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A continuous 1,500 kyr record of atmospheric CO_2 from boron isotopes.

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During the past 1,500 thousand years (kyrs) Earth's climate has undergone major changes, key among these being the Middle Pleistocene Transition (MPT). The MPT was a gradual change in the climate system that seemingly occurred without a significant change to external climate forcing, thus implicating internal climate feedbacks as the principal driver(s). Ice core CO_2 data are only continuous for the last 800 kyrs meaning no high quality CO_2 data covers this last great climate transition. To access information about the movement of carbon between the atmosphere and oceans through the MPT, reliable records of both atmospheric and oceanic carbon content are required. Here we present a continuous compilation of boron isotope-derived pH-CO_2 records from low-latitude ocean sites over the past 1,500 kyrs, doubling the extent covered by high-resolution ice core records. We show evidence for a close coupling of oceanic-pH and atmospheric CO_2 over the ice core interval, confirming that the $\delta^{11}B$-pH proxy is well placed to extend the CO_2 record beyond the reach of ice cores and validating our longer record. Combining CO_2 with global temperature and sea level records, we investigate changes to Earth System and Climate Sensitivities over the Pleistocene. We interrogate this new CO_2 record using a Carbon cycle model (CYCLOPS) to investigate the relative importance of climate drivers in setting CO_2 on orbital time scales.