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Climate of the Past Discussions

Interactive comment on "Towards orbital dating of the EPICA Dome C ice core using $\delta O_2/N_2$" *by* A. Landais et al.

Anonymous Referee #2

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General Comments

The accurate dating of climate records of deep polar ice cores is an important task of the scientific community without having a satisfying solution so far. Landais et al. contribute to that topic. The paper presents the first deltaO2/N2 record of trapped air from the EPICA Dome C ice core covering the period between 300 and 800 ka and discuss the approach of orbital dating for that specific core and time span. Landais et al. mainly conclude that the EDC3 age scale is generally correct within its published uncertainty (6ka). In my opinion the paper is important although no additional constraints for the dating have been made. It should be published with some minor revisions because it points to some substantial problems with the orbital tuning approach via dO2/N2 and give the scientific community worthwhile hints how the method and data acquisition

can be improved. The paper is well structured and gives proper credit to related work.

Specific comments:

1. EDC raw data, gas loss corrections

It might be point out that the corrections only account for a homogenous gas loss, ignoring potential small-scale gas loss variations due to micro-structural differences. By comparing the data of series 1 (stored at -25°C and xx for gas loss) and series 3 (stored at -50°C) in the overlap region (Fig 1. $\sim$380ka - 450 ka) one can see not only a constant shift but also small-scale variations pointing to small-scale gas loss variations. The authors decide to ignore the data of series 1 in the overlap region (which might be the best choice) but they use the series 1 data in regions without overlap which could lead to quite a large uncertainty especially in such a sparse data set in which the comparison to the insolation signal is on the limit of the sampling theorem (almost every data point in the deltaO2/N2 record is interpreted as a representation of one period in the insolation signal).

2. Possible constraints on the duration of MIS11

In my opinion it is an over interpretation of the correspondence between deltaO2/N2 and the 75° S 21 December insolation when the authors formulate an (possible) constraint on the duration of MIS11. To strengthen the limitation of the approach I would remove the focus on MIS11 (at least Fig. 8.).

Interactive comment on Clim. Past Discuss., 7, 2217, 2011.