First long temperature reconstruction for the eastern Mediterranean based on tree rings

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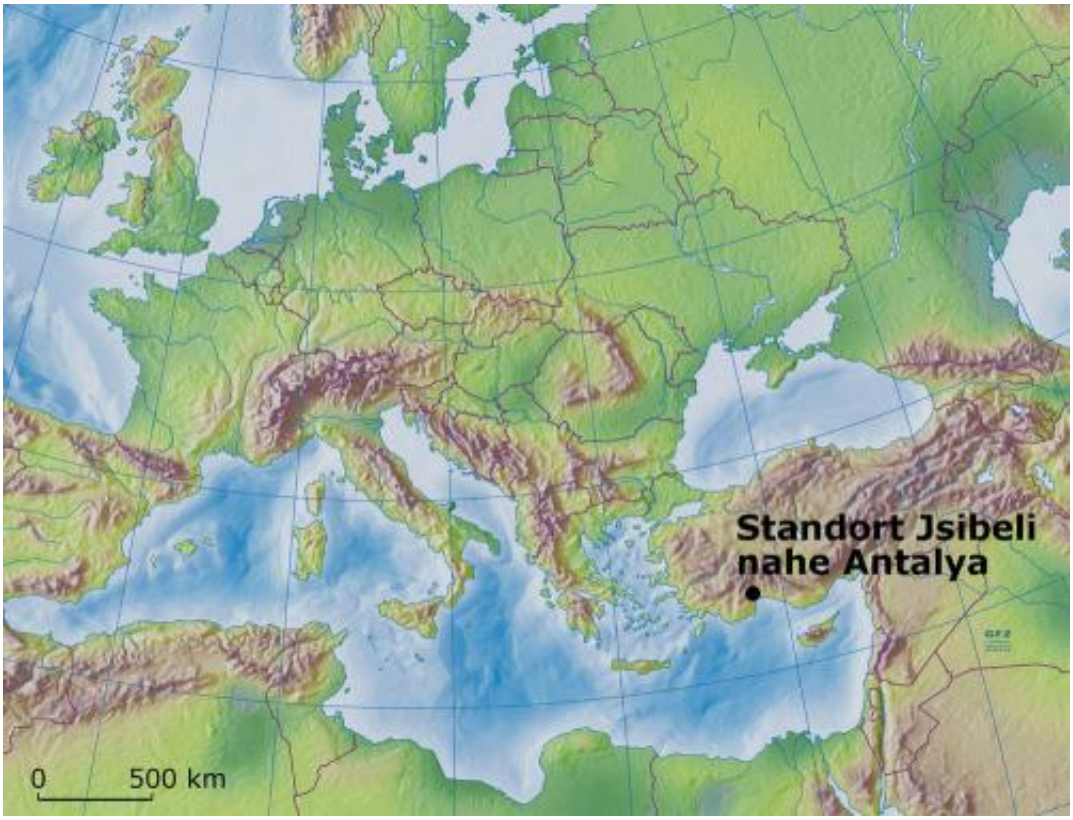

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For the first time a long temperature reconstruction on the basis of stable carbon isotopes in tree rings has been achieved for the eastern Mediterranean. An exactly dated time series of almost 900 year length was established, exhibiting the medieval warm period, the little ice age between the 16th and 19th century as well as the transition into the modern warm phase. Moreover, Ingo Heinrich from the GFZ German Research Centre for Geosciences and colleagues revealed that the modern warming trend cannot be found in the new chronology. "A comparison with seasonal meteorological data also demonstrates that at several places in the Mediterranean the winter and spring temperatures indicate long-term trends which are decreasing or at least not increasing", says Ingo Heinrich. "Our results stress the need for further research of the regional climate variations."

It seems that especially temperature reconstructions derived from extreme sites such as high mountain zones and high latitudes do not always correctly reflect the climate of the different geographical regions. The past temperature variations in the lowlands of central Europe and in the Mediterranean are not well understood yet. The analysis of carbon isotope ratios (13C/12C) in tree rings aims to close this research gap. By focusing on the months January to

May the researchers detected the period in which the trees shift from dormancy in late winter to re-activation of growth in early spring. The carbon isotope ratios measured in individual tree rings largely depends on the environmental conditions; thus, the varying tree-ring isotope values are good indicators for changes in the environment. The carbon isotope ratios in the trees from Turkey indicate a temperature sensitivity of the trees during late winter to early spring. In cold winters the cambium and the leaves are damaged more than usual and the following recovery in spring takes longer. Low spring temperatures further delay the photosynthesis or slow down the rate of photosynthesis, with negative effects on the cambial activity.

More information: Ingo Heinrich, Ramzi Touchan, Isabel Dorado Liñán, Heinz Vos, Gerhard Helle: "Winter-to-spring temperature dynamics in Turkey derived from tree rings since AD 1125", Climate Dynamics, October 2013, Volume 41, Issue 7-8, pp 1685-1701, DOI: 10.1007/s00382-013-1702-3