



Temperature and precipitation reconstruction in correspondence to Dansgaard-Oeschger events and glacial terminations from Turkey

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Lacustrine records from deep closed lakes, such as the 600,000 yr-old sedimentary sequence from Lake Van (Turkey), can provide detailed insights into the mechanisms of past environmental changes in the continental interior. The Lake Van record is continuous and has an excellent age control over the last 350 ka. Repetitive intervals of annually-laminated sections are reflected in a sub-annual resolved color record. The Lake Van color record documents lake-level rises for all Dansgaard-Oeschger (DO) interstadials synchronous to the NGRIP $\delta^{18}\text{O}$ record of Greenland ice reflecting temperature increases. Comparison with model hindcasts from LOVECLIM experiments, supports the notion that the lake-level increases during the warm interstadials is caused by precipitation increases due to atmospheric changes as consequence of AMOC increase during a paucity of ice-sheet calving events. Quaternary quantitative temperature and precipitation changes in the Eastern Mediterranean are unknown over the last 150 ka although it covers a critical time and area in human and mammal evolution.

We quantified temperature and hydroclimate changes within a multi-proxy biomarker study. Lipid biomarkers during several DO events from MIS 3 and over the last two terminations were extracted at centennial resolution. Mean air temperatures (MAT) based on down-core distributional changes in branched glycerol dialkyl glycerol tetraethers (brGDGTs), indicate a 1.5-3° warming at stadial/interstadial transitions and 2-4° warming for glacial/interglacial transitions. Simultaneous analysis of the leaf wax hydrogen isotopic composition ($\delta^2\text{H}_{\text{wax}}$) result in a reconstruction of changes in the source water due to variable precipitation/evaporation ratio. Isotopically 10 ‰ (20 ‰) lighter δD -values of leaf-wax *n*-alkane C_{29} argue for a significantly increased humidity during the interstadials (interglacials) compared to the stadials (glacials). Magnitudes of temperature and precipitation changes at the DO-transitions and glacial terminations are also quantitatively in line with temperature and precipitation anomalies over Turkey from LOVECLIM model simulations. The abruptly changing water availability and highly variable climates are alternative driving mechanism for megafaunal transition events to be considered next to the effects of long-lasting glacial coldness or/and competitive factors (e.g. hunting pressure).