

## ***Interactive comment on “A 60 000 year Greenland stratigraphic ice core chronology” by K. K. Andersen et al.***

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This is an important paper, which should be published in Climate of the Past, but only after some major revision. Given the extensive concerns that I and the other reviewers have, I think it would be appropriate to send the revised manuscript to re-review.

I agree entirely with the comments from the other reviews and comments already published on line. I wish to emphasize especially that I agree with Dominique Genty's comments on the ambiguity of linking cave records to Greenland. The authors seem to be assuming that that Greenland  $d18O$  changes and speleothem proxy changes are synchronous. This is a common assumption, but it is an assumption that becomes truly problematic when one is using this assumption to say something quantitative about timescales. More discussion about the risk of this assumption is needed. Care should

be taken to be very specific when discussing the "agreement" between records. For example, one might say "the timing of the event in Greenland agrees with the dating of that event in Hulu Cave within 800 years, ASSUMING THAT THE PEAK IN d18O at Hulu Cave indeed corresponds with the peak in Greenland d18O."

I have two additional major comments, and a few minor ones, below.

## MAJOR COMMENTS

1) This is a dating paper, yet I find the terminology used for dates very confusing. As far as I know, the use of the term "100 kyr b2k" is not standard. I think that using "ka" would be appropriate. You should state at the beginning that you mean "before A.D. 2000.0". I don't know what the Climate of the Past Standards are, but they should be adhered to. I hope that Climate of the Past has not adopted "b2k"!

2) It is stated on line 2, page 1234, that : The stadials preceding GI-1, 8, 12, and 17, which are concurrent with the Heinrich events H1, H4, H5, and H6, are constrained by absolutely dated Brazilian speleothems (Wang et al., 2004) that support the long-term GICC05 dating (Fig. 5).

This is a careless and ambiguous way to discuss Heinrich events. I am sure what is meant here is that the Heinrich events (which are not climate events, but are specific iceberg discharge events) occur during stadial periods, and it is those stadial periods that are dated by the Brazilian speleothems. The Heinrich events are very short lived and do not last as long as the stadials with which they are associated, so it makes no sense to say that the stadials are "concurrent with" the Heinrich events.

I have four suggestions. First, in Figure 5, if you wish to show the timing of Heinrich events, show the dates of the Heinrich events from the available dating from North Atlantic sediment records. Second, if you wish to also show the dates of the stadials, as dated in Brazil, show them, but label them correctly as stadials, not Heinrich events. Third, make the distinction clear in the text. Although it has become commonplace to

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say "Heinrich event" both for the iceberg discharges, and for the the cold stadial period during which a Heinrich event occurred, they are NOT the same thing. It would be very nice if this paper would clarify this, rather than add to the confused terminology in the literature. Fourth, make it clear what you think the Brazilian records show. As noted above and by Genty, there is are assumptions here about the relationship between Greenland climate and Brazilian climate. What are those assumption? What are the implications if those assumptions are wrong?

#### MINOR COMMENTS:

Page 1236, line 24: In order to interpret the climatic signal provided by the ice cores and to enable comparison with other paleoclimatic records [insert comma] accurate time scales are crucial.

Page 1237, line 15 This period includes the Holocene, the last glacial period and the termination of the previous interglacial period [delete hyphen, insert comma] the Eemian.

Page 1237, line 17 "glacial ice to be thicker than in [delete "all"] other Greenland ice cores [insert "recovered so far"]

If you say "all" then you are precluding future ice cores that may have thicker glacier ice.

Page 1239, line 12. It is stated that

the Maximum Counting Error (MCE) and is regarded as a 2sigma error of the time scale

but in the Abstract it says this is a 1 sigma error. Which is it?

Line 13 page 1240, you need to define "ECM". Not everyone reading this paper will be an ice core specialist!

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