



Titan's northern lakes and terrains from SAR and high-resolution radiometry

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High resolution radiometry obtained along with the Synthetic Aperture Radar (SAR) imaging of the latest T16, T17, T18, T19, T21, T23 and T25 flybys covering Titan's Northern hemisphere at latitude above 75 degree has shown evidence of hydrocarbon lakes on Titan.

A radiometric characterization based on preliminary calibrated data of selected lakes (with surface $\geq 200\text{km}^2$) and adjacent terrains is presented here by mean correlation of normalized radar cross-section σ^0 vs brightness temperature T_b and prospective models.

Results show on average a 3-4 K brightness temperature increase in the lakes with respect to the surrounding terrains and seem somewhat consistent with a Kirchoff dielectric surface whose thermal emission properties are determined by Fresnel coefficients. These results seem to be consistent also with σ^0 incidence angle independency suggesting smooth surfaces of solid or liquid hydrocarbons ($\epsilon = 1.6-1.9$; methane-ethane) or plains of solid non-water-ice materials (solid organics and sludge with dielectric constant ~ 2.0). The terrains surrounding the lakes define a class more likely represented by a higher dielectric i.e. $\epsilon=3.1$ (water ice), in which more complex behaviour is observed with respect to σ^0 and brightness temperature variations.