

## Volcanic synchronization of Dome Fuji and Dome C Antarctic deep ice cores over the past 216 kyr

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Two deep ice cores, Dome Fuji (DF) and EPICA Dome C (EDC), drilled at remote dome summits in Antarctica, were synchronized to better understand their chronology. A total of 1401 volcanic tie points were identified covering the past 216 kyr. DFO2006, the chronology for the DF core characterized by strong constraining by the O<sub>2</sub>/N<sub>2</sub> age markers, was compared with AICC2012, the chronology for 5 cores including the EDC core, and characterized by glaciological approaches combining ice flow modelling with various age markers. The age gaps between the two chronologies are within 2 kyr, except at Marine Isotope Stage (MIS) 5. DFO2006 gives ages older than AICC2012, with peak values of the gap of 4.5 kyr and 3.1 kyr at MIS 5d and MIS 5b, respectively. Accordingly, ratios of duration DFO2006/AICC2012 are 85% at a period from the late stage of MIS 6 to MIS 5d and 114% at a period from MIS 5d to 5b. We then compared the DFO2006 with another chronology of the DF core, DFGT2006, characterized by glaciological approaches with weaker constraining by age markers. Features of the DFO2006/DFGT2006 age gaps are very similar to those of the DFO2006/AICC2012 age gaps. This fact lead us to hypothesize that a cause of the systematic DFO2006/AICC2012 age gaps at MIS 5 are associated with differences in the dating approaches. Besides, ages of speleothem records from China agreed well with DFO2006 at MIS 5c and 5d but not at MIS 5b. Thus, we hypothesize at least at MIS 5c and 5d, major sources of the gaps are systematic errors in surface mass balance estimation in the glaciological approach. Compatibility of the age markers should be carefully assessed in future.

Keywords: ice core, dating, Milankovitch, Dome Fuji, Dome C, Antarctica