Clim. Past Discuss., 7, C634–C636, 2011
www.clim-past-discuss.net/7/C634/2011/

Climate
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Discussions

Interactive comment on "Rare Earth Elements from an ice core in the Atlantic sector of Antarctica indicate a dust provenance change at the end of the last deglaciation" *by* A. Wegner et al.

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Received and published: 26 May 2011

Using REE patterns from the EPICA ice core drilled at Dronning Maud Land, the authors place constraints on the source regions of aeolian dust between about 26,500 BP and 7,500 BP. I understand that this study represents a lot of work and I have no problems in accepting that during the last glacial era the dust came essentially from southern South America.

On the other hand, it is my impression that the authors are pushing the analytical capabilities to, if not beyond, their limits. The low dust concentrations during the Holocene result in REE concentrations close to the analytical blanks and I wonder how trustable

the REE data can be after correcting for blanks. Many of the patterns shown in Fig. 4 (but also in Fig. 6) look funny and cannot easily be assigned to any specific minerals or rocks. For example, Gd or Tb anomalies are not normally observed in terrestrial rocks or minerals. Also, some patterns show a strange odd–even variation where elements with odd atomic numbers appear to be elevated. To me, this strongly points to analytical artifacts. This is also true for the blank pattern where Tb, Tm, and Lu are elevated in comparison to the elements with even atomic numbers next to them.

If the authors indeed have used Wedepohl's 1995 upper crustal REE concentrations for normalization (I have found no values for Er and Tm in his table), instead of the bulk crustal values, they should consider to switch to better data sources. Wedepohl's upper crustal Gd concentration (2.8 ppm) seems to be low by about 25% and his Lu concentration (0.27 ppm) seems to be high by about 10 to 15%. A better data source is:

R. L. Rudnick & S. Gao (2005) Composition of the continental crust. In: The Crust, Vol. 3 Treatise on Geochemistry (eds. H.D. Holland and K.K. Turekian), R. L. Rudnick [Editor], Elsevier–Pergamon, Oxford, pp. 1–64

I do not object that this study gets published but I suggest that the authors take a more conservative approach in their discussion of source areas for the Holocene ice core samples. The data should not be strained beyond their limits. Although this presents quite a bit of work, I feel that it will be worth it.

As a geologist, I would have been interested in knowing whether there is any information on the mineralogical composition of the dust. If yes, the information should be included in the paper. Moreover, I wonder on which basis the potential source areas other than southern South America were chosen (for example, why south-eastern Australia and not south-western Australia).

Please also note the supplement to this comment:

http://www.clim-past-discuss.net/7/C634/2011/cpd-7-C634-2011-supplement.pdf

Interactive comment on Clim. Past Discuss., 7, 601, 2011.