

Lecture Series















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Use of stable isotope and molecular organic geochemistry in studying the biogeochemical cycles of coastal and marine deep environments

In coastal and marine deep environments, the association of stable isotopes and molecular organic geochemistry (e.g. lipid biomarkers) allows to explore various scientific questions, as for instance (i) what are the main biogeochemical processes mediated by microbial communities at the interface between the biosphere and geosphere? (ii) what are the sources of organic matter and its fate in the trophic chain? (iii) what are the different sources of organic pollutants and is there a natural biodegradation of these pollutants?

Among these different research axes, I will expose some examples of applications using this methodological approach. More detailed way; I will focus on the survey of the sources of organic matter in a complex semi-enclosed coastal system (Arcachon Bay, France). The obtained results, especially based on the development of new molecular indices, highlighted a spatial heterogeneity of the sedimentary organic matter composition associated with high proportions of phanerogam seagrasses and terrestrial inputs.

Following, I will present the study of the biogeochemical processes related to methane emissions in cold seep environments (Norwegian Sea and Marmara Sea). The high amount of microbial lipids associated with 13C-depleted signatures provided evidence for the involvement of bacterial and archaeal assemblages in the anaerobic oxidation of methane (AOM) in sediments, as well as in the formation of authigenic carbonates by way of this AOM process.

Evidently, the common approach of lipid biomarker distribution and stable isotope signatures applied in numerous ecosystems needs to be still developed more thoroughly in order to better assess the functioning of biogeochemical cycles in recent but also in ancient environments.

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Amphi A, IUEM



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