Clim. Past Discuss., 8, C2833–C2834, 2012
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Climate of the Past Discussions

Interactive comment on "Spatial gradients of temperature, accumulation and δ^{18}O-ice in Greenland over a series of Dansgaard-Oeschger events" *by* M. Guillevic et al.

Anonymous Referee #1

Received and published: 15 December 2012

Gillevic et al. reconstructed magnitudes of temperature changes (including d18Oice) as well as accumulation rate change for the D/O events (8-10) using nitrogen isotopes occluded air in NEEM ice cores from Greenland. Then, the results were compared with other temperature and accumulation rate reconstructions from different sites (NGRIP and GISP2). Results are important for ice-sheet modeling and more importantly for climate modeling community providing temperature constrains for abrupt climate changes on Greenland. Therefore, I recommend publishing this paper in CP with minor revision. Especially, it will be beneficial if it includes more discussion on the causes of differences in magnitude of temperature changes during abrupt climate change in different sites in Greenland, which should be useful for wider audiences. You can probably look

more into climate modeling studies and modern climate condition of NEEM, GISP2, and NGRIP (different altitudes and latitudes) to investigate the causes.

Here, I describe some specific comments on the papers.

p5211. Abstract. It would be useful to provide values of temperature changes including uncertainties for each D/O events in different sites. Also, it would be good to describe your hypothesis for causes of the difference of temperature changes.

p. 5219. Line 10. You may want to cite (Craig et al., 1988) and (Schwander, 1989) for gravitational fractionation and (Severinghaus et al., 1998) for thermal fractionation.

p. 5221. Line 8. Have you considered changes in depth of convective zone? NEEM site may have experienced stronger katabatic winds during the deep glacial period.

P. 5225. Line 8. "(within uncertainties)" means not significant? Please provide confidence interval. For temperature estimates, you have to provide uncertainties in main text as you already calculated in Appendix, and also specify 1 sigma or 2 sigma somewhere in main text.

p. 5229. Line 27. Please provide uncertainties. These estimates are important but needs uncertainty estimates to be useful.

Craig, H., Horibe, Y., and Sowers, T.: Gravitational Separation of Gases and Isotopes in Polar Ice Caps, Science, 242, 1675-1678, 1988. Schwander, J.: The transformation of snow to ice and the occlusion of gases, in: Glaciers and Ice Sheets, edited by: Oeschger, H., C. C. Langway Jr., John Wiley, New York, 53-67, 1989. Severinghaus, J. P., Sowers, T., Brook, E. J., Alley, R. B., and Bender, M. L.: Timing of abrupt climate change at the end of the Younger Dryas interval from thermally fractionated gases in polar ice, Nature, 391, 141-146, 1998.

Interactive comment on Clim. Past Discuss., 8, 5209, 2012.