

Interactive comment on “Synchronisation of the EDML and EDC ice cores for the last 52 kyr by volcanic signature matching” by M. Severi et al.

M. Severi et al.

Received and published: 20 June 2007

Authors' response to reviewer in bold.

General: The authors have linked the two EPICA ice cores (EDC and EDML) over the last 52 ka using the volcanic signals, mainly the sulphate peaks. This linking of the depth scale allowed them to compare the glaciological age scale by comparing the duration between successive volcanic events. Establishing a common chronology among ice core records and still better among all paleorecords is essential for their climatological interpretation. The authors find deviations of about 20% between the two ice core chronologies, which they attribute mainly to uncertainties in the estimates of past accumulation rates. But from the generally good agreement between the age scales especially over the glacial termination they conclude that the estimate of past accumulation rates from the isotopic records is justified. The paper is of sound scientific

quality (except the conclusion on the accumulation rate estimate; see comment “p. 420, l. 13ff and p. 422, l. 6ff” below). The manuscript is clearly structured and well written.

Specific comments:

page 410, l. 25: I suggest to use “..time resolution better than ..” instead of “.. time resolution higher than ..”

Changed

p. 412, l. 4: “This implied a requirement to ..” -> “This required to ..”

Changed

p. 412, l. 10: “ .. and preserved in ice or sediment stratigraphies as, respectively, tephra layers and sulphate (and in second order acidity and conductivity) spikes.” -> “Ě and preserved in ice or sediment stratigraphies as tephra layers and/or sulphate (and as a consequence acidity and conductivity) spikes.”

Changed

p. 415, l. “In the figure are also shown three known and well-dated volcanic events: the eruption of Krakatau (year of eruption 1884 A.D.), the double spikes of Tambora (1815 A.D.) and an unknown eruption 5-6 years earlier;” There is a contradiction: three “known .. events” of which one is “an unknown eruption..” “In the figure are also shown ..” is not adequate beginning of the sentence because what follows is not an additional feature shown in the figure. Suggestion: “There are three well-dated volcanic events: the eruption of Krakatau (year of eruption 1884 A.D.), the double spikes of Tambora (1815 A.D.) and an unknown eruption 5-6 years earlier;”

Changed according to reviewer’s suggestion.

p. 416, l. 29: “..to fill in the sections between.”-> “.. to fill in the sections inbetween.”

Corrected

p. 417, l. 20: “transferring EDML depth to EDC depth and then using the EDC3 timescale.” I suggest to move “ and then using the EDC3 timescale” to the caption of Fig.7 (e.g. “plotted on the EDC3 age scale”)

Done

p. 419, l. 28: “(1) different glaciological settings upstream of the drilling site (higher surface elevation, possibly different origins of the precipitations, etc.)” The authors should mentions here to what extent these upstream corrections have been considered in the glaciological model (or not at all?).

We added a sentence in the manuscript to summarise what have been considered in the glaciological model.

p. 420, l. 13ff (and p. 422, l. 6ff): “Given that these methods are virtually independent this is good proof of the applicability of the thermodynamic relationship of water vapour saturation pressure to derive past accumulation rates that can be regarded as largely representative for high resolution reconstruction of e.g fluxes of aerosol deposition.” This conclusion cannot be drawn like this. The chronologies are not that independent. The thermodynamical estimate of the accumulation rates are similar. The chronologies are based on common absolute time markers (which are essential for any glaciological model).

We changed our sentences taking into account the reviewer’s suggestion.

p. 420, l. 20: Define “AIM”

Done

Fig. 2 caption: There seems something odd with the first sentence.

The caption has been changed.

(General comment: “sulfate (Am)” or “sulphate (Br.)”? about 50

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Corrected: only sulfate (Am) used throughout the paper.

Fig. 3 (and p. 415, l. 26): “..in order to point out the link established between different kind of records.” What do the authors want to express with that statement? First, sulphate and DEP are anyway strongly linked, and, second, there is the EDC96/EDC99 link which has nothing to do with the main subject of this paper.

We reported the EDC96/EDC99 stratigraphic link in Fig. 3 because, while the EDML stratigraphy is continuous, the top 770 m of the EDC99 core was not measured by FIC, but only by DEP. FIC in the top part of the EDC core was run only in the EDC96 core, and the EDC/EDML comparison needed also the link between the two EDC cores, which was only possible using DEP. For this reason we decided to keep the DEP profiles in the figure.

We hope to have fully answered the questions raised by the referee and we thank him/her for his/her useful comments that improved the scientific quality of the paper.

Interactive comment on Clim. Past Discuss., 3, 409, 2007.

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