

## A 1.46-million-year record of atmospheric CO<sub>2</sub> from sedimentary leaf wax in the Bay of Bengal

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A great deal of effort is now focused on reconstructing atmospheric CO<sub>2</sub> during periods of lower polar ice volume to better constrain carbon cycling under conditions similar to those expected in the future. Here we reconstruct the past 1,460,000 years of atmospheric CO<sub>2</sub> by taking advantage of the unique relationship between CO<sub>2</sub> concentration and leaf wax  $\delta^{13}\text{C}$  value resulting from changes in the distribution of plant functional types in East India. We find that CO<sub>2</sub> variability is tightly coupled with variability of global ice volume and deep-ocean circulation on glacial-interglacial timescales. However, unexpectedly, interglacial CO<sub>2</sub> concentrations were lower before the mid-Pleistocene transition (MPT; 900,000 years ago) than after it, despite the smaller continental ice volume, while CO<sub>2</sub> showed a similar secular trend with deep-ocean carbon isotopes. A shift in the relative phase of CO<sub>2</sub> and ice volume cycles occurred during the MPT. These findings suggest that deep-ocean circulation controlled the long-term CO<sub>2</sub> trend, and the interaction between CO<sub>2</sub>, continental ice, and deep-ocean circulation was reorganized during the MPT.

Keywords: Carbon dioxide, Glacila-interglacial cycles, Mid-Pleistocene Transition