Temperature and moisture variability in the eastern Mediterranean region during Marine Isotope Stages 11-10 based on biomarker analysis of the Tenaghi Philippon peat deposit

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Author(s) Ardenghi, Nicole; Mulch, Andreas; Koutsodendris, Andreas; Pross, Joerg; Kahmen, Ansgar; Niedermeyer, Eva M.
Author(s) at UniBasel Kahmen, Ansgar ;
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The Mediterranean region is highly sensitive to climate change, particularly with regard to warming and increasing aridity. Understanding its past climate history during periods similar to the Holocene is key to understand the long-term dynamics that accompany anthropogenic climate change. Marine Isotope Stage (MIS) 11 (ca. 424-367 ka BP) is considered one of the best Holocene analogues. Despite detailed insight from Atlantic marine records and European continental records, MIS 11 temperature and rainfall evolution in the Mediterranean remains poorly understood.We present a detailed record of MIS 11-10 climate change at Tenaghi Philippon, a telmatic peatland in NE Greece. We use microbial membrane lipids (brGDGTs), the delta D of n-C-29 (delta D-wax) and distribution of n-alkanes derived from plant leaf waxes, and levoglucosan concentrations to reconstruct changes in temperature, rainfall sources and vegetation burning. Glacial-interglacial temperature patterns indicate strong Atlantic influence in the Eastern Mediterranean region.Low delta D-wax values and high temperatures indicate a predominance of Atlantic-sourced winter precipitation during MIS 11, and vice versa during MIS 10. The latter is attributed to a suppression of the Mediterranean storm track, probably due to a persistent high-pressure cell over most of the European continent, mainly in response to an extended ice cover during the glacial. The levoglucosan record is consistent with rapid change to drier conditions and increased vegetation burning from MIS 11 to 10. Millennial-scale oscillations allow to characterise cooling episodes previously recorded at other sites, with conditions of decreased winter precipitation, while suggesting increased seasonality during the interglacial optimum.
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