NORTH ATLANTIC CLIMATE IMPACTS ON MEDITERRANEAN VEGETATION DURING THE HOLOCENE: A KEY COMPONENT OF LANDSCAPE STABILITY?

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High-resolution pollen analyses from a western Mediterranean marine core (MD95-2043) reveal vegetation response to climate change in a region that is highly sensitive to North Atlantic climate variability related to the latitudinal position of the westerly storm tracks, and where modern precipitation patterns reflect predominant westerly Atlantic moisture sources.

Key words: North Atlantic climate, Mediterranean vegetation, pollen.

In order to understand natural variability in vegetation cover, landscape stability and climate at a range of timescales, high-resolution palaeoclimatic and palaeoenvironmental data series are required. High-resolution pollen analyses from a western Mediterranean marine core (MD95-2043) reveal vegetation response to climate change in a region that is highly sensitive to North Atlantic climate variability related to the latitudinal position of the westerly storm tracks, and where modern precipitation patterns reflect predominant westerly Atlantic moisture sources. Pollen spectra reflect an integrated regional image of vegetation in the neighbouring continental areas of the southern Iberian Peninsula and North Africa. Principal components analysis (PCA) is used to identify the major gradients in the pollen data. The first principal component (PCA1) reflects a gradient of moisture availability critical for forest development. Multi-centennial-scale forest declines (indicated by reduced forest pollen percentages and shifts in PCA1) occurred throughout the Bölling-Alleröd, Younger Dryas and Holocene. Forest declines are associated with reduced preci-
ation (PANN) as estimated by the modern analogue technique. Forest declines reflect drier atmospheric conditions in phase with Lateglacial events of high-latitude cooling including GI-1d (Older Dryas), GI-1b (Intra-Allerod Cold Period) and GS-1 (YD), and during early Holocene events of high-latitude cooling and N. Atlantic ice-rafting (events at 10.1, 9.3, 8.2 and 7.4 cal ka BP). Spectral analysis indicates a significant millennial oscillation centred at ~1740 yr in the PCA1 time series, reflecting long-term fluctuations between xerophytic and mesophytic vegetation development in response to changing moisture availability. In common with several other N. Atlantic records (Debret et al., 2007), this oscillation is most evident from the mid-Holocene onwards. Comparison with published northern European records located in areas sensitive to variability in westerly wind strength and precipitation suggest that this millennial oscillation may reflect sustained latitudinal shifts in the westerly flow similar to the modern day North Atlantic Oscillation (NAO) pattern. Comparison with other records from the western Mediterranean region suggests that these longer-term fluctuations in moisture availability had wide impacts on hydrological regimes and landscape stability, and represent a key component of natural climatic variability since the end of the last deglaciation.