Geophysical Research Abstracts
Vol. 20, EGU2018-19826, 2018
EGU General Assembly 2018

Orbital parameters controlling the western Iberian vegetation and climate during the Middle Pleistocene Transition: evidence from the extreme interglacial MIS 31

Dulce Oliveira (2,3), Stéphanie Desprat (2), Filipa Naughton (3,4), Josue M. Polanco-Martínez (2,5), Francisco J. Jimenez-Espejo (7), Joan O. Grimalt (7), Belen Martrat (7), Antje H.L. Voelker (3,4), Ricardo Trigo (8), David Hodell (9), Fátima Abrantes (3,4), and Maria Fernanda Sánchez Goñi1 (2)

(2) Univ. Bordeaux, EPOC, UMR 5805, F-33615 PESSAC, FRANCE , (3) Divisão de Geologia e Georecursos Marinhos, Instituto Português do Mar e da Atmosfera (IPMA), Avenida de Brasília 6, 1449-006 LISBOA, PORTUGAL, (4) CCMAR, Centro de Ciências do Mar, Universidade do Algarve, Campus de Gambelas, 8005-139 FARO, PORTUGAL, (5) Basque Centre for Climate Change – BC3, Edificio Sede No. 1, 1a, Parque Científico de la UPV/EHU, 48940 LEIOA, SPAIN, (6) Japan Agency for Marine-Earth Science and Technology, 2-15 Natsushima, 237-0061 YOKOSUKA, JAPAN, (7) Department of Environmental Chemistry, Institute of Environmental Assessment and Water Research (IDAEA), Spanish Council for Scientific Research (CSIC), 08034 BARCELONA, SPAIN, (8) Instituto Dom Luiz, Universidade de Lisboa, 1749-016 LISBOA, PORTUGAL, (9) Godwin Laboratory for Palaeoclimate Research, University of Cambridge, CAMBRIDGE, UK

The study of past interglacials, periods of reduced ice volume like our present interglacial, the Holocene, is crucial for understanding the future climate. The so-called “super interglacial” MIS 31 (1.082-1.062 ka) is a period of primary interest in this regard as it is considered among the best analogues for the current and projected global warming. However, key questions remain about the regional signature of its extreme orbital forcing and intra-interglacial variability. Based on a new direct land-sea comparison in SW Iberian margin IODP Site U1385 we examine the climatic variability between 1100 and 1050 ka including the “super interglacial” MIS 31, a period dominated by the 41-ky obliquity periodicity. Pollen and biomarker analyses at centennial-scale-resolution provide new insights into the regional vegetation, precipitation regime and atmospheric and oceanic temperature variability on orbital and suborbital timescales.

The MIS 31 extreme insolation (precession) forcing was favorable for an anomalously warm interglacial characterized by enhanced seasonality in the SW Iberia region. However, our study shows that, unlike other locations at higher latitudes, atmospheric and sea-surface temperatures were not exceptionally high in the context of other middle- to late Pleistocene interglacials. Moreover, the Site U1385 pollen-based vegetation record reveals for the first time an unexpected temperate and humid climate regime marked by low abundance of Mediterranean sclerophylls and the development of diverse summer drought-intolerant trees. This muted seasonality during MIS 31 is consistent with analysis of vegetation dynamics and cross-correlation coefficients showing a dominant influence of obliquity on the forest development rather than precession. Prevailing obliquity-driven vegetation and climatic changes, in agreement with modeling experiments, are likely associated to a decrease in the seasonal distribution of rainfall in SW Iberia resulting from higher summer precipitation associated to obliquity maxima rather than to precession minima.