ from one region to the other. Tui Regio and Sotra Patera change with time becoming darker and brighter respectively in terms of surface albedo. In contrast, we find that the undifferentiated plains and the suggested evaporitic areas in the equatorial regions do not present any significant change [5]. This observation supports the hypothesis that Titan is surface brightening of Sotra supports a possible internal rather than an exogenic origin. This observation supports the hypothesis that Titan is a cryovolcanic world due to the presence of local complex volcanic-like geomorphology [1] and indications of surface albedo changes [4,5]. Potential sources of the energy for cryovolcanism include tidal heating, possible internal convection, and ice tectonics, is believed to be a pre-requisite of a habitable planetary body as it allows the recycling of minerals and potential nutrients and provides localized energy sources. A recent study has shown that tidal forces are a constant and significant source of internal deformation on Titan and the interior liquid water ocean can be relatively warm for reasonable amounts of ammonia concentrations [8].

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