Low sensitivity of alkenone carbon isotopes to atmospheric CO_2 during the Plio-Pleistocene

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Atmospheric CO_2 is a critical component of the Earth's exogenic carbon system, and is seen by many as the major "knob" controlling Earth's climate past, present and future. Accurate and precise reconstructions of its concentration through geological time are therefore seen as one of the holy grails of the Earth Sciences. This has never been more important than now, as Earth System modellers, policy makers and the wider public increasingly rely on palaeo-CO_2 reconstructions to ground-truth and inform climate models capable of predicting future conditions.

Two long established methods of reconstructing atmospheric CO_2, one based on the boron isotopic composition of planktic foraminifera, the second from the carbon isotopic fractionation between DIC and the alkenones produced by some haptophytes, have received increasing attention in recent years. Both may be generated from ocean sediments, allowing, in theory, high temporal resolution datasets to be generated at a global scale from the repositories of the (I)ODP. However as more records become available discrepancies between the two are beginning to appear, with often reduced amplitudes of variability in alkenones vs. boron based reconstructions

Here we present new and existing records from ODP Site 999 from identical samples from the Plio-Pleistocene. These data may help to unravel the emerging differences, and go some way to improving our understanding of how to correctly reconstruct this critical greenhouse gas.