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The climate in the Balkans during the Eemian: a multi-method approach

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The Eemian (∼128,000 - 115,000 yrs BP) is a key period for climate reconstruction because it allows us to compare climatic changes within the warm interglacial to current and projected future conditions. Interest in past climate variability has been stimulated by the increasing manifestation of anthropogenic climate change since these past climate reconstructions can help validate future climate scenarios. For this reason the prior Eemian interglacial, characterised by temperatures that were as warm or warmer than the present, offers an excellent opportunity for comparison to current climate conditions.

We present climatic reconstructions for Lake Orhid (Albania) based on pollen assemblages obtained from a sediment core that spans the Eemian. Lake Ohrid is an exceptional site for paleoclimate reconstruction across the glacial-interglacial fluctuations and for examining the impact of these fluctuations on terrestrial and lacustrine ecosystems (Lezine et al., accepted). This lake is the deepest freshwater body in southern Europe and the oldest in Europe. The pollen record clearly shows the dominance of temperate cold and dry plant associations (conifer dominated) during interglacials with steppic, herbaceous associations during the glacial periods.

To provide the Eemian climatic reconstruction, we use the Modern Analogues Technique (MAT), the recent Non-Metric Multidimensional Scaling/Generalized Additive Model method (NMDS/GAM), Partial Least Squares regression (PLS),Weighted Averaging-Partial Least Squares regression (WA/PLS), and two probabilistic indicator taxa approaches (pdf-method). This multi-method approach allows us to better assess the error of reconstruction inherent in pollen-based climate prediction.

We compare our results with Brewer et al (2008) who produced a reconstruction based on 17 sites distributed across Europe. Brewer et al (2008) evaluated trends and regional average for climate parameters during this period, however only two sites were available in south Europe (Monticchio and Ioannina). Although Brewer et al (2008) show stable temperatures and precipitation for southern Europe throughout the Eemian, our results indicate a gradual decline in temperatures throughout the Eemian at the Lake Orhid site. Thus the Lake Orhid reconstruction fills a gap in South Europe and provides new results for the Balkan Peninsula.