

Interactive comment on “IceChrono v1: a probabilistic model to compute a common and optimal chronology for several ice cores” by F. Parrenin

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Reviewer 2 has provided a thorough review of the paper by Parrenin. However in doing so, they make the comment "The Datic chronologies (first Lemieux-Dudon et al., 2010 and then AICC2012) have not been universally accepted as the best timescales for the various ice cores, and have caused widespread timescale confusion. (A recent paper in Nature by Weber et al. 2014 is a good example of this confusion)." As chair of the EPICA science group, I feel that I should clarify any such confusion, although I am not convinced that it exists.

The EPICA community has tried very hard to be absolutely clear what are the official,

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approved age models for the EDC and EDML cores, precisely in order to avoid the confusion that surrounded earlier ice core projects. Our goal has been to keep the age model as stable as possible, changing the recommended version only when significant new information or methodology had been added.

The first age model for EDC extended back only 45 ka, and was announced as EDC1 in 2001 by Schwander et al. (2001). The second age model, covering 740 ka, was again clearly announced as EDC2 in the EPICA community paper (EPICA, 2004). In the absence of an official age model for EDML, the first paper using the EDML record (EPICA, 2006) was presented on a GICC05 (Greenland) timescale, with EDML data placed on this through synchronisation of methane records between EDML and Greenland.

The first age model that covered both EDC and EDML, along their entire length, resulted in the EDC3 and EDML1 timescales. These were exposed in an entire special issue of *Climate of the Past* (The EPICA (EDC and EDML) ice cores age scales). Different papers described components that went into the age model, while the final age scales were summarised in two papers (Parrenin et al., 2007; Ruth et al., 2007).

It is true that a few papers, looking at the last climatic cycle, and with a particular interest in phasing between Greenland and Antarctica, used the timescale presented in the early DATICE paper (Lemieux-Dudon et al., 2010). This was never a recommended age model. One of the motivations for replacing EDC3 and EDML1 by AICC2012 was to avoid any need to use such an "unofficial" age model, by providing a recommended "official" age model that was synchronised to a much-used Greenland age scale (GICC05), while also carefully considering all other age constraints that might be included.

The EPICA community of scientists agreed that the ability to include knowledge from several cores, and to synchronise (as far as possible) with an accepted Greenland age model, justified the need for a new age model, which was issued as AICC2012

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(Bazin et al, 2012; Veres et al., 2012). Its working title at the early stages of the work was "EDC4", and it was clearly intended to replace EDC3 and EDML1 as the recommended timescale. The main groups and people involved in EDC3 were strongly involved in AICC2012 as its replacement and there is therefore no reason for anyone to "not accept" AICC2012, and instead use its less comprehensive predecessor.

The supplementary files that present the AICC2012 age model for each core have been deposited at Pangaea (www.pangaea.de) and at NCDC (paleo) where it can be found at http://hurricane.ncdc.noaa.gov/pls/paleox/f?p=519:1:0:::P1_STUDY_ID:15076. Unfortunately, the curators of the NCDC paleo site were unable to add it to the ice core pages where the old EDC3 age model appears, we understand because of impending structural changes. This is outside our control, and it is possible that this is the reason that the recent paper by Weber et al, referred to by reviewer 2, used EDC3. I agree that we should work with NCDC to rectify this as soon as possible. While it is regrettable if people use an old age model, as long as they clearly set out which model they used, I cannot see why any confusion should exist. AICC2012 is the age model recommended by the entire EPICA project. It will certainly not be the final age model (I think Parrenin used the word "last" to mean "most recent", not to mean "final") but for now it is the best available, and I want to clarify that we recommend all scientists to use it in preference to earlier official and unofficial age models.

Bazin, L., Landais, A., Lemieux-Dudon, B., Kele, H. T. M., Veres, D., Parrenin, F., Martinierie, P., Ritz, C., Capron, E., Lipenkov, V., Loutre, M. F., Raynaud, D., Vinther, B., Svensson, A., Rasmussen, S. O., Severi, M., Blunier, T., Leuenberger, M., Fischer, H., Masson-Delmotte, V., Chappellaz, J., and Wolff, E. W.: An optimised multi-proxy, multi-site Antarctic ice and gas orbital chronology (AICC2012): 120-800 ka, *Climate of the Past*, 9, 1715-1731, 2013.

EPICA Community Members: Eight glacial cycles from an Antarctic ice core, *Nature*, 429, 623-628, 2004.

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EPICA Community Members: One-to-one hemispheric coupling of millennial polar climate variability during the last glacial, *Nature*, 444, 195-198, 2006.

Lemieux-Dudon, B., Blayo, E., Petit, J. R., Waelbroeck, C., Svensson, A., Ritz, C., Barnola, J. M., Narcisi, B. M., and Parrenin, F.: Consistent dating for Antarctic and Greenland ice cores, *Quat. Sci. Rev.*, 29, 8-20, 2010.

Parrenin, F., Barnola, J. M., Beer, J., Blunier, T., Castellano, E., Chappellaz, J., Dreyfus, G., Fischer, H., Fujita, S., Jouzel, J., Kawamura, K., Lemieux, B., Loulergue, L., Masson-Delmotte, V., Narcisi, B., Petit, J. R., Raisbeck, G., Raynaud, D., Ruth, U., Schwander, J., Severi, M., Spahni, R., Steffensen, J. P., Svensson, A., Udisti, R., Waelbroeck, C., and Wolff, E. W.: The EDC3 chronology for the EPICA Dome C ice core, *Climate of the Past*, 3, 485-497, 2007.

Ruth, U., Barnola, J. M., Beer, J., Bigler, M., Blunier, T., Castellano, E., Fischer, H., Fundel, F., Huybrechts, P., Kaufmann, P., Kipfstuhl, J., Lambrecht, A., Morganti, A., Oerter, H., Parrenin, F., Rybak, O., Severi, M., Udisti, R., Wilhelms, F., and Wolff, E. W.: "EDML1": A chronology for the EPICA deep ice core from Dronning Maud Land, Antarctica, over the last 150,000 years, *Climate of the Past*, 3, 475-484, 2007.

Schwander, J., Jouzel, J., Hammer, C. U., Petit, J.-R., Udisti, R., and Wolff, E. W.: A tentative chronology for the EPICA Dome Concordia ice core, *Geophys. Res. Lett.*, 28, 4243-4246, 2001.

Veres, D., Bazin, L., Landais, A., Kele, H. T. M., Lemieux-Dudon, B., Parrenin, F., Martinierie, P., Blayo, E., Blunier, T., Capron, E., Chappellaz, J., Rasmussen, S. O., Severi, M., Svensson, A., Vinther, B., and Wolff, E. W.: The Antarctic ice core chronology (AICC2012): an optimised multi-parameter and multi-site dating approach for the last 120 thousand years, *Climate of the Past*, 9, 1733-1748, 2013.

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