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Climate of the Past Discussions

Interactive comment on "Iron fluxes to Talos Dome, Antarctica, over the past 200 kyr" *by* P. Vallelonga et al.

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Dear Dr Kulkarni,

We thank you for your comment regarding the contribution of volcanic ash particles to Fe fluxes in the Talos Dome ice core. We did not classify ash particles separately from mineral dust particles, but precautions were taken to ensure that visible ash layers were not analyzed. We would expect that there is the possibility of some volcanic ash being present in the samples, but we are confident that the presence of such ash would not greatly alter our results or their interpretation, for the following reasons:

1) Visible ash layers were removed prior to CFA sampling. The CFA processing procedure for the Talos Dome ice core is described on the TALDICE website

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(http://www.taldice.org/awi/index.php). After the 34 mm x 34 mm CFA piece was cut on the bandsaw, visible ash layers were cut away for tephra analysis. This ensured that only non-visible ash layers could have potentially been introduced into the CFA system.

2) Any volcanic ash in the samples would have been further diluted by the multi-year sampling inherent in each measurement. As noted in the manuscript, each measured sample was an integration of a 1 metre long section of ice, which corresponded to between 15 and 700 years of snow deposition. Hence the effect of one large volcanic eruption is likely to be much diminished by the other years sampled in the same CFA section.

An important question is whether the Fe content of volcanic ash varies from that of mineral dust. Only if volcanic ash is very enriched (or depleted) in Fe, can it have any great effect on the results obtained. There is some evidence to suggest that Fe and Al (and presumably other metals) emitted from volcanoes are more soluble than that sourced from dust (Gabrielli et al., 2008; Spolaor et al., 2012), but a thorough study is required. If Dr Kulkarni can provide any information regarding the enrichment or enhanced solubility of Fe in volcanic ash, it would be a valuable contribution to our understanding of the potential contribution of volcanic Fe to Southern Ocean primary productivity.

References

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Interactive comment on Clim. Past Discuss., 8, 6093, 2012.