

Sedimentary processes on the NW Iberian continental shelf since the late Little Ice Age

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The OMEX core CD110 W90, retrieved from the Douro Muddy Patch (DMP) off the River Douro in the north of Portugal, records the last ≈ 150 years, i.e. the period since the late Little Ice Age (LIA). The core chronology is mainly based upon ^{210}Pb and ^{137}Cs activities. Geochemical, granulometric and microfaunal (benthic foraminifera) data suggest the occurrence of precipitation changes which may have been, at least partially, influenced by the North Atlantic Oscillation (NAO).

Southwesterly Atlantic storm track is associated with the negative phases of the NAO, when 1/ the Azores High is anomalously weak 2/ strong oceanographic hydrodynamism and downwelling events occur and 2/ rainfall is high. Prevalence of these characteristics in the late LIA is recorded in this core between AD ≈ 1870 -1900. During this period the DMP received a higher contribution of relatively coarse-grained terrigenous sediments, enriched in quartz particles which diluted the contribution of other minerals, as indicated by reduced concen-

trations of several lithogenic chemical elements such as: Al, As, Ba, Ce, Co, Cu, Fe, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Rb, Sc, Sn, Th, V and Y. The presence of biogenic carbonate particles also underwent dilution, as revealed by the smaller abundance of foraminifera and correlative lower concentrations of Ca and Sr. In the same period, the DMP received a significant contribution of organic matter, indicated by higher values of both lignin remains and benthic foraminifera high productivity index (BFHP), which triggered early diagenetic changes with pyrite formation. Since the beginning of the 20th century this contribution decreased, probably due to several drier periods and the impact of human activities in the Douro basin and in the littoral areas.

During the first half of the 20th century positive phases of the NAO prevailed, caused by the above normal strengthening of the subtropical high pressure centre of the Azores and the deepening of the low pressure centre in Iceland. These phases may

have contributed to the reduction in the supply of both terrigenous sediments and organic matter to the DMP. During the positive phases of the NAO, sedimentation became finer. The contribution of quartz particles decreased, which resulted in a greater expression of other minerals, as suggested by the geochemical composition of the sediments.

The development of mining and industrial activities during the 20th century is marked, in this core,

by higher concentrations of Pb. Furthermore, the erosion of heaps resulting from wolframite exploitation leaves its signature as a peak of W concentrations recorded in the sediments of the DMP deposited between the 1960s and the 1990s. Mining of wolframite ore deposits was a very important activity in north-central Portugal in the mid 20th century, particularly during the Second World War and the Korean War.

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