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Reconstructing abrupt climate changes of the last deglaciation & Holocene: Pollen & biomarker analyses from the Portuguese Margin

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In light of the current rate of anthropogenic climate change, it is becoming increasingly critical to enhance knowledge of past abrupt climate events and subsequent responses of the Earth system. One period that can provide such insight is the last ~28 kyr, with several abrupt changes occurring over the course of the deglaciation. The Portuguese Margin has been an ideal location to study the impacts of these abrupt climate events on marine and terrestrial environments. The combined effect of the narrow continental shelf and close proximity to the Tagus and Sado rivers, lead to the rapid delivery of a high quantity of sediment, including our pollen and biomarker proxies, to the Tagus Abyssal Plain. Joint terrestrial and palaeoceanographic analyses from the same sediment samples enable an in situ assessment of the relative timing of changes in palaeoceanographic and terrestrial proxies.

Here we document the response of western Iberian vegetation to millennial and centennial-scale changes, particularly changes in moisture availability, over the deglaciation and Holocene, by combining (for the first time at a Portuguese Margin site) pollen and leaf-wax isotopic biomarker records ($\delta^{13}C$ and δD) from core SHAK06-5K. A high-resolution pollen record (every 2cm) and lower-resolution n-alkane $\delta^{13}C$ and δD records spanning 28kya are compared with high-resolution XRF sediment and planktonic foraminiferal $d^{18}O$ analyses from the same core. The sequence is supported by high-resolution age control, based on 40 Accelerator mass spectrometry (AMS) ^{14}C dates from monospecific samples of the planktonic foraminifera, *Globigerina bulloides*.

Our pollen record indicates the rapid response of regional vegetation to centennial changes and millennial-scale climate events, with forest expansion during the warm interglacial/ interstadial Bølling-Allerød and Holocene, and forest contraction and steppe expansion during cold glacial/ stadial conditions of the Last Glacial Maximum and Younger Dryas. Comparing our pollen and n-alkane biomarker data with the XRF Zr:Sr ratio and planktonic foraminiferal $\delta^{18}O$ records, a clear synchroneity can be seen in the timing of millennial-scale changes in all records. The millennial-

scale changes in our leaf wax n-alkane δD and $\delta^{13}C$ records can be explained by both vegetation composition and growing season water availability.