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The jump of CO_2 into the Bølling/Allerød

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During the last glacial/interglacial transition the atmospheric CO_2 record as measured in the EPICA Dome C (EDC) ice core shows a remarkable jump of nearly 11 ppmv between two data points which are temporally separated by 350 years only (slope of more than 30 ppmv per millennium) around 14,000 years before present (kyr BP). This CO_2 jump coincides with a rapid rise in atmospheric CH_4 (104 ppbm in 279 years between two points) measured in the same ice core, the onset of the Bølling/Allerød (BA) warm period in the north and the start of the Antarctic Cold Reversal (ACR) in the south. Atmospheric gases trapped in ice cores are, however, not precisely recording one point in time, but average over decades to centuries. We here show that when considering the gas age distribution the original atmospheric jump in CO_2 might have been twice as large and much faster, equivalent to a slope of more than 100 ppmv per millennium. If we further take the concomitant jump in CH_4 and newly available measurements of $\delta^{13}CO_2$ on the EDC ice core as an evidence for massive reorganization of the land carbon cycle and therefore assume a pure terrestrial source of this CO_2 jump a carbon release of 125 PgC in less than a century can then explain the observations. Our line of evidence is independent from gas age uncertainties, which has to be taken into consideration if the CO_2 jump into the BA has an oceanic source.