Geophysical Research Abstracts
Vol. 20, EGU2018-165, 2018
EGU General Assembly 2018

Northern origin of western tropical Atlantic deep waters during Heinrich Stadials

Natalia Vazquez Riveiros (1), Claire Waelbroeck (1), Didier Roche (1,2), Santiago Moreira (1), Pierre Burckel (3), Fabien Dewilde (1), Luke Skinner (4), Helge Arz (5), Evelyn Boehm (1), and Trond Dokken (6)

(1) LSCE - CNRS, Laboratoire des Sciences du Climat et de l'Environnement, Gif-sur-Yvette, France (natalia.vazquez@lsce.ipsl.fr), (2) Vrije Universiteit Amsterdam, Faculty of Sciences, Cluster Earth and Climate, de Boelelaan 1085, 1081HV Amsterdam, The Netherlands, (3) Institut de Physique du Globe de Paris, Université Sorbonne Paris Cité, 75238, Paris, France, (4) Godwin Laboratory for Palaeoclimate Research, Department of Earth Sciences, University of Cambridge, Cambridge, CB2 3EQ, UK, (5) Leibniz-Institute for Baltic Sea Research, Seestrasse 15, D-18119, Rostock, Germany, (6) Uni Research Climate and Bjerknes Centre for Climate Research, Nygårdsgaten 112, 5008, Bergen, Norway

During Heinrich Stadial 1 (HS1), δ13C decreased throughout most of the upper North Atlantic between $\sim$ 1000 – 2500 m, and in some deeper South Atlantic sites. Most studies explain the δ13C decrease as a response to a weakening of the Atlantic circulation, but the origin and pathway of this poorly-ventilated water mass is still debated. The behavior of intermediate and deep waters during previous Heinrich Stadials is even less well constrained. Here, high-resolution records of the last 45 ka from marine sediment cores off the Brazilian margin are compared with freshwater forcing simulations of the Earth System Model of intermediate complexity iLOVECLIM, using δ18O as a water mass tracer. Our data reveal a low-δ13C water mass at 2300 m during the last four HS. HS1 and HS4 are also marked by decreases in benthic foraminifer δ18O too large to be due to sea level changes alone, suggesting the incursion of warmer and/or fresher waters between 2300 - 3600 m. Model simulations indicate the presence of a southward-flowing, low-δ18O water mass spreading from the North Atlantic to the tropics, likely transported by the Western Boundary Current. Our results thus suggest that the minimum in ventilation in the Tropics during HS is of northern origin, rather than being related to an expansion of southern waters to shallower depths.