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Past climate variability in the Iberian Margin during Marine Isotope Stages 15-9 (570 to 300 ka): Suborbital glacial variability and interglacial stability

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Surface water conditions recorded in Calypso-core MD03-2699 from the Estremadura Spur north off Lisbon provide insights into orbital and suborbital-scale climate change between Marine Isotope Stage (MIS) 15 and 9 (570 to 300 ka). We use biomarker based proxy records such as the alkenone unsaturated index to estimate sea surface temperature (SST), the total alkenone concentration to reconstruct phytoplankton productivity and terrestrial biomarkers to evaluate the continental input. Our results extend the existing biomarker records in the Iberian Margin back in time to the 6th climatic 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-Uk'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 were never exactly identical. A general trend of stable interglacials contrasts with glacial periods and glacial inceptions which are marked by high-frequency variability. Superimpose to the orbital variability several short-lived climatic coolings were identified by large SST decreases, the occurrence of ice-rafted detritus (IRD) and high percentages of the tetra-unsaturated alkenone C37:4. Some of these events were extremely cold and similar in their general trends to the well known Heinrich events of the last glaciation. We identified 8 Heinrich-type events between 580 and 300 ka. The general deglaciation pattern detected between MIS 15 and MIS 9 is similar in their general trends to that characterizing the more recent climatic cycles, i.e. marked by two coolings separated by a short warming episode which may reflect the southward, north- and southward migration of the Polar front.