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Extreme Glacial conditions in the Iberian Margin during MIS 12 and MIS14

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Suborbital-scale climate variability in the Iberian margin is now proven to have occurred as far back in time as the 6th Pleistocene climate cycle. Previous studies demonstrated that the Iberian margin is a crucial area for the comprehensive evaluation of climate variability in both hemispheres. The spliced SST-$U^{k'}_{37}$ profile of cores MD01-2443[*Martrat, et al.*, 2007] and MD03-2699 [*Rodrigues et al.*, 2011] confirms that each climatic cycle during the last 580 ka was not an exact reproduction of the other because forcing factors like orbital parameters, atmospheric greenhouse gas concentrations or ice-sheet dynamics changed. In this study we will focus in a detailed description of the two extreme galacial periods the coldest MIS12 and the coll MIS 14.

The MD03-2699 deep-sea core was recovered from the western Iberian margin (39º02.20'N, 10°39.63'W; Estremadura spur) at about 100 km offshore and 1895 m water depth. This region is at present dominated by the surface Portugal Current System (PCS), the eastern recirculation of the North Atlantic's subtropical gyre (Fiúza 1983, Peliz et al. 2005). Alkenones were used to reconstruct past SST ($U^{k'}_{37}$ index) and the possible advection episodes of subpolar water masses which were reflected in the relative proportion of the tetra-unsaturated alkenone ($C_{37:4}$) to total C_{37} alkenone concentration. High $C_{37:4}$ percentages were indicative of cold surface waters which occurred in conjunction with

increased meltwater input and thus reduction in surface water salinity.

The composed Iberian margin SST record reveals that coldest SSTs were recorded during MIS 12 in association with the maximum ice volume and a weak insolation forcing. The weak eccentricity-precession forcing during this period suggest that the ice volume was driven by the obliquity orbital forcing.

This composed record also shows that the pattern of the last deglaciation (two cold phases coincided with Heinrich event 1 and Younger Dryas separated by a warming episode, the Bølling-Allerød) was also reproduced during the deglaciation of MIS 12. The abrupt climatic shifts of those deglaciatons were likely the result of changes in the position of the Polar Front and could be traced back at least to Termination V. These results that the deglacial pattern changed after the Mid-Brunhes event in association with variations in the climate forcing.

Glacial MIS 14 was warmer (14°C) than any of the later glacials which is in agreement with what has been recorded in other regions such as in the North Atlantic Ocean, the subtropical North Atlantic, off northwest Africa, the southeast Atlantic Ocean and the eastern equatorial Pacific. Different circulation pattern were probably in place during this glacial period in which the subtropical waters of the Azores current had a substantial influence on the Iberian margin. However the maximum orbital obliquity signal could intensify the insolation forcing during this period.