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Elemental and stable isotope analysis in the assessment of fluvio-marine interactions over the last 5000 years

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The estuarine environment are one of the most sensitive areas in the climatic change framework and sea level rise scenarios as they are an interface between fluvial and marine influence and they support not only important wetland biodiversity but also strategic economic activities. These environments record marine sea level changes as well as hydrogeomorphological and land cover changes of the drainage basins, natural and man induced.
Over the last 5000 years different trends of sea level, climatic fluctuations, Bond events or humid episodes have been recorded in the Iberian Peninsula, as well as the increase of the human intervention in the landscape, particularly sensitive since the Middle Bronze Age, all imprinted in the filling up of the alluvial plain estuaries.
To assess the evolution of interface environments along the Portuguese coast, three mesotidal estuaries with alluvial plain and medium drainage basins in different geological and geomorphological frameworks were selected and the sedimentary organic matter characterized by geochemical methods, including elemental (C, N) and stable isotope analysis (δ13C, δ15N). Organic matter from marine environments is usually enriched in 13C, presenting δ13C values ranging from -20 to -24‰ while organic matter from terrestrial origin may present δ13C values between -25 and -28‰ being, therefore, depleted in 13C (Lamb et al. 2006). For C/N ratio, according to its value (normally increasing with terrestrial influence) and its relation with δ13C, the nature of organic matter present in the sediments can be inferred.
One of the estuaries was the Alcabrichel river estuary. A sedimentary core (AlcMac3) was collected and the preliminary results present a down-core variation of δ13C, ranging from -24.0 ‰ to -27.0 ‰Ṙegarding the C/N ratios the results range from 8.7 to 22.7.
According to this preliminary data concerning the evolution of these proxies along the sedimentary record it is possible to identify variations in the predominant sedimentary sources, the evolution of fluvial and marine influences, the responses to climatic events and the impact of land use changes in the different estuarine environmental conditions over the last 5000 years.

Keywords: Stable isotopes, C/N ratios, Environmental changes, Fluvio-marine interactions.

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