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Simulation of species-specific sedimentary planktonic calcite δ^{18}O with the FAME module

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Different planktonic foraminifers are known to produce different calcite δ^{18}O records when measured at the same site through time. The reason is most probably to be found in their change of vertical and seasonal habitats in response to changing environmental conditions. This has two direct consequences: (1) the potential to reconstruct the change of habitat for the different species and hence to access to details of the evolving oceanic conditions (2) the necessity to handle these changes in a simple framework so as to enable to use outputs from climate models to simulate the different – species specific – evolutions.

With the simple FAME (Foraminifers as Modeled Entities) module, we propose to investigate the effect of habitat change by comparing measured and mechanistically computed calcite oxygen isotopic ratios (δ^{18}O) for *N. pachyderma*, *N. Incompta*, *G. bulloides*, and *G. ruber*. FAME only relies on species specific temperature-dependent growth rates to infer the habitats of each different species.
As part of this communication, we will use FAME in two different frameworks.

- 1) In a validation step, we force the FAME module by hydrography and water δ^{18}O taken or derived from observations. The module then predicts the average calcite δ^{18}O that is to be found in the sedimentary record. The latter is then compared to the MARGO Late Holocene and core top planktonic δ^{18}O data and yields excellent results.

- 2) We investigate the species-specific simulated records of sedimentary planktonic calcite δ^{18}O when forced with transient climate evolution around the Last Glacial Maximum, as computed with the iLOVECLIM coupled, isotope enabled, climate model.