Supporting Online Material for

Stable Carbon Cycle–Climate Relationship During the Late Pleistocene

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Supporting Online Material

Methods

For the Dome C measurements, the methods used in Bern and Grenoble for routine measurements are based on dry extraction techniques, followed by Infrared Laser Spectroscopy or Gaschromatography, respectively. The analytical method used in Bern has been described by Indermühle et al. (*1*) with the exception of an extraction phase extended by 5 min suitable for clathrate ice to avoid a fractionation effect because of slower release of CO_2 relative to N_2 and O_2 from clathrates. The data represent the mean of six samples during termination V (*2*) or the mean of 4 samples (MIS 12 to MIS 16). The error bars denote the reproducibility of the measurements, i. e., one standard deviation of the mean, on average 1.2 ppmv over the whole record. CO_2 concentration has been measured on 1372 samples at 322 depth intervals, including data from 193 samples at 31 depth intervals over termination V of ref. (*2*) of the Dome C ice core with an age between 413 and 650 kyr BP. A second extraction device, based on a sublimation technique similar to the one of Güllük et al. (*3*) (accuracy ±2 ppmv), is primarily used for validation and not for routine measurements. We made 5 measurements with the sublimation extraction at 5 depth intervals with an age between 480 and 631 kyr BP (see Fig. 1). The Grenoble method is slightly modified compared to Barnola et al. (*4*). In Grenoble, CO_2 concentation has been measured (accuracy 2σ = ±3 ppmv) at 31 depth intervals of the Dome C ice core with an age between 391 and 424 kyr BP.

EDC2 Δage

The evaluation of the gas age/ice age difference (Δage) in the EDC2 timescale (*2*) used in this paper, is derived from a firn model (*5*), based on physical grain sliding and deformation laws, and that takes into account the diffusion of temperature in the firn.

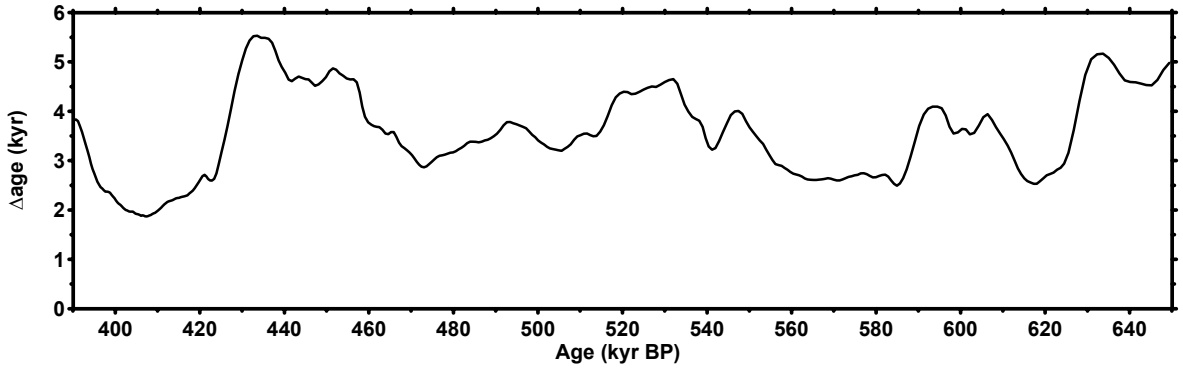

Fig. S1. Δage vs. age in the EDC2 timescale (*2*) used in this paper over the interval of the record.

Lead of CO_2 around 534-548 kyr BP

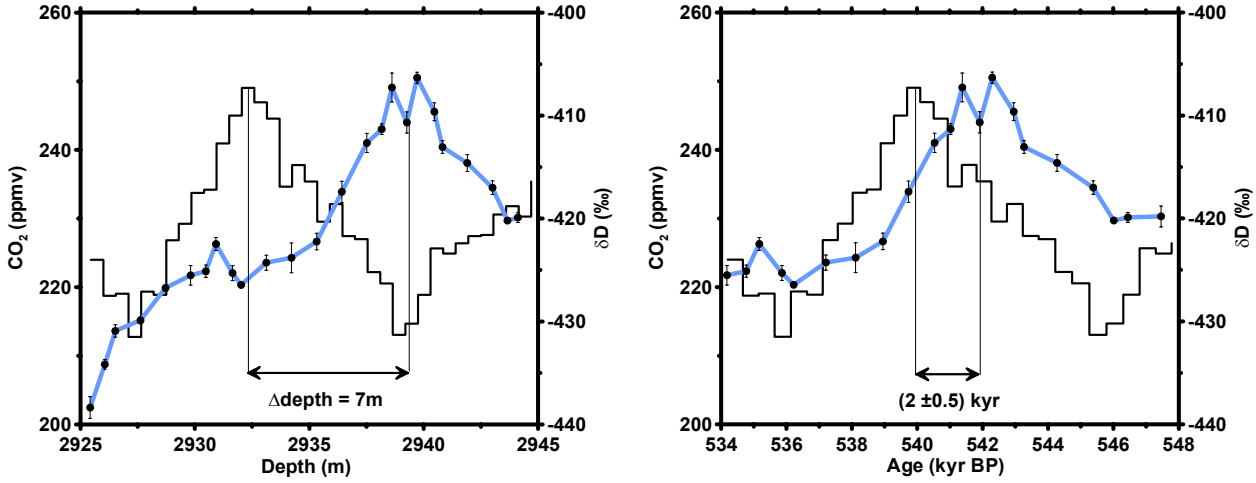

Fig. S2. CO_2 and δD plotted on the depth scale (left) and on the EDC2 age scale (right). The observed depth offset of CO_2 and δD at this event is 7m. On the age scale, the observed lead of CO_2 is (2 ± 0.5) kyr. As the enclosed air is younger than the surrounding ice (*6*), synchronous events are expected to appear with a certain offset on the depth scale (Δ depth). The modelled Δ depth is 4.3 m, at this event in the Dome C ice core.

References

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