

Sedimentary climatic record in the Galician Internal Basin: sediment provenance, transport time and hydrodynamics over the last 60.000 years.

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The sediments of the Galician Interior Basin are influenced by the Atlantic Meridional Overturning Circulation (AMOC) and by their proximity to the Western Iberia continental landmass, and thus provide an adequate archive to study the peculiarities of the last glacial-interglacial dynamics and the transition into present day conditions.

The aim of this study has been to analyse the sedimentary expression of climatic processes and forcings derived from the relation between the last North Atlantic glacial cycle and the local regional components -including abrupt climate changes and local events- since the end of the last glacial period in this area. We have attempted to establish the rates and magnitudes of change of this system to understand its climate dynamics, processes and feedbacks, and hence its role on a local to sub-regional scale from a palaeoclimatic proxies perspective. The inference of these climatic mechanisms encrypted in the deep-sea sedimentary record needs to constrain the spatial and temporal scales of the sedimentary processes involved, in particular the identification of source areas, pathways and transport, storage times and hydrodynamic conditions. In order to achieve these goals we have used a twofold approach; an initial effort to constrain the current sedimentary conditions to their associated local hydrography conditions by means of a mooring, which will be used to later infer the palaeoenvironmental conditions from sediment cores.

The location of the mooring and the 5 coring locations has been based on the acquisition of new geophysical data: a precise 20 x 20 m bathymetry covering an area of 9860 km² and 690 km of high-resolution seismic profiles distributed in 10 transects that allow to investigate the main sedimentary units in the region. The mooring comprised 2 sediment traps located at 500 and 1400 m below the sea surface. These depths are under the influence of the Eastern North Atlantic Central Water (ENACW) and Mediterranean Water (MW). The sediment traps also target sediments from the shelf and the upper slope. Sediments were collected monthly for a 9 month period, whilst hydrographic conditions such as current speed, salinity, oxygen and turbidity were continuously recorded in associated instruments at the same depths.

Finally, a multidisciplinary study combining resolution scans, including geochemistry (ITRAX), physical properties (GEOTEK) and enviromagnetic properties (2G cryogenic magnetometer), has been constrained using a very robust geochronology framework.

Further analyses comprised grain size distributions, SS, SEM, XRD, stable and high-precision radioactive isotopes.

The area consists mostly of generally autochthonous hemipelagic and terrigenous muds and sandy to silty muds with high clay content, showing abundant bioturbation and early diagenesis. Allochthonous material of different provenances (characterized by ¹⁴³Nd/¹⁴⁴Nd and ⁸⁷Sr/⁸⁶Sr isotopic ratios) occurs interbedded within the hemipelagic sediments associated to Heinrich Stadials HS1 to HS6. The sediments also show significant changes in the vigour of bottom-currents (based on the SS proxy) both within and between the HS. The combination of these sedimentological, geochemical and geophysical data has provided a new insight into the role of current strength, circulation and sediment provenance changes in the area, and allowed to establish across vs. along margin transport balances in the sedimentary record of the Galician Internal basin over the last 60 Ky.

Keywords: Galician Internal Basin, Last glaciation, Heinrich Events, Sr Isotope Ratios, Nd Isotope Ratios, Sortable Silt, Sediment sources

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