

Interactive comment on “Synchronization of ice core records via atmospheric gases” by T. Blunier et al.

Anonymous Referee #1

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General comments:

This is a useful paper outlining the strategy used to provide a Greenland-based chronology for the DML ice core. It is good to see the details published here, which will allow those interested to evaluate the DML result more thoroughly. The paper is also valuable because it provides a quantitative treatment of the problems of synchronizing methane records. Some of these techniques and concepts were published in earlier papers by Blunier, Schwander, and colleagues, but the application to DML is important enough that it is good to have it all in one place in this paper.

Specific comments:

1) In assigning ages to GRIP from NGRIP the GRIP delta age is preserved. GRIP delta

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age must depend on a model or calculation of GRIP accumulation rate. Does the new NGRIP time scale for GRIP change GRIP accumulation rate enough to also change GRIP delta age? 2) The method of putting GRIP methane on the NGRIP time scale makes sense for the most part. It is not clear, however, if it is any different than using the Rasmussen match points to re-date the GRIP core ice age scale on the NGRIP time scale, then applying the original GRIP delta age to get an “NGRIP-based” time scale for the GRIP methane data. If not, this would seem a clearer way to explain what is done. 3) The other reviewer brought up good points about the potential limitations of the densification modeling and I think that these should be addressed. 4) Although it is good to see the uncertainty in delta age dealt with quantitatively, propagated through the synchronization, I suggest that the authors spend more time discussing the values they choose for the uncertainties in temperature and accumulation that go in to their estimate of delta age uncertainty. 5) Three different ways of comparing NGRIP and DML are discussed and the authors maintain that all three approaches give the same result. I suggest that this statement be supported with some quantitative evaluation of the differences between the approaches.

Technical corrections 1) The paper is fairly clearly written, though English usage is a bit awkward in places. Some additional editing with that in mind would be useful. 2) The reference to Shackleton et al on page 366 seems out of place since that paper was trying to absolutely date an ice core record via correlation and the next sentence says that this can not be done. 3) How big are the uncertainties in the synchronization? I did not see that reported. 4) It is stated that the impact of a 25% accumulation rate on delta age is the same as a 2% temperature change, but this statement does not have a context. Why is this particular statement important? 5) On page 369, “fitting” the model time scale ss09sea to the counted time scale is mentioned. What does the “fitting” refer to? Is the counted scale GICC05? Is it counted below 41 kyr? I believe this information is in other papers, but should be repeated here for the reader. 6) On page 373, the statement that methane and Greenland temperature variations are similar is true for timing, but note necessarily for amplitude. 7) Is it possible to plot the 10Be records to

show how well they match for NGRIP vs. EDML?

Interactive comment on Clim. Past Discuss., 3, 365, 2007.

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3, S148–S150, 2007

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