



## The importance of seasonal and sporadic events in the organic matter export along the southwestern Gulf of Lion continental margin

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Submarine canyons are located along continental slopes and act as bypass zones connecting the shelf with the deep ocean. Most of the transfer of particulate material along canyons occurs as result of gravity-driven processes such as Dense Shelf Water Cascading (DSWC). This mechanism has been suggested as the main driver affecting the shelf-slope exchanges of particulate organic matter (OM) along Mediterranean margins. In order to investigate the off-shelf export of particulate material driven by DSWC, arrays of sediment traps were deployed in the Gulf of Lions (GoL, Western Mediterranean). Nine sediment traps were deployed along Lacaze-Duthiers and Cap de Creus submarine canyon axis and on the southern GoL open slope over 1 year (October 2005 – October 2006). Organic carbon, opal, calcium carbonate and biomarkers (pigments, lignins and amino acids) were analyzed to constrain the marine and terrestrial pools of organic matter.

The dense water overflowing off the continental shelf during winter 2006 (January-March) was the main particle flux forcing during our sampling period. The strong down-canyon currents during the DSWC event eroded and quickly transported material basinwards inducing significant increase of particle fluxes. Three major events of fresh, marine OM inputs were detected. The largest one was in spring, with smaller events also observed in December and August, suggesting that both spring blooms and sporadic blooms associated with wind-driven mixing affects carbon fluxes in this system. The DSWC event that partially overlapped the spring-bloom enhanced the overall down-canyon transfer of OM. Land-derived material was constantly advected with no significant along-canyon dilution. In contrast, amino acid and chloropigment indicate that more labile OM was degraded before reaching the canyons and within the canyons themselves, affecting the composition of organic matter in the most distal canyon locations and open slope. Our results illustrate the importance of both seasonal and sporadic pelagic and continental shelf/lateral events in controlling the exchange of OM across this margin.