

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

Anonymous Referee #3

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The study presents a new data set of acid leachable iron concentrations from an Antarctic ice core (Talos Dome) over the past 200 kyr. Fe fluxes at Talos Dome were larger than those at Dome C and show different trends during deglaciation and early Holocene. The differences are attributed to a reorganization of atmospheric transport pathways.

This new Fe data set is valuable for improving the understanding of temporal changes of dust sources and dust transport to Antarctica and for constraining the effect of iron fertilization on Southern Ocean CO₂ sequestration. Further it gives evidence that the dust tracers total particle mass, Fe, and non-sea salt Ca²⁺ show different temporal behavior. This is an important finding for future interpretation of dust proxies.

However, with respect to this last finding I miss a more cautious discussion about the
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effect of the analytical method. Is acid leachable Fe a conservative proxy or does it depend on dust load, dust particle sizes, and dust composition? Could a non-conservative behavior explain the differences compared to the other dust proxies? I am aware that this is a non-trivial problem, inherent with the analysis of colloids in ice, for which the ice core community has not come up with a satisfying solution. Nevertheless, the point should get more attention.

Generally the manuscript is well written, but in some cases more detailed information is missing or the procedure is unclear as outlined in the following.

It would be good to show the Fe concentration record, which is the initial result of the analysis.

Using a running mean on data with so different temporal resolution is not adequate. This has to be adapted to the resolution. Especially the dust flux data in Fig. 1 seem to be discontinuous or with very different temporal resolution. Add in the figure caption what the different lines are.

In table 1 the fluxes are given, obtained from accumulation and concentration. However, I do not get the numbers given. Please check.

In fig. 3 the Dome C Fe fluxes are all zero. Can you use a log scale as you did for the dust flux?

A map of the sites discussed would be helpful.

Minor comments:

Page 6094, line 24: The term atmospheric coupling is not clear. Do you mean increased meridional transport?

Page 6097, line 24: Add Victoria Land, Antarctica,

Page 6098, line 18 and 23, page 6099, line 5: Indicate transition T1, “pre-Holocene dust minimum”, and ACR in Fig. 2.

Page 6098, line 13: The dust fluxes since 8 kyr BP are not shown in Fig. 2.

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