Light scattering measurements with Titan's aerosols analogues produced by a dusty plasma

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The Titan's atmosphere contains solid aerosols produced by the photochemistry of nitrogen and methane. These aerosols are at the origin of the characteristic brown yellow colour of Titan. During the descent of the Huygens probe, the 14^{th} January 2005, optical measurements of the Titan's haze and Titan's surface have been done. In order to explain the obtained results, laboratory simulations are necessary. We produce analogues of the Titan's aerosols in a RF capacitively coupled low-pressure plasma in a N_2–CH_4 mixture representative of the Titan's atmosphere (Szopa et al., 2006; Szopa et al., this conference). The morphology of the produced solid aerosols is observed by SEM analyses. They are quasi spherical and their mean size is function of the plasma conditions. Moreover, their colour changes from yellow to brown as a function of CH_4 ratio in the plasma.

In order to have information on the optical properties of the produced aerosols, measurements have been performed with the PROGRA2 experiment (Renard et al., 2002). The PROGRA2 experiment measures the phase dependence of the linear polarization of the light scattered by dust particles for two wavelengths: 543.5 nm and 632.8 nm. The particles are lifted either in microgravity in the CNES/ESA dedicated airplane or by an air-draught in ground-based conditions. The aim of this work is to build a database for further modelling of the optical properties of Titan's in connection with the Huygens data. These particles have also an astrophysical interest as organic compounds (Hadamcik et al., 2005).

Results obtained with different samples will be presented. The chosen samples are of different colour and size. Differences in the phase curves characteristics are observed as a function of the CH_4 amount in the plasma and are correlated to the physical properties of the samples.

References

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