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Exploiting multi-proxy analysis of marine sediments in the southeast Atlantic: Intensification of Agulhas leakage tied to the start of the 100ka cycles.

Benjamin Petrick (1), Erin McClymont (2), and Fabienne Marret (3)

(1) Department of Geography, Newcastle University, Newcastle upon Tyne, U.K. (benjamin.petrick@ncl.ac.uk), (2) Department of Geography, Durham University, Durham, U.K. (erin.mcclymont@durham.ac.uk), (3) School of Environmental Sciences, University of Liverpool, Liverpool, U.K. (f.marret@ liverpool.ac.uk)

The transition in orbital forcing from a 41 ka world to a 100 ka world was a major change in the climate regime over the last 1.5 Ma but its causes and its impacts are still being investigated. Here, we present reconstructions of sea-surface temperature (SST), salinity, and plankton assemblages obtained from a single core, ODP site 1087 (31º28'S, 15º19'E, 1374m water depth) spanning the last 1.5 Ma. Our hypothesis is that the response and position of the Agulhas leakage, which transfers heat and salt to the SE Atlantic region, has shifted as a result of changes in the dominant periodicity of orbital forcing. We draw on evidence from the alkenone (U^{K}_{37}') proxy for SST, dinoflagllate species analysis, and foraminifera oxygen isotopes for salinity and ice volume, to identify changes in the input of the Agulhas leakage to the SE Atlantic. We present the first continuous record of SE Atlantic SSTs reaching to 1.5 Ma which spans both the 41 kyr and 100 kyr glacial cycles. We identify large changes in SST and salinity on glacial-interglacial timescales, but show that there is a consistent pattern of SSTs leading salinity and then global ice volume change, so that deglaciation occurs some 5-10 kyr after the onset of rapid warming in the SE Atlantic during the recent glacials and interglacials. This early warming pattern, which characterizes the most recent cycles, began to develop as early at 900 ka, as the 100 kyr cycles became dominant. Before this time there is little evidence of Agulhas leakage in the ODP1087 record. We also show that over the last 600 ka there has been a strengthening of the Agulhas Leakage which has led to warmer interglacials over this time period. Overall the record shows that the strength and location of the Agulhas leakage is sensitive to changes in the dominant cycles in the climate.