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A new high-precision record of δ^{13}C of CO_2 during the last millennium from the WAIS Divide Ice Core

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High-resolution ice core records from Antarctica reveal multi-decadal scale variability in atmospheric CO_2 during the Late Pre-industrial Holocene. The mechanisms behind these variations remain elusive, but are important in constraining natural carbon-climate feedbacks. Additionally, recent data suggesting a Pre-industrial anthropogenic influence on atmospheric CO_2 (Nevle, 2011) conflict with results of coupled climate-carbon models (Pongratz, 2011). The stable isotopic composition of carbon dioxide (δ^{13}C of CO_2) offers a tool to determine the nature and strength of carbon dioxide sources to the atmosphere.

A new high-precision (<0.02 per mil), high-resolution ($\sim$30 year sample spacing) record of δ^{13}C of CO_2 from 1000-1870 C.E. reveals previously unobserved variability in the δ^{13}C of CO_2 during periods of rapid changes in CO_2. A rapid 0.1 per mil ^{13}C depletion coincides with a 3 ppm increase in CO_2 around 1500 AD, and is followed by a trend towards enriched values during a 6-7 ppm decrease in CO_2 from $\sim$1575-1650 . Modeling of the carbon cycle will help to deconvolve the source history of atmospheric CO_2.