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The role of obliquity forcing on the interglacial climate instabilities in the mid-latitudes of the North Atlantic

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Anthropogenic CO₂ release into the atmosphere leads to temperature projections for 2100 only experienced on Earth since many million years. However, those periods are poorly known due to low temporal and spatial data and ill-defined climate forcings. However past warm periods (interglacials), occurring during the Quaternary, under variable boundary conditions (e.g. greenhouse gases concentration, sea level and ice sheets size, insolation and orbital forcing), can provide invaluable information on the dynamics and processes behind natural warm climates. Here we present records for the sea surface temperature based in Uk'37-SST at orbital and millennial-scale over the last 1.25 Ma, with special focus on the past interglacials of two SW Iberian margin sedimentary sequences recovered during IODP Expedition 339, Sites U1385 (37°34.285'N, 10°7.562'W; 2589m) and U1391 (37°21.5322'N, 9°24.6558'W; 991m). We also performed a data-model comparison to explore the dynamics related with the role of obliquity on the Atlantic Meridional Overturning Circulation (AMOC) changes. Our data show that Interglacials are characterized by an interval of maximum warmth followed by a temperature decline punctuated by millennial-scale SST oscillations. In most cases the first stadial marks the beginning of a glacial inception that is characterized by an abrupt SST decrease, followed by high frequency SST oscillations, and large amounts of freshwater input. This suggests a climatic change from interglacial to glacial conditions linked to the start of ice sheets growth (enrichment of δ18O) and the AMOC slowdown resulting in an enhanced cooling of the mid-latitudes.