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Relative contribution of autochtonous primary producers and continental inputs to the sediment organic matter composition in a coastal semi-enclosed ecosystem.

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Coastal ecosystems are situated at the interface between ocean and continent. As a consequence, profuse and renewed amounts of mineral matters from watersheds support the coastal high biological productivity. Moreover, the high level of primary production in coastal area goes with a higher diversity of primary producers in these areas. The diversity and high production of primary producers in coastal ecosystems and the potential contribution of continental inputs have consequences on the composition of particulate organic matter (POM) in these systems. The composition of POM may have strong influence on the ecosystem functioning especially on food webs because the different primary producers are not consumed in the same way as a function of their biochemical composition. The Arcachon bay, a 174-km^2 semi-enclosed coastal ecosystem situated in South Western France is good example of coastal ecosystem displaying a high variety of primary producers (phytoplankton, microphytobenthos, saltmarshes, extensive seagrass beds, epiphytes...). In such an environment, our study aimed at identifying the main primary producers contributing to the accumulation of organic matter in the top first centimetre of the sediment. Sediment organic matter was characterized in 31 stations (12 subtidal and 19 intertidal) in April 2009 using nitrogen and carbon stable isotopes and C/N ratios. Primary producers and continental sources were studied at the same period and characterized in the same way. Primary producers were well discriminated by isotope ratio. Indeed, terrestrial and marine material displayed significantly different isotopic signatures, as well as seagrasses and microalgae. No spatial pattern was identified regarding the most profuse primary producers. For the sediment organic matter (SOM), δ^{13}C was different between subtidal and intertidal sediments. Within the intertidal area SOM from the extensive *Zostera noltii* seagrass bed also displayed significantly higher δ^{13}C (+1‰) than SOM from bare sediments. The discrepancy between intertidal and subtidal δ^{13}C values of sediments could be due to a different composition and/or amount of the microphytobentos and/or to higher impact of freshwater Organic matter inputs on subtidal SOM. Higher values of δ^{13}C observed in intertidal seagrass beds could be linked to a more important amount of degraded leaves of *Z. noltii* in meadows than in bare intertidal sediments. Indeed, seagrass beds are known to enhance trapping of particles and to reduce resuspension. A significant difference was also observed between δ^{15}N of stations located near the watershed and stations from the inner bay. However, this discrepancy was very slight and didn't seem linked to influence of watershed itself. In terms of relative contributions, the SIAR procedure applied to our data, indicated that, in general, sediment organic matter in Arcachon bay would be composed by about 60% microalgae (both pelagic and benthic), 15% degraded *Z. noltii* leaves, 13% freshwater POM and 7% macroalgae (*Gracilaria spp*. and Ulvales). There were no or slight variations of relative contributions of primary producers depending on the kind of sediments.