

Home

Online Library CP

- ▣ Recent Final Revised Papers
- ▣ [Volumes and Issues](#)
- ▣ Special Issues
- ▣ Library Search
- ▣ Title and Author Search

Online Library CPD

Alerts & RSS Feeds

General Information

Submission

Review

Production

Subscription

Comment on a Paper

Impact
Factor
1.450

ISI
indexed



▣ [Volumes and Issues](#) ▣ [Contents of Issue 3](#) ▣ [Special Issue](#)

Clim. Past, 3, 527-540, 2007

www.clim-past.net/3/527/2007/

© Author(s) 2007. This work is licensed under a Creative Commons License.

New constraints on the gas age-ice age difference along the EPICA ice cores, 0–50 kyr

L. Loulergue¹, F. Parrenin¹, T. Blunier², J.-M. Barnola¹, R. Spahni², A. Schilt², G. Raisbeck³, and J. Chappellaz¹

¹Laboratoire de Glaciologie et de Géophysique de l'Environnement (LGGE), CNRS, Université Joseph Fourier – Grenoble, BP96 38402 Saint Martin d'Herès Cedex, France

²Climate and Environmental Physics, Physics Institute, University of Bern, Sidlerstrasse 5, 3012 Bern, Switzerland

³Centre de Spectrométrie Nucléaire et de Spectrométrie de Masse (CSNSM), IN2P3-CNRS-Université de Paris-Sud, Bat 108, 91405 Orsay Cedex, France

Abstract. Gas is trapped in polar ice sheets at ~50–120 m below the surface and is therefore younger than the surrounding ice. Firn densification models are used to evaluate this ice age-gas age difference (Δ age) in the past. However, such models need to be validated by data, in particular for periods colder than present day on the East Antarctic plateau. Here we bring new constraints to test a firn densification model applied to the EPICA Dome C (EDC) site for the last 50 kyr, by linking the EDC ice core to the EPICA Dronning Maud Land (EDML) ice core, both in the ice phase (using volcanic horizons) and in the gas phase (using rapid methane variations). We also use the structured ¹⁰Be peak, occurring 41 kyr before present (BP) and due to the low geomagnetic field associated with the Laschamp event, to experimentally estimate the Δ age during this event. Our results seem to reveal an overestimate of the Δ age by the firn densification model during the last glacial period at EDC. Tests with different accumulation rates and temperature scenarios do not entirely resolve this discrepancy. Although the exact reasons for the Δ age overestimate at the two EPICA sites remain unknown at this stage, we conclude that current densification model simulations have deficits under glacial climatic conditions. Whatever the cause of the Δ age overestimate, our finding suggests that the phase relationship between CO₂ and EDC temperature previously inferred for the start of the last deglaciation (lag of CO₂ by 800±600 yr) seems to be overestimated.

▣ [Final Revised Paper](#) (PDF, 602 KB) ▣ [Supplement](#) (1238 KB) ▣ [Discussion Paper](#) (CPD)

Citation: Loulergue, L., Parrenin, F., Blunier, T., Barnola, J.-M., Spahni, R., Schilt, A., Raisbeck, G., and Chappellaz, J.: New constraints on the gas age-ice age difference along the EPICA ice cores, 0–50 kyr, *Clim. Past*, 3, 527-540, 2007. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)



Search CP

Library Search

Author Search

News

- ▣ [TWO editors of Climate of the Past funded by ERC](#)
- ▣ [Financial Support for Authors](#)
- ▣ [New Service Charges](#)

Recent Papers

01 | CP, 03 Nov 2008:
Forced and internal modes of variability of the East Asian summer monsoon

02 | CPD, 27 Oct 2008:
The 8.2 ka cooling event related to extensive melting of the Greenland Ice Sheet

03 | CP, 21 Oct 2008:
Anticyclonic atmospheric circulation as an analogue for the warm and dry mid-Holocene summer climate in central Scandinavia

04 | CPD, 21 Oct 2008: