



Constrains on the nature of Titan's surface from Cassini/VIMS and RADAR

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Cassini remote-sensing instruments for more than 10 years now and in situ by the Huygens instruments back in 2005. For the surface, the presence of diverse terrains in terms of morphology and composition suggest both exogenic and endogenic processes to be at play. In this study, we investigate the surface and atmospheric contributions from the Visual and Infrared Mapping Spectrometer (VIMS) spectro-imaging data by use of a radiative transfer code in the near-IR range and the RADAR/SAR data for the distinction of geomorphological units. We focus here on those units identified in Lopes et al. (2010, 2015) [1; 2] and Malaska et al. (2015) [3]: mountains, plains, labyrinths, dune fields, and the areas previously suggested to have experienced change such as the possible cryovolcanic and evaporite features (Barnes et al. 2013; Solomonidou et al. 2014; 2015) [4; 5; 6]. With the use of a recently updated radiative transfer code, we evaluate the atmospheric contribution and extract the pure surface albedo information for each region of interest. The extracted albedo shapes and values are then tested against spectra of constituents that are considered to be the best Titan candidate materials, including a very recent library of Titan ice spectra [7]. We find that many of the units show compositional variations while units of significant geomorphological differences seem to consist of very similar materials, which help us provide implications on their endogenic or exogenic origin. Preliminary results on the chemical composition of the regions that have shown temporal changes are also presented.

References: [1] Lopes, R.M.C., et al.: *Icarus*, 205, 540-558, 2010; [2] Lopes, R.M.C., et al.: *Icarus*, in press; [3] Malaska, M., et al.: *Icarus*, submitted; [4] Barnes, J., et al.: *Planetary Science*, 2:1, 2013; [5] Solomonidou, A., et al.: *JGR*, 119, 1729-1747, 2014; [6] Solomonidou, A., et al.: *Icarus*, in press; [7] Schmitt, B., et al.: GhoSST database (ghosst.osug.fr).