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Climate of the Past Discussions

Interactive comment on "Correlation of Greenland ice-core isotope profiles and the terrestrial record of the Alpine Rhine glacier for the period 32–15 ka" *by* M. G. G. De Jong et al.

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We thank AR2 for his/her response. We would like to comment on the points of criticism in the second report as follows.

The level 3 and level 4 division: The division is an interpretation of trends, trend changes and patterns in the data. The interpreter picks those boundaries which he judges to be relevant – meaningful in the vertical direction; persistent in the lateral direction - thereby using his set of criteria. The criteria we use have been defined and explained in Chapter 3; major points are:

- we focus on trend changes in the input data which are expressed as negative, up-to-

the-left, turning-points in the trend curves;

- we select the trend changes which bound packages that can be interpreted as climate oscillations; the INPEFA motif of a full climatic oscillation is a kind of C-shape or semi-circular shape with negative turning-points at top and bottom (Figure 1);

- differences of INPEFA pattern between boreholes are commonly apparent, but the upward succession of intervals between matched turning-points may still be confidently correlated;

- while we can expect synchroneity of the events that define the succession of climatic changes, we also expect that the detailed pattern will differ from ice core to ice core at all scales, because of differences in local response to the same climatic changes.

There is always an element of subjectivity in graphical correlation and generating a correlation & scheme. Systematic application of the criteria and prudence in picking boundaries, however, minimize the subjectivity.

As said before, our division is based on pattern analysis and matching of 3 ice cores and 2 data sets for each core. We maintain that this information cannot be ignored or be rejected as being random. And, we think that the study of the underlying mechanisms may benefit from our work.

The link between the Greenland and terrestrial proxies: From our terrestrial proxy we have presented and correlated in our manuscript only the major events. In addition to these, we have identified a large number of 'Lokalstadien' in the area of the Rhine glacier: landforms and deposits which represent relatively short-lasting stationary events in the overall retreat of the Rhine glacier into the Alps following maximum glaciation. Please refer to De Jong (1983), De Jong et al. (1995), De Graaff et al. (2007) and Seijmonsbergen (1992) - and the map enclosures therein - for details. We suspect the 'Lokalstadien' to be linked to subtle climate changes, although we cannot 'prove' this. The exact timing of the events is uncertain; Table 2 of De Graaff et al.

(2007) presents an estimate, based on their position in the total sequence of events. Work is ongoing on 10Be age dating of a number of the 'Lokalstadien'; our plan is to present the results in due time.

Linking these 'Lokalstadien' with specific oscillations in the Greenland ice cores is tempting. We consider the uncertainty too large at the current state of the art to do so. We should, however, have mentioned in our manuscript that the existence of high-order events in the terrestrial proxy may be considered, in broad terms, as corroborative evidence for the presence of high-order oscillations in the Greenland ice-core data. We will do so in the next version of the manuscript.

We hope and feel that we have addressed correctly and adequately the points of criticism raised by AR2 in his/her second interactive comment. We look forward to the reaction of the Editor.

Interactive comment on Clim. Past Discuss., 7, 4335, 2011.