EGU2020-11682
https://doi.org/10.5194/egusphere-egu2020-11682
EGU General Assembly 2020

Orbital CO2 cycles and the Mid-Pleistocene Transition

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Over the past 1.5 million years, Earth's climate has shifted from a predominantly 41 thousand year (kyr) dominated climate cycle to one dominated by longer and larger glacial-interglacial cycles, known as the Mid-Pleistocene Transition (MPT). The MPT occurs over a period of several hundreds of thousands of years, with little change to Earth's external orbital forcing, thus implicating internal climate feedbacks. Here we interrogate the current capacity, and future potential, of boron isotope records to provide high quality carbon cycle information for the Pleistocene. We also present a compilation of boron isotope-derived pH-CO_2 records from low-latitude ocean drill cores which closely follow the evolution of atmospheric CO_2 over the ice core interval but extend it to 1.5 million years ago with a resolution of up to ~1 sample per 3 kyr. This new, near continuous $\delta^{11}B$-derived CO_2 record is compared against other independent CO_2 data from blue-ice cores and records of ocean and climate change., This confirms there is a decline in mean CO_2 across the MPT which manifests as a lengthening and deepening of glacial CO_2, and highlights the distinct difference in the nature of CO_2 cycles in the 41-kyr world.