



## **Chronologies of marine sediment cores during the Last Interglacial: strengths and limitations of commonly used climato-stratigraphic alignments**

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The Last Interglacial (LIG, ~129-116 thousand of years, ka) is relatively well documented in marine sediment cores retrieved across the globe. However, these records exhibit very few absolute age markers such as magnetic events and dated tephra layers, which limits the definition of independent and precise LIG age models. As a result, age models of marine sediments are defined using various methods based on the (i) synchronisation or (ii) climato-stratigraphic alignment of marine records to dated “reference” records, assuming simultaneous regional changes for a given climate variable (e.g. foraminiferal  $\delta^{18}\text{O}$ , temperature). The use of different “reference” chronologies (e.g. LR04, speleothem or ice core chronologies) also limits a precise investigation of climatic sequences across the LIG.

Here, we evaluate the underlying hypotheses, strengths and limitations, and age uncertainties of methods commonly used in marine sediments during the LIG: i.e. benthic  $\delta^{18}\text{O}$  alignment to the LR04 benthic  $\delta^{18}\text{O}$  stack, temperature alignment to ice core or to speleothem records. We compare the resulting age models using examples from the North Atlantic core MD95-2042 and the Southern Ocean core MD02-2488. We show a lack of remarkable tie-points within the LIG, which limits the study of the sub-millennial-scale climate variability. We also report age offsets up to 4 ka when different reference chronologies (e.g. ice cores vs. speleothems) or different types of aligned records (e.g. SST vs. planktonic  $\delta^{18}\text{O}$ ) are used.

These results highlight the need for careful estimates of age uncertainties when defining age models in marine sediments. They also emphasize the fact that LIG chronologies should be considered with care. A clear statement on the reference chronology, the method of alignment and the type of tracers that are used should be given when investigating the LIG sequence of climatic events from various sediment cores or when comparing LIG marine records and climate model simulations.

Such chronological aspects are fundamental to meet the objectives covered by the IMAGES program.