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Anomalous flow below 2700 m in the EPICA Dome C ice core detected using $\delta^{18}\text{O}$ of atmospheric oxygen measurements

G. B. Dreyfus^{1,2}, F. Parrenin³, B. Lemieux-Dudon³, G. Durand⁴, V. Masson-Delmotte¹, J. Jouzel¹, J.-M. Barnola³, L. Panno⁵, R. Spahni⁵, A. Tisserand⁶, U. Siegenthaler⁵, and M. Leuenberger⁵¹LSCE/IPSL, CEA-CNRS-UVSQ, CE Saclay, 91191, Gif-sur-Yvette, France²Department of Geosciences, Princeton University, Princeton, New Jersey, USA³Laboratoire de Glaciologie et Geophysique de l'Environnement (CNRS), St Martin d'Herès, France⁴Niels Bohr Institute for Astronomy, Physics and Geophysics, University of Copenhagen, Copenhagen, Denmark⁵Physics Institute, University of Bern, Bern, Switzerland⁶Université Bordeaux I, UMR 5805 EPOC, Environnements et Paléoenvironnements Océaniques et Côtiers, Talence Cedex 33405, France

Abstract. While there are no indications of mixing back to 800 000 years in the EPICA Dome C ice core record, comparison with marine sediment records shows significant differences in the timing and duration of events prior to stage 11 (~430 ka, thousands of years before 1950). A relationship between the isotopic composition of atmospheric oxygen ($\delta^{18}\text{O}$ of O_2 , noted $\delta^{18}\text{O}_{\text{atm}}$) and daily northern hemisphere summer insolation has been observed for the youngest four climate cycles. Here we use this relationship with new $\delta^{18}\text{O}$ of O_2 measurements to show that anomalous flow in the bottom 500 m of the core distorts the duration of events by up to a factor of 2. By tuning $\delta^{18}\text{O}_{\text{atm}}$ to orbital precession we derive a corrected thinning function and present a revised age scale for the interval corresponding to Marine Isotope Stages 11–20 in the EPICA Dome C ice core. Uncertainty in the phasing of $\delta^{18}\text{O}_{\text{atm}}$ with respect to insolation variations in the precession band limits the accuracy of this new agescale to ± 6 kyr (thousand of years). The previously reported ~30 kyr duration of interglacial stage 11 is unchanged. In contrast, the duration of stage 15.1 is reduced by a factor of 2, from 31 to 16 kyr.

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