The chemical nature of Titan's organic aerosols; constraints from spectroscopic and mass spectrometric observations.

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Introduction

The Cassini-Huygens observations greately extend our knowledge about Titan's organic aerosols. The Cassini INMS and CAPS observations clearly demonstrate the formation of large organic molecules in the ionosphere. The VIMS and CIRS instruments have revealed spectral features of the haze covering the mid-IR and far-IR wavelengths. This study attempts to speculate the possible chemical nature of Titan's aerosols by comparing the currently availabe observations with our laboratory study.

Results and Conclusion

We have conducted a series of cold plasma experiment to investigate the mass spectrometric and spectroscopic properties of laboratory aerosol analogs [1, 2]. Titan tholins and C_2H_2 plasma polymer are generated with cold plasma irradiations of N_2/CH_4 and C_2H_2, respectively. Laser desorption mass spectrum of the C_2H_2 plasma polymer shows a reasonable match with the CAPS positive ion mass spectrum. Furthermore, spectroscopic features of the the C_2H_2 plasma polymer in mid-IR and far-IR wavelegths qualitatively show reasonable match with the VIMS and CIRS observations. These results support that the C_2H_2 plasma polymer is a good candidate material for Titan's aerosol particles at the altidues sampled by the observations.

[1] Imanaka et al. (2004) *Icarus* **168**, 344-366. [2] Imanaka et al. (2012) *Icarus* **218**, 247-261.

B-Sr-U isotope systematics and ^{14}C dating of groundwaters from southwestern France.

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The Eocene sands aquifer has been extensively studied for its hydrology, hydrogeochemistry, and also for stable isotopes and groundwater residence time using ^{14}C [1, 2]. Recently, in the framework of the CARISMEAU project, groundwaters have been in addition characterized for B, Li, Sr and U isotopes (Négrel et al., 2008).

The second step of the CARISMEAU research project is aimed at studying the restricted "Entre-Deux-Mers" area, where Eocene groundwaters displays high sulfate and fluorine contents that exceed the regulation limits for drinking water use. B and Sr isotopes have been measured in 18 water samples. The isotopic signal of these groundwaters emphasize the influence of carbonate and evaporitic sources, and also of clay lithologies in some samples, as indicated by B isotopes.

Uranium activity ratios are also available for 18 waters samples (which do not match those analyzed for B and Sr). U activity ratios are in any case higher than the equilibrium value, ranging from 2.9 to 8.6. Such high values confirm those previously measured in Eocene groundwaters during the first step of the project [4].

Finally, ^{14}C activity has been measured in 2009 on 30 groundwaters. The calculated residence times are compared when possible to ^{14}C dates obtained during the 90's on water samples recovered from the same sites. New dates are surprizingly much younger. In addition, a slight shift in $\delta^{13}C$ is observed between the 90's data and those obtained in 2009. The significance of these new ^{14}C data is discussed in the light of both groundwater sampling procedures and the impacted status of this aquifer due to overpumping.

[1] André (2002) *PhD thesis, University of Bordeaux III*, 320 p.
[2] André et al. (2005) *Journal of Hydrology*, **305**, 40-62.
[3] Négrel et al. (2008) *BRGM Report RP-56291-FR*, 193 p.
[4] Innocent and Négrel, *Applied Geochemistry*, submitted.