

Interactive comment on “New constraints on the gas age-ice age difference along the EPICA ice cores, 0–50 kyr” by L. Loulergue et al.

Anonymous Referee #2

Received and published: 13 April 2007

In this paper the authors use an indirect but viable method to reconstruct the gas age ice age difference for the EPICA Dome C ice core for the 10,000 to 50,000 year time period. The indirect method involves transferring ice and gas chronologies from EPICA DML and NGRIP to EPICA Dome C, which indirectly also provides the gas age-ice age difference for EPICA Dome C. This can be compared with models that predict that parameter from EPICA Dome C data only. The latter appear to overestimate the gas age-ice age difference based on this analysis. This result is important because of the role of uncertainty of gas age vs. ice age in understanding phasing of CO₂ and climate change. While they point this out, the authors do not examine the implications of the result in detail, which in my opinion leaves the paper incomplete. I suggest that a more thorough discussion of what the results mean for interpreting records from EPICA

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Dome C and DML be added to the paper.

Page 428, line 3. Although the EPICA community seems convinced that all DO events have Antarctic counterparts, this is, as far as I know, and observation based on visual correlation rather than a statistical analysis.

Page 428, line 6. Is “interessant” a typographical error?

Page 428, line 14-16. Give specific age limits for the Greenlandic chronologies used.

Page 428, line 15-20. The discussion of thermal diffusion should be properly referenced to the original papers on this subject.

Page 440, line 0-5. Can the authors provide more quantitative information about the uncertainty on relative age between nearby depths?

Page 440, line 11. I am not sure it will be clear what “methane-isotope” synchronization means.

Page 441. The factor beta needs more explanation.

Page 442, top. The artifacts in Holocene accumulation need more explanation.

Page 442. I find the use of ^{10}Be data in this paper questionable. The point of using ^{10}Be is that it is an independent time marker allowing one to check assumptions made in other correlations. However, there are no NGRIP or DML ^{10}Be data, so other time scale information is used here to decide where the ^{10}Be peaks would be in NGRIP and DML. Once this is done it seems to me that the ^{10}Be data are no longer independent of the other chronological constraints. At minimum I would like to see the authors address this point - perhaps they can argue that the correlations between NGRIP and GRIP and DML and DC are so solid that the problem I raise here is not significant. However, I do not see how one can escape the fact that, as used, the ^{10}Be data are not independent markers.

Page 446. The authors are using the Arnaud firn model. Others have used the Goujon

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

model, and in other papers submitted to this volume the modeling from Bern is used. This is potentially confusing and at minimum a discussion of the different models and what lead to the choice made in this case would be helpful.

Page 447. Why is the term “glacial-interglacial temperature amplitude” used here? I believe the isotope-temperature calibration is being discussed but I don’t quite understand why this term is used.

Page 447-452. The discussion here goes through the possible explanations for the discrepancies between model and empirical estimates of delta age and delta depth. Several possible explanations are ruled out reasonably logically, with the final explanation that the delta age model probably gets the density profile wrong. At this point it would be appropriate to discuss this aspect of the model in more detail, and compare its treatment of densification to other models.

Page 452. As mentioned above, I suggest a more complete treatment of the implications of the results of this study.

Interactive comment on Clim. Past Discuss., 3, 435, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper