

Impact of organic matter source and quality on living benthic foraminiferal distribution on a river-dominated continental margin: A study of the Portuguese Margin.

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Living (rose Bengal stained) benthic foraminifera were investigated on surface sediments from 23 stations from the river-dominated north-western Portuguese margin. Samples were collected in March 2011, following the period of the maximum rainfall over the Iberian Peninsula, between 20 and 2000 m water depth along five cross-margin transects. Four of them are located off the Douro, Mondego, Tagus and Sado rivers and one off the Estremadura coast. The major objectives of this study are hence 1) to compare the influence of the rivers on the distribution of benthic foraminifera and 2) assess the impact of organic matter of various origin and quality on the benthic micro faunas. To do this, sedimentological and biogeochemical characteristics of the sediments were identified by measuring grain size, oxygen penetration depth (OPD), total organic carbon (TOC) content, stable carbon isotopic composition of TOC ($\delta^{13}\text{CTOC}$) and concentration of pigments and amino acids. Based on the principal component (PCA) and cluster analyses of the environmental data, three major geographical groups are identified: (1) deep stations, (2) coastal and mid-slopestations, and (3) shelf stations under river influence. At the deepest stations, species are associated with high organic matter (OM) quantity but low OM quality, where *Uvigerina mediterranea*, *Hoeglundina elegans* and agglutinated species such as *Reophax scorpiurus* or *Bigenerina nodosaria* are dominant. All stations off the Sado River, which is the most affected area by the anthropogenic influence, are also characterized by high quantity but low quality of OM with the minimum faunal density and diversity within the study area. Mid-slope stations are associated with low OM content and coarse sediments (Q50) with the predominance of *N. scaphum*. Shallow shelf stations close to the Douro and Tagus river mouths show a dominance of taxa (e.g. *Ammonia beccarii*, *Bulimina aculeata*, *Eggerelloides scaber*, *Nonion scaphum*, *Cancris auriculus* and *Quinqueloculina seminula*) adapted to environments characterized by high OM quality (high fresh chlorophyll (Chl-a/Phaeo) and available amino acids (EHAA/THAA)). The benthic foraminiferal distribution is mostly controlled by three environmental parameters, i.e. TOC (quantity), EHAA/THAA (quality), and $\delta^{13}\text{CTOC}$ (source). Hence, this study clearly highlights that the quantitative and qualitative inputs of OM and its source are the most important factors controlling the living benthic foraminiferal distribution with clear differences between the different rivers influence. This study also suggests a good tolerance of several species for river discharges where the OM quality.