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Climate of the Past Discussions

Interactive comment on "Rapid coupling of Antarctic temperature and atmospheric CO_2 during deglaciation" *by* J. B. Pedro et al.

Anonymous Referee #2

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General comments:

Ice core CO2 records show that CO2 is strongly correlated with Antarctic temperature. However, the exact phase relationship and control mechanisms remain unclear. The authors utilise a recently developed proxy for regional Antarctic temperature in order to better compare CO2 with Antarctic temperature during the last glacial termination. The results are similar to those from previous studies, but important to paleoclimate and carbon cycle research communities. This paper would have benefited by clarifying or better wording as suggested in the "Specific comments."

Specific comments:

Title: It is not entirely clear if the "rapid" is well supported in the paper (see comments

for Page 622, Line 13-14). "during the last deglaciation" could be better words than "during deglaciation" because the authors calculated and discussed only for the last glacial termination.

Page 622, Line 13-14: "faster... than... suggested by previous studies" may be misleading. The time lag calculated by the authors is smaller than the average of the previous results, but similar to some of the individual results.

Page 623, Lines 14-19: the authors should be cautious in comparing the time lags because previous studies used various methods with various focuses. For example, Fischer et al. (1999) compared CO2 with Antarctic temperature AT THE END of the glacial terminations while Monnin et al. (2001) did it AT THE ONSET of the last termination.

Page 624, Lines 3-4: It may be better to mention the age where the abrupt change was observed.

Page 624, Line 26 and Page 625, Line 2: Specify "stratigraphic makers." If they represent age tie points, those ages should be provided in the paper.

Page 626, Line 25: "Fig. 1B" instead of "Fig. 2B"?

Page 627, Lines 15-17: Should be compared with Ahn et al. (2004)'s results, too.

Page 627, Lines 17-20: The calculated time lags from Monnin et al. (2001) & Loulergue et al. (2007) are relevant only to the start of the last termination. Thus, the comparison with the average time lag during the entire termination should be reconsidered.

Page 628 Line4 $\sim$ Page 630 Line 14: It would be informative to readers if the authors shortly explain the CO2 control mechanisms on longer (glacial-interglacial) timescales. The discussion focuses only on millennial CO2 variations.

Page 631, Line 4: "Antarctic temperature" and CO2 lag?

Page 631, Lines 5-6: "However, if the response in the Southern Hemisphere is instan-

taneous, then higher resolution records may not be sufficient" could be deleted.

Fig 1. Locations of Vostok and Dome C sites should be marked on the Antarctic map.

Fig 2. Gray part (no significant trend) of 14.6∼14.8 ka seems to correspond to a cooling period. The boundary between gray and pink at 11.68 ka could be moved to 11.6 ka.

Interactive comment on Clim. Past Discuss., 8, 621, 2012.