

International Master 2 Atmospheric Environment: Research Training 2021-2022

Laboratory: PhLAM

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Characterization of gas hydrates from the Black Sea

A 5-month internship is available in the ANATRAC group at the PhLAM laboratory (Physique des Lasers Atomes et Molécules), Univ. Lille (CNRS, UMR 8523), France. The Master's project will focus on the characterization of natural gas hydrates recovered from Black Sea by micro-Raman spectroscopy. The master's student will investigate the composition and physical properties of natural clathrate hydrates contained in sediments.

The study aims also to understand how certain dissolved sodium-based ions (chloride, sulphates and carbonates) influence the physico-chemical properties of gas hydrates in order to better understand their occurrence and evolution in the context of the Black Sea. The approach is also designed to integrate a multi-scale methodology that will combine the laboratory synthesis of natural gas hydrate analogues (NGH) from selected single electrolytes and macroscopic experiments. The latter will be carried out to study the kinetics of hydrate formation, while spectroscopic analyzes will probe the spatial variability (micro-scale) of the compositional structure / distribution. A better understanding of the mechanism of hydrate formation induced by seawater infiltration is expected, with implications for the assessment of the resilience of hydrate deposits distributed around the world to global changes.

The candidate should demonstrate clear motivation for experimental work.

Key words: Clathrate, Raman spectroscopy, high/low pressure cryogenic cell