

## A new Eemian-aged reconstruction of temperature and effective moisture from Padul Wetland, Southern Iberia

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The Eemian (~130 to 115 ka BP), also termed Marine Isotope Stage (MIS) 5, was the most recent interglacial period prior to the Holocene. Given that average temperatures during the Eemian were ~2 °C warmer than today, studies of this period offer insights into how variables like aridity may change under near-future warming scenarios. A study was initiated to investigate carbonate-rich, Eemian-aged sediments from Padul Wetland (southern Iberia), a site which contains one of the oldest (>200 ka BP) continuous sediment records in the Mediterranean. The resulting proxy record includes stable isotope ( $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$ ) and clumped isotope ( $\Delta_{47}$ ) compositions of aquatic gastropods (e.g., *Radix balthica*, *Anisus spirorbis*) and bivalves (e.g., *Pisidium* sp.). Variations in  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  closely correspond with the Pollen Climate Index (PCI) for Padul, suggesting that  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  at Padul are sensitive to moisture changes. Shifts in  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  of shelly fauna at Padul also resemble variations in  $\delta^{18}\text{O}$  from the NGRIP ice core (Greenland) and alkenone-based marine sea surface temperature (SST) records of the western Mediterranean region, underscoring the sensitivity of Padul Wetland to regional- and global-scale climatic changes. A measurement of  $\Delta_{47}$  in the aquatic gastropod *Radix balthica* suggests that average temperatures at Padul during the Eemian were  $19.7 \pm 2.6$  °C, which is consistent with marine records from the Iberian margin. In summary, the stable and clumped isotope records generated in this ongoing study build on previous Eemian-aged reconstructions from southern Iberia by providing higher resolution proxy data constrained by quantitative temperature reconstructions. This research deepens our understanding of how effective moisture in southern Iberia may change in the near future.