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DO MAR
PHD PROGRAM IN MARINE SCIENCE, TECHNOLOGY AND MANAGEMENT

PhD project: **Late quaternary paleoclimate in the Eastern North Atlantic: a multiproxy approach**

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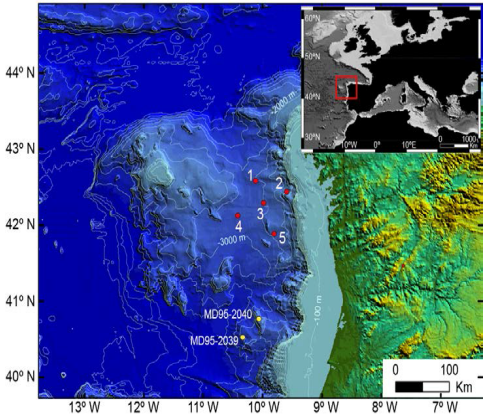
Foto doctoranda




Summary: The study of past circum-Atlantic ice sheet motions and instabilities and the reconstruction of related changes in the strength of the North Atlantic deep bottom-currents are fundamental to understand the effects of past climate changes, and subsequently to predict the effect of future changes. An important part of the research efforts produced in this regard has focused on the Laurentide ice-sheet (LIS), leaving the potential role of the European Ice Sheet (EIS) relatively unexplored. Similarly, the millennial changes in the bottom currents strength, their possible relationship to the Atlantic Meridional Overturning Circulation (AMOC) variations and the deep and intermediate water masses re-accommodations remains also very weakly constrained.

The main objective of this thesis is to study the interrelated dynamics of the Northern Hemisphere ice sheets and their coupling with the Thermohaline circulation, AMOC and climate, focusing on the period of the last ~135 ka, during which the North Hemisphere climate and the ice-sheets extensions fluctuated rapidly.

The thesis also presents the southernmost evidence of meltwater pre-events from the EIS during the initial stages of HS1, HS2, and HS4, and IRD from the LIS and EIS during the final stages of these stadials, and throughout HS3, HS5 and HS6. The relevance of these findings resides in the potential for large freshwater discharges like these to act as an additional forcing mechanism for AMOC weakening; and subsequently, for ice sheets collapses, prolonging the Heinrich Stadials. The results also show the intensification of bottom current velocities during HS3, HS5, HS6, the Last Glacial Maximum, and through the final stages of the HS1, HS2 and HS4. The observed current accelerations in the area coincided with throttling of the North Atlantic Water mass (NADW) in other areas of the North Atlantic during these cold intervals. This feature has been attributed to the irruption in the GIB of a more vigorous current resulting from the hydrographic reorganisation during HSs and LGM, very likely the Mediterranean Outflow Water (MOW). This supports the hypothesis of MOW's salt injection into the intermediate North Atlantic waters preconditioning the MOC to switch from the stadial to the interstadial mode.