Geophysical Research Abstracts
Vol. 16, EGU2014-1160, 2014
EGU General Assembly 2014

The interest of combining micropaleontological and geochemical data for understanding the climate system: the example of the last interglacial-glacial transition

Maria Fernanda Sanchez Goñi (1), Edouard Bard (2), Amaelle Landais (3), and Linda Rossignol (4)

(1) Ecole Pratique des Hautes Etudes, EPHE, UMR-CNRS 5805 EPOC, Talence, France (mf.sanchezgoni@epoc.u-bordeaux1.fr), (2) Aix Marseille Université, CNRS, IRD, Collège de France, UM CEREGE, Technopole de l'Arbois, BP80, 13545 Aix-en-Provence Cedex 04, France (bard@cerege.fr), (3) IPSL / Laboratoire des Sciences du Climat et de l'Environnement IPSL CEA CNRS UMR 1572, Bât. 712 / Orme des merisiers 91191 Gif-sur-Yvette cedex, France (amaelle.landais@lsce.ipsl.fr), (4) Université Bordeaux 1, UMR-CNRS 5805 EPOC, Avenue des Facultés, 33405 Talence, France (l.rossignol@epoc.u-bordeaux1.fr)

Theoretical and numerical models predict that rapid ice sheet growth in the North Atlantic high latitudes was the consequence of a) a decrease in summer insolation, b) a strong thermal gradient between ocean and landmasses, and c) moisture generated by persisting warmth and salinity in the subpolar and northern subtropical Atlantic. So far, however, no data have demonstrated the strong land-sea thermal gradient, and how this process was affected by the sub-orbital climatic variability. To fine tune our understanding of this process we examined the MIS 5a/4 transition, between ~80 and 70 thousand years before present (ka), a period marked by decrease in summer insolation and a succession of cooling events, C20 to C19, affecting large parts of the subpolar and central North Atlantic, and Greenland (GS21 to 19). We combined high resolution pollen-based vegetation and foraminifera-based sea surface temperature (SST) data for the interval 85-50 ka, MIS5a-MIS3, from core MD04-2845 located in the Bay of Biscay (northern subtropical gyre, 45°21'N, 5°13'W, 4100 m water depth) with Ice Rafted Debris (IRD), N. pachyderma (s) and benthic foraminifera δ18O records from the same core. This approach allows the identification, without chronological ambiguity, of offsets between eastern North Atlantic Ocean surface hydrology (temperatures and iceberg melting) and atmospherically-driven changes in western European vegetation. The Bay of Biscay palaeoclimatic records were compared with foraminifera and Uk'37-based SST and pollen-based vegetation records from another core, MD99-2331, located in the northwestern Iberian margin. Data from these two cores located in the northern subtropical gyre reveal for the first time a decoupling between atmospheric and oceanic responses to orbital and sub-orbital climatic variability during the last interglacial-glacial transition. We have identified a long-term increase in the thermal gradient (cold land-warm sea) along the western European margin punctuated by three phases of highly pronounced land-sea thermal gradients. We argue that this composite trend was responsible for the production of moisture that continued to feed, via northward tracking storms, northern European, Greenland and Arctic ice sheets during the C20, onset C19 and C18' cold events.