Atmos. Chem. Phys. Discuss., 7, S8512–S8513, 2008 www.atmos-chem-phys-discuss.net/7/S8512/2008/ © Author(s) 2008. This work is distributed under the Creative Commons Attribute 3.0 License.



ACPD

7, S8512–S8513, 2008

Interactive Comment

## Interactive comment on "Modeling cosmogenic radionuclides <sup>10</sup>Be and <sup>7</sup>Be during the Maunder Minimum using the ECHAM5-HAM General Circulation Model" by U. Heikkilä et al.

## Anonymous Referee #2

Received and published: 17 January 2008

In this paper, the authors investigated the major factors influencing the concentrations of cosmogenic radionuclides (10Be and 7Be) measured in ice cores, by comparing 10Be and 7Be concentrations and deposition fluxes during Maunder Minimum (MM) and Present Day (PD) modeled with the ECHAM5-HAM GCM. The authors showed that the 32% increase in the mean global production rate of 10Be during MM leads to about 32% increase in the total 10Be deposition and the zonally averaged 10Be deposition change deviates locally (due to changes in precipitation rate and transport) only by around 8% from the mean increase of 32%. The authors conclude that the climate changes do influence the 10Be deposition fluxes but not enough to disturb the production signal significantly, and thus the common method to reconstruct the solar



activity from the 10Be measured in ice core is reasonable. This paper is well written and the scientific questions addressed are within the scope of ACP. I recommend the publication of the paper in ACP after the following comments are addressed.

1. Table 1 gives 10Be and 7Be global averages in MM and PD and change. Fig. 7 shows the 10Be deposition fluxes and change at different latitude. I would suggest that authors present a figure showing the zonally averaged vertical distribution of mean 10Be production change (in percentage) between MM and PD. The latitude and altitude distributions of mean 10Be production change will provide useful information about the maximum and minimum regions of the change that will help the readers to better understand the deposition flux change at different latitude and also the discussion with regard to stratosphere-troposphere exchange.

2. Field et al. (J. Geophys. Res., 111, D15107, 2006) studied production and climaterelated impacts on 10Be concentration in ice cores using the Goddard Institute for Space Studies ModelE GCM. Field et al. found significant latitudinal differences in the response of 10Be fluxes to 10Be production changes. They also showed significant climate-related 10Be concentration variation in both Greenland and Antarctica, which appears to be different from one conclusion of this paper (i.e., small climate-induced changes especially in polar regions). The author briefly mentioned the work of Field et al. in the Introduction. I think that the results of Field et al. should be discussed in more detail. Specifically, the authors should discuss both the consistency and difference between Field et al.'results and their own findings.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15341, 2007.

## ACPD

7, S8512–S8513, 2008

Interactive Comment

Full Screen / Esc

**Printer-friendly Version** 

Interactive Discussion

**Discussion Paper** 

