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Central European vegetation and climate dynamics during the past 130 ka at Füramoos, SW Germany

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To better understand the response of Central European vegetation to rapid climate change during the late Quaternary, we have revisited the Füramoos peat bog in southwestern Germany. Located between two moraine ridges of Rissian age and comprising a near-complete sedimentary sequence from late Marine Isotope Stage (MIS) 6 to 1, this peat bog represents the longest continuous pollen record from the last glacial-interglacial cycle north of the Alps. The Füramoos site has been in the focus of several palynological studies in the past, showing that it presents an excellent archive to study the impact of Dansgaard-Oeschger (D-O) events on the Central European ecosystems (e.g., Müller et al., 2003). However, these previous studies were only of limited temporal resolution, which has yet precluded detailed insight into the ecosystem response to short-term climate change. We present a new, highly resolved pollen record (temporal resolution: 80–200 yrs) and XRF core scanning data from Füramoos spanning the past ~130 ka based on two new drill cores that consist of peat and lake sediments (Kern et al., 2019).

Our results show that closed temperate forests thrived at Füramoos during full interglacials characterized by *Alnus*, *Corylus*, *Quercus*, and *Ulmus*. The major difference between the past two interglacials is that *Fagus* dominates during MIS 1 whereas it is mostly absent during MIS 5e. During MIS 5, the vegetation evolved from closed temperate (MIS 5e) to boreal forests (dominated by *Betula*, *Picea*, and *Pinus*; MIS 5d–5a). The youngest part of the last interglacial (MIS 5d–5a) is marked by six distinct forests contractions (decreases in arboreal pollen by ~30–50%) before the establishment of a steppe vegetation that prevailed throughout the Last Glacial (MIS 2–4). In addition, seven transient increases in tree-pollen percentages document the expansion of boreal forests during MIS 2–4; they are associated with synchronous increases of Si, Ti, K and Fe contents as evidenced in XRF data.

We attribute the forest contractions during MIS 5d–5a to the cooling events C19–C24 known from marine records in the North Atlantic and terrestrial records from southern Europe. Moreover, the forest expansions during MIS 2–4 are associated with warm and moist conditions occurring during D-O events 7–12, and 14. In contrast, D-O events 13 and 15–19 don't leave an imprint on the vegetation although their presence is clearly documented in the XRF data. Our findings emphasize

that the sediments from Füramoos are exceptionally well suited to reconstruct ecosystem dynamics in Central Europe yielding unprecedented insight into the vegetation response to short-term climatic forcing north of the Alps during the past 130 kyrs.

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