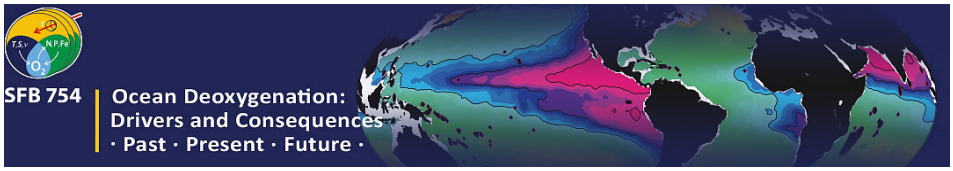

Contribution ID : **130** Type : **Poster**

Changes in North Atlantic deep-water oxygenation across the Mid-Pleistocene Transition

Deconvolution of the benthic δ18O signal at Site 1123 into its temperature and seawater components suggests an abrupt increase in glacial ice volume occurred at 900 ka (MIS 24-22) during the MPT. At the same time, neodymium and carbon isotopic evidence suggests a major change occurred in deep-water circulation. Benthic δ13C values are among the lowest at many sites during MIS 22-24, suggesting increased storage of carbon in the deep sea and lower values of glacial pCO2. Remineralisation of carbon should have also affected Apparent Oxygen Utilization (AOU) of deep-water.

Here we reconstruct nutrient regeneration and AOU across the MPT using a stoichiometric proxy for palaeooxygen (McCorkle and Emerson, 1988) based on the carbon isotope gradient between epifaunal *Cibicidoides wuellerstorfi* and infaunal *Globobulimina affinis* (Δδ13Cepi-infaunal), which has been recently calibrated by Hoogakker et al. (2015). We apply the method to Site U1385 ("Shackleton site") and extend the Iberian Margin record back to ~1.44 Ma. The first sharp decreases in the Δδ13C gradient, indicating times of reduced oxygenation, are observed immediately prior to Terminations 26/25 (~960 ka), 24/23 (~915 ka) and low Δδ13Cepi-infaunal persisted throughout much of MIS 22 (~890-864 ka). The Δδ13Cepi-infaunal values are less than those observed during some Heinrich events of the last glacial period (Hoogakker et al., 2015).

We estimate that oxygen concentrations were nearly two thirds lower than today during maximum glaciations of MIS 26, 24 and 22, which equates to more than double pre-industrial AOU. These low-oxygen conditions may have contributed to increased extinction rates of benthic foraminifera observed in the Middle Pleistocene (Kender et al., 2016).

References:

Hoogakker, B. A. A., Elderfield, H., Schmiedl, G., McCave, I. N. and Rickaby, R. E. M. (2015) 'Glacial–interglacial changes in bottom-water oxygen content on the Portuguese margin', Nature Geoscience, 8(1), pp. 40–43. doi: 10.1038/ngeo2317.

Kender, S., McClymont, E. L., Elmore, A. C., Emanuele, D., Leng, M. J. and Elderfield, H. (2016) 'Mid Pleistocene foraminiferal mass extinction coupled with phytoplankton evolution', Nature Communications. Nature Publishing Group, 7(May), pp. 1–8. doi: 10.1038/ncomms11970.

McCorkle, D. C. and Emerson, S. R. (1988) 'The relationship between pore water carbon isotopic composition and bottom water oxygen concentration', Geochim. Cosmochim. Acta, 52(5), pp. 1169–1178. Available at: http://www.sciencedirect.com/science/article/pii/0016703788902700.

Position

PhD Candidate

Affiliation

Godwin Laboratory for Palaeoclimate Research, Department of Earth Sciences, University of Cambridge, Cambridge, CB2 3EQ

Email Address

nct30@cam.ac.uk

Are you a SFB 754 / Future Ocean member?

No

Primary author(s) : Ms THOMAS, Nicola (Godwin Laboratory for Palaeoclimate Research, University of Cambridge)

Co-author(s) : Prof. HODELL, David (Godwin Laboratory for Palaeoclimate Research, University of Cambridge)

Presenter(s) : Ms THOMAS, Nicola (Godwin Laboratory for Palaeoclimate Research, University of Cambridge)

Track Classification : 09 Ocean Deoxygenation - How the Past can Inform the Future