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A New Record of Atmospheric CO_2 using Boron Isotopes in Planktonic Foraminifera from the Indian Ocean

MATTHIEU PAULHAC BUISSON[1], RACHEL BROWN[1], LUC BEAUFORT[1], EVA MORENO[2] AND THOMAS B CHALK[1]

[1]CNRS-CEREGE-Aix Marseille Université
[2]MNHN-LOCEAN-Sorbonne Université

The recent (~150 years) increase of atmospheric CO_2 is essentially due to human activities. To understand its precise role in climate change, it is essential to document the causes and the consequences of natural CO_2 variations in the atmosphere during over Earth history. Ice cores, through trapped gas bubbles which have encapsulated the past composition of the atmosphere, offer a unique and continuous record of atmospheric CO_2 for the last 800 000 years and although new, deeper data will be generated soon there is a hard temporal limit on ice availability. Boron isotopes ($\delta^{11}B$) records obtained from planktonic foraminifera in marine sediments can reproduce with great fidelity the glacial/interglacial (G/IG) cyclicities of the atmospheric CO_2 for this time period. Hence, using $\delta^{11}B$ in biocarbonates it is possible to extend the atmospheric CO_2 record into deeper time.

Here we present new data collected from the core MD90-0940 in the Indian Ocean (61°40.12E, 05°33.53S). This site is particularly well positioned in a region where atmospheric CO_2 is in near equilibrium with the ocean and well away from oceanographic boundaries which may impact that equilibrium. The previous stratigraphy, covering the last 4 Myr, was based on published magnetostratigraphy, biostratigraphy using calcareous nannofossils, and isotope stratigraphy derived from $\delta^{18}O$ measurements of planktonic foraminifera. We have refined this stratigraphic model and the late Pleistocene chronology of this core now reaches now achieves orbital-scale precision through our added measurements of $\delta^{18}O$ and $\delta^{13}C$ from benthic foraminifera.

We also present new marine $\delta^{11}B$ records for the last 300 kyrs, measured in the calcitic shells of the planktonic foraminifera *Globigerinoides ruber* (stricto sensu, white) and *Trilobatus sacculifer*. Our oceanographic data are compared with regional data and our $\delta^{11}B$-derived CO_2 data with the CO_2 from ice cores. This work contributes to the CenCO_2PIP database of atmospheric CO_2 proxies, enhancing our understanding of glacial-interglacial cycles in the region and further strengthening the $\delta^{11}B$ proxy as a tool for paleoclimatic reconstructions in the Indian Ocean.