Clim. Past Discuss., 8, C3520–C3521, 2013
www.clim-past-discuss.net/8/C3520/2013/

Climate of the Past Discussions

Interactive comment on "An optimized multi-proxy, multi-site Antarctic ice and gas orbital chronology (AICC2012): 120–800 ka" *by* L. Bazin et al.

Anonymous Referee #4

Received and published: 7 March 2013

This paper aims to present a coherent and accurate ice core timescale for Antarctica for the time period 120-800ka (with the companion paper concentrating on <120ka). This includes ice ages as well as gas ages with estimates of uncertainties. The authors' approach is to use an inverse dating method that aims for the best compromise between stratigraphic (absolute) time markers and background scenarios based on flow, densification and thinning. This method has been developed in a previous work for the last 50ka (Lemieux-Dudon et al. 2010) and is extended in this study to the last 800ka. New to this study is the addition of a large number of orbital time markers for the EDC and TALDICE ice cores based mainly on new measurements of d18Oatm and the incorporation of orbital time markers based on total air content and dO2/N2. The constructed new chronology AICC2012 is compared to the previous timescale EDC3 for Epica DomeC and as a short application the onset and duration of MIS5 is

shortly addressed and compared with independent estimates based on precisely dated speleothems records. Besides providing a coherent timescale for 4 Antarctic ice cores (with their various gas, aerosol and climate records) this work gives additional insights into the relationship of temperature change among the 4 records but also about synchronicity between CH4 emissions and the climate record from very precisely dated speleothems. As none of this climate relations have been used as time markers the authors avoid the danger of a circular argument. Ice core timescales are dynamic and will continuously change over time when more and new relative or absolute time markers become available. Also new ice core records as the mentioned records from WAIS, Dome F and NEEM will significantly improve our understanding and further reduce uncertainties in ice core dating. These findings presented here are impressive and highly relevant not only within the ice core community. They also link to various other independent archives of past climate. While further improvements will certainly/hopefully occur in the future (in AICC2015?, AICC2020?) this current state of the dating as presented in this manuscript should be published, thus allowing to fully exploit the wealth of climate information in the various ice core records of Antarctica.

Interactive comment on Clim. Past Discuss., 8, 5963, 2012.