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TITLE: Transfer of lipid molecules and polycyclic aromatic hydrocarbons to open marine waters by dense water cascading events

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ABSTRACT:

Settling particles were collected by a set of moored sediment traps deployed during one year in the western Gulf of Lion along Cap de Creus and Lacaze-Duthiers submarine canyons and on the adjacent southern open slope. These traps collected particles during periods of pelagic settling and also during events of deep water flushing by dense shelf water cascading (DSWC). Analyses of lipid biomarkers (n-alkanes, n-alkan-1-ols, sterols and C37-C38 alkenones) and polycyclic aromatic hydrocarbons (PAHs) showed much higher transfer of terrestrial lipids and PAHs to open deep waters during DSWC than in the absence of cascading. The area of highest lateral fluxes was mostly located at 1000 m depth but also at 1500 m depth and extended along the canyons and to the adjacent slope. Higher fluxes were observed near the bottom (30 m above bottom; mab) than at intermediate waters (500 mab) which is consistent with the formation and sinking of dense water over the continental shelf, and its transport through the canyons towards the continental slope and deep basin. DSWC involved the highest settling fluxes of terrestrial lipids and PAHs ever described in marine continental slopes and the pelagic domain, as illustrated by peak values of C23-C33 odd carbon numbered alkanes (405 ng m?2 d?1), C22-C32 even carbon numbered alkan-1-ols (850 ng m?2 d?1), ?-sitosterol+sitostanol (4800 ng m?2 d?1) and PAHs (55 µg m?2 d?1). The algal lipids also showed higher transfer to deep waters during DSWC but to a lower extent than the terrigenous compounds. However, the C37-C38 alkenones constituted an exception and their settling fluxes were not influenced by DSWC. The lack of influence of the DSWC on the C37-C38 alkenone settling is consistent with absence of haptophyte algal inputs from the continental shelf and reinforces the reliability of these molecules for palaeothermometry and palaeoproductivity measurements in pelagic systems.

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