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Sequence of events from the onset to the demise of the Last Interglacial (140-105 ka): how to address chronologies in paleoclimatic archives?

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The Last Interglacial (LIG) represents a precious case study to investigate the response of vulnerable components of the Earth system to polar warming. However, the scarcity of precise absolute age constraints in most archives during this time interval leads to the use of different reference chronologies and various strategies to align paleoclimatic records. Therefore, the investigation of the climatic sequence of events across the LIG remains limited.
Here, we review the strengths and limitations of the methods that are commonly used to date or define chronologies in various paleoclimatic archives (corals, speleothems, polar ice, marine sediments, lake sediments and peat sequences) for the time span encompassing the penultimate deglaciation, the LIG and its demise (∼140-105 ka). In particular, we provide quantitative estimates of the associated absolute and relative age uncertainties.
Subsequently, we formulate recommendations on how to define at best absolute and relative chronologies. Future climate alignments should provide (1) a clear statement of climate hypotheses involved, (2) a detailed understanding of environmental parameters controlling selected tracers and (3) a careful evaluation of the synchronicity of aligned paleoclimatic records. We insist on the need to (1) systematically report quantitative estimates of relative and absolute age uncertainties, (2) assess the consistency of chronologies when comparing different records and (3) integrate these uncertainties in paleoclimatic interpretations and comparison with climate simulations.
We finally present a sequence of major climatic events with associated age uncertainties from the onset to the demise of the LIG. This should serve as a new benchmark to disentangle mechanisms of Earth system response to orbital forcing and evaluate LIG transient climate simulations.
The chronological aspects of paleoclimatic archives and the sequence of climatic events addressed in this study perfectly fit within the aims of the IMAGES program.