Elemental and stable isotope study of sedimentary organic matter in the continental shelf off the Guadiana River (SW Iberian Peninsula)

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Sedimentary organic matter (OM) preserved in coastal sediments can be characterized by geochemical methods, which include elemental (C, N) and stable isotope ($\delta^{13}C$) analysis. Organic matter from marine environments usually presents $\delta^{13}C$ values ranging from -20‰ to -24‰, while organic matter with terrestrial origin presents $\delta^{13}C$ values between -25‰ and -28‰. The coupling of C_{org}/N ratios, usually increasing with terrestrial influence, and $\delta^{13}C$ values of OM has been widely used to determine changes in sources of organic matter in tidal marsh sediments and coastal areas offering the opportunity to investigate local environmental events and global changes.

This study presents the elemental and stable isotope analysis of OM in Holocene sediment cores selected from campaign CRIDA0702 (namely cores 3 and 6), which were collected on the continental shelf of the Guadiana river.

Core 6, the first to be studied, has a length of 2.99 m and was collected in the Guadiana Muddy Patch at 40 m water depth. It presents a δ13C down-core variation ranging from -22.4 ‰ to -26.8 ‰, while the C_{org}/N ratios range from 13.2 to 9.4 allowing the establishment of three major down-core trends. The most significant variations can be found in the top of the core (first 45 cm) where $\delta^{13}C$ range from -24.2 ‰ to -26.8 ‰ and the C_{org}/N ratio from 13.2 to 10.1. The middle section (0.45 to 2.06 m) present higher $\delta^{13}C$ values (-22.5 to -23.9 ‰) and lower C_{org}/N ratios (10.9 to 9.4), while at higher depths (2.06 to 2.99 m) a lower trend of $\delta^{13}C$ values becomes dominant (-23.3 to -24.4 ‰) and higher C_{org}/N ratios (12.7 to 10.6) were attained.

Regarding the total organic carbon (TOC) and the total nitrogen (TN) contents, a higher and most variable TOC content is obtained in the top section of the core, while the other two sections present a lower and more uniform content. TN results show a similar trend for the three sections.

According to the obtained data and the evolution patterns of the used proxies along the sedimentary record it is possible to identify significant inputs of terrestrial sediments (fluvial discharges) in the top section. Data obtained for the middle section points

out to a stabilization phase of the environmental conditions in the region after the sea level rise associated with the beginning of the Holocene recorded at the bottom section. Radiocarbon dating of the sedimentary record establishes the chronological framework where to place these events and changes.

Keywords: Sedimentary organic matter, $\delta^{13}C$, C_{org}/N ratios, Environmental changes, Guadiana river, Holocene.

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