STABLE ISOTOPIC COMPOSITION (DELTA^{13}C AND DELTA^{15}N) OF PARTICULATE ORGANIC MATTER IN THE WESTERN GULF OF LIONS

A. Sanchez-Vidal [1] *, P. Kerhervé [1], C. Pascual [2], A. Calafat [2], S. Heussner [1], A. Palanques [3], P. Puig [3]
[1] CEFREM, UMR-CNRS 5110, Université de Perpignan, 52 av. P. Alduy, 66860 Perpignan - anna.sanchez@univ-perp.fr
[2] GRC Geociències Marines. Facultat de Geologia. Univ. Barcelona. 08028 Barcelona
[3] CMIMA-CSIC, Pg Marítim de la Barceloneta 37-49, 08003 Barcelona

Abstract
Two submarine canyons in the southwestern part of the Gulf of Lions (western Mediterranean Sea) are currently studied to understand their role in the cross-margin redistribution of organic material derived from primary production and terrestrial runoff. Carbon and nitrogen stable isotopic composition is determined on the organic fraction of settling particles collected by sediment traps deployed over one year and from marine sediments collected below the array of nine mooring lines. Simultaneously, suspended particles of local rivers are sampled on a monthly basis to trace the terrestrial source and follow its influence within the Gulf of Lions.
Keywords : Gulf Of Lions, Organic Matter.

Submarine canyons are key environments on continental margins, known as fast-track corridors for material transferred from the land to the deep sea, major pathways for transportation and burial of organic carbon in the oceans, and hotspots of biodiversity. Thus, canyons are complex systems in terms of their hydrography, sedimentology, biogeochemistry and biology. The better understanding of the biogeochemical drivers that control canyon ecosystems is one of the aims of the HERMES project (Hotspot Ecosystem Research on the Margins of European Seas), launched in April 2005 as part of the 6th European Research Framework Programme.
HERMES has concentrated much effort on the study of the Lacaze-Duthiers and Cap de Creus canyons in the southwestern part of the Gulf of Lions, which are considered as particularly active sediment conduits during present conditions [1]. Previous results obtained on this margin have also shown that sediment transport at the head of these canyons is mainly associated with easterly storms and shelf water cascading events during wintertime [2], which may enhance transfer of organic matter of terrestrial origin into the slope waters. Finally, spectacular communities of deep water corals have been recently found in several places of the Cap de Creus canyon head [3].
The biogeochemical drivers in these two canyons are being studied, focusing on the quality of bulk organic matter, which appears to determine the distribution of key fauna. To provide a general view of the role played by these canyons in the redistribution of carbon derived from primary production and terrestrial runoff, stable carbon and nitrogen isotopes (δ^{13}C and δ^{15}N) are used to examine the sources of organic material, the biogeochemical processes involved in its transformation, and the physical processes of material transport and mixing. Analysis were conducted in samples collected by sequential sediment traps (12 cups) placed in nine mooring lines deployed over one year, from October 2005 to October 2006 in two consecutive deployments. Moorings were placed along the axis of the Lacaze-Duthiers and Cap de Creus canyons at 300, 1000, 1500 m depth, in the confluence of both canyons at 1900 m depth, and on the adjacent southern slope at 1000 and 1900 m depth (Fig. 1). Traps were placed at 30 m above bottom, together with one current meter equipped with temperature, conductivity, pressure and turbidity sensors at 5 m above bottom. The mooring at 1000 m in Lacaze-Duthiers included one extra sediment trap-current meter pair at 500 m above the bottom.

In addition, particulate matter samples from local rivers and marine sediments are used to characterize the riverine input, asses the amount of riverine organic matter sequestered by the canyons and exported towards the abyssal plain and provide information about the fate of the off-shelf transported particles and their impact on the canyon and deep basin ecosystems.

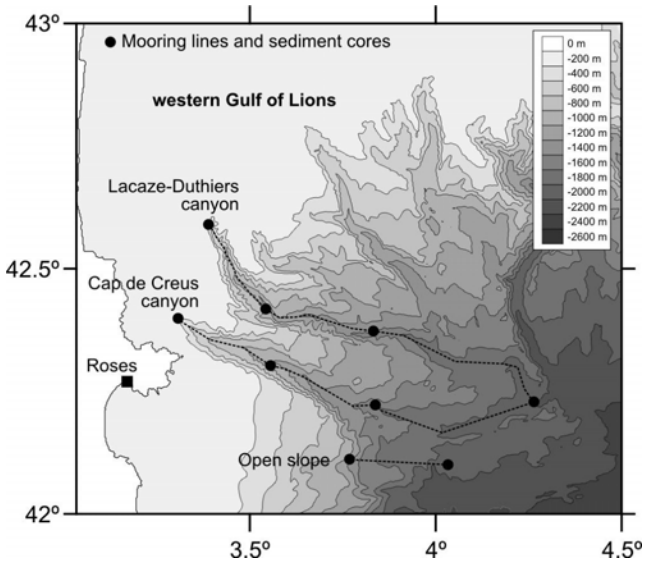

Fig. 1. Location of the nine mooring and sediment core stations in the southwestern region of the Gulf of Lions.

References

1 - Puig P., Palanques A., Guillén J., 2005. Sediment transport processes through the Cap de Creus submarine canyon. ASLO Summer Meet., 19-24 June 2005, Santiago de Compostela, Spain.
2 - Palanques A., Durrieu de Madron X., Puig P., Fabres J., Guillén J., Calafat A., Canals M., Heussner S., Bonnin J., 2006. Suspended sediment fluxes and transport processes in the Gulf of Lions submarine canyons. The role of storms and dense water cascading. *Mar. Geol.* (In press).
3 - ICM-CSIC HERMES team. New coral communities discovered in the Cap de Creus canyon. HERMES Newsletter December 2005.