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Modest summer temperature variability during DO cycles in western Europe

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Abrupt climatic shifts between cold stadials and warm interstadials, termed Dansgaard-Oeschger (DO) cycles, were common features during the Last Glacial. Their distinct imprint has mostly been observed in the North Atlantic area, but has also been recognized in paleorecords worldwide. Despite an increased understanding of the spatial and temporal distribution of DO cycles, little is known about their temperature amplitudes both annually and seasonally in different regions. A recent hypothesis put forward by modelling studies, implies that the abrupt climate shifts of the Last Glacial were characterised by distinct changes in seasonality in the Northern Hemisphere. Suggestively, the largest temperature change between DO stadial and interstadial phases occurred during the winter and spring seasons, while the summer season was characterised by a rather muted temperature shift.
Here we present a temporally high-resolved reconstruction of July temperatures for eastern France during a sequence of DO cycles between 36 and 18 kyr BP. The reconstruction is based on fossil diatom assemblages from the paleolake Les Echets and indicates July temperature changes of ca 0.5 to 2°C between stadials and interstadials. This study is the first to have reconstructed summer temperatures over several DO cycles in continental Europe. It is therefore also the first proxy record that can test and support the hypothesis that temperature changes during DO cycles were modest during the summer season.