Clim. Past Discuss., 4, S35–S36, 2008
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Climate of the Past Discussions

Interactive comment on "An improved method for delta ^{15}N measurements in icecores" *by* F. S. Mani et al.

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Received and published: 20 March 2008

Comments on Mani et al., manuscript entitled "An improved method for delta 15N measurements".

This manuscript provides an important new benchmark for d15N measurements in air and trapped gases in ice core samples. The technique is elegant and rather straightforward with the obvious drawback of not yielding ratios of other species from the same sample. However, since the objective is to search for small abrupt temperature changes, this "short-coming" is not really relevant. The manuscript is well written and deserves to be published with minor revisions.

I do have some questions that, when addressed, should improve the manuscript. First,

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the d15N profile from Berkner Island firn air is unusual. In every d15N profile from numerous sites that I've seen, d15N shows a shallow enrichment due to the previous winter cold bump still apparent in the firn. This normally occurs around 15m. Below about 20m, d15N increases in a linear fashion owning to gravitational fractionation. In fact, the linear nature of this purely diffusive region is normally used to extrapolate to the surface to determine the depth of the convective zone below the surface. There doesn't appear to be any samples between 25 and 50mbs that would normally be used to establish the convective region. I may have missed this but I think a few words could be added to address this issue and the significance of the d15N profile at Berkner Island in terms of firn air transport (lock-in, convective?).

Secondly, I'm somewhat concerned about the two air samplings yielding d15N values that differ by 0.03? (Table 3). This is a huge difference given the two days that separate the two samplings. This is troubling and really needs an explanation. If real, then there are some very large sources/sinks of atmospheric N2 with very anomalous d15N values. If real, this could potentially be a unique tracer of nitrogen dynamics that we have not had access to till now. If this is an artifact, it goes without saying that the utility of the method would not gain us additional information about abrupt paleo temperature swings recorded in ice core bubbles.

It would also be nice to discuss the origin of the 15N/14N ratio of your working standard (s). I'm surprised to see such a large difference between the results with and without O2 in Table 3 and the fact that the values deviate so much from zero as they are the effectively the internationally recognized standard for such measurements.

Interactive comment on Clim. Past Discuss., 4, 149, 2008.

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