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Using Titan's tholins and condensates produced in laboratory for interpreting Cassini-Huygens data.

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Titan, the largest satellite of Saturn, has been studied as an exo/astrobiological object for several years. Its dense atmosphere is made of nitrogen with a few percent of methane. Subjected to UV and energetic particle bombardments (incoming from solar radiations and Saturn's magnetosphere), hydrocarbons, nitriles (like HCN, a precursor of amino-acids) and organic aerosols are produced inside the atmosphere in significant amounts. These aerosols then accumulate on the surface. Currently, the aerosols composition and structure and their production are unknown, whereas they play a key role in the chemistry and energy balance of Titan's atmosphere.

The DISR and CIRS instruments onboard the Cassini-Huygens mission have returned and/or are returning spectroscopic data from Titan's atmosphere and surface. The analysis of these data requires the visible and infrared optical properties of 1) Titan's aerosols analogues such as the so-called "tholins" and 2) potential solid or liquid condensates composed with various molecules (HCN, CH_3CN,...). It also requires, especially for tholins, an accurate chemical and physical characterization in order to derive

spectral tracers, and to establish the relevancy of these analogues.

We have initiated a study which associates different analytical techniques including macroscopic and micro-FTIR, Raman micro-spectroscopy, Nuclear Magnetic Resonance and High Resolution Electron Microscopy. The first results of this study will be presented along with their use for interpreting spectroscopic data from the Cassini-Huygens mission.

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