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Vegetation response in SE France to the millennial-scale climate variability of the last glacial period

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Deep-sea pollen records from the Western European margin indicate that regional vegetation oscillated between open forest and steppe during the Last Glacial period (*ca.* 115-27 ka), in response to the millennial scale climate variability, specifically the Dansgaard-Oeschger, (D-O) cycles and Heinrich events (HE). The magnitude of the forest expansions during D-O warming events was modulated by orbital parameters. However, the vegetation response in the north-western Mediterranean region during this period remains poorly understood due to the fragmentary nature of the available sequences.

In this study, we present a new well-chronologically constrained high-resolution marine pollen record from the Gulf of Lion (MD99-2343, 40°29'N, 4°01'E) documenting the vegetation response in southeastern France during Marine Isotope Stages (MIS) 4 to 2 (ca. 73-27 ka). Initial findings highlight that the extent of the temperate forest expansions in SE France, *i.e.* the forest colonizing the Rhône valley, in response to D-Os warming events is modulated by precession, as previously indicated by Western European margin pollen records located in the Mediterranean region below 40°N. In Western Europe, the HEs are all characterized by steppe expansions, but the new pollen analysis documents another scenario with an increase in forest cover during HE 6. We hypothesize that the combination of minima in precession and local atmospheric and marine processes in the Gulf of Lion allowed the development of the temperate forest in SE France during HE 6, while the expansion of open environments occurred in Western Europe.