

Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System (B)
Cassini Highlights at Saturn (B5.2)

TITAN'S MAJOR GEOMORPHOLOGICAL UNITS: THEIR SPECTRAL AND MORPHOLOGICAL NATURE

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We investigate the surface of Titan using spectro-imaging near-infrared data from the Visual and Infrared Mapping Spectrometer (VIMS). We use a radiative transfer code to determine the contributions of atmospheric haze to the spectrum and retrieve the surface albedo [1]. We focus on the major geological units identified in [2;3;4] from SAR data: mountains, plains, labyrinths, impact craters, dune fields, and alluvial fans. We find that all the different regions classified as being the same geomorphological unit in SAR show a similar spectral response after the VIMS data analysis, thus suggesting a good correlation in the classification between SAR and VIMS. Exceptions are the undifferentiated plains, which present two different types of spectral responses. In addition, by matching the extracted albedos with candidate materials for Titan's surface [5], we find that all regions of interest fall into one of three main compositional groups of major candidate constituents: water ice-like, tholin-like, or an unknown, very dark material. More specifically, we find that part of Titan's surface appears to be dominated by a tholin-like and/or a dark unknown (most likely organic) material, and that some fraction of the surface is covered by atmospheric/organic deposits. Material with a spectral response similar to water ice is also present at a number of regions as major constituent at latitudes higher than 30°N and 30°S. The surface albedo differences and similarities among the various geomorphological units constrain the implications for the geological processes that govern Titan's surface and interior (e.g. aeolian, cryovolcanic, tectonic). Our results show that Titan's surface composition has a significant latitudinal dependence [6]. [1] Solomonidou et al.: JGR, 119, 1729-1747, 2014; [2] Lopes et al.: Icarus, 205, 540-558, 2010; [3] Lopes, et al.: Icarus, 270, 162-182, 2016; [4] Malaska et al.: Icarus, 270, 130-161, 2016; [5] <http://ghosst.osug.fr>; [6] Solomonidou et al.: JGR-Planets, in press.