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Interactive comment on "Variability of sulfate signal in ice-core records based on five replicate cores" *by* E. Gautier et al.

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General comments.

This paper by E. Gautier and co-authors presents an interesting study of local scale variability of sulfate records achieved in a low accumulation site (Dome C, Antarctica), in order to assess the representativeness of a single ice core record for such reconstruction. One of the main outcome of this study is an intra-site variability larger than the one reported in literature for inter-site studies for most of the largest volcanic eruptions of the last 2 kyr. The most surprising result is the absence of the Tambora signature in 2/3 cores out of the 5 drilled and analysed in this work. The increasing interest in the last years in extracting information about climate forcing induced by volcanic eruptions recorded in ice cores makes this paper a good piece of science that deserves publication in "Climate of the Past" after few minor revisions. From a methodological

point of view, the authors use a new method with respect to recent literature to identify the volcanic spikes along each sulfate profile. The method is based on the calculation of a background non-volcanic level above which volcanic spikes are detected using a "moving window" in the depth profile. In my opinion it would be better to calculate the running mean in a constant temporal range (and not a constant depth range) but I think that to the purpose of this study it should not make a big difference in the obtained results.

Minor comments.

As concerning the Tambora eruption, in the text you write that 2 out of 5 cores don't show the sulfate peak while in the caption of figure 8 you write that 3 cores out of 5 don't show this signature. Correct the text according to what we can see from figure 8 (it seems to me that just 2 of the 5 cores show the sulfate peak and that there is no "intermediate" peak as written in the text). P. 3985 line 19 and following . . . .Change "Maximums" in maxima. It would be interesting to have a new table 2 showing two more columns: the mean volcanic flux and the corresponding SD; this would allow a direct comparison with the fluxes and uncertainties calculated in other papers dealing with this topic. There is no mention in the paper to the uncertainty of the IC measurements, but I believe that part of the differences in the maximum concentration of sulfate when a volcanic event is detected can be ascribed to the error associated to the measurement. Can you give an estimate of how big is this uncertainty with respect to the "real" uncertainty in the amount of sulfate deposition? For future works it would be important to know a few details of the sampling site (i.e. the approx. distance of the 5 cores from the FIRETRACC ice core and, above all, from the EDC96 and EDC99 drilling sites). P. 3990 line 8. Check the reference Sigl et al. that seems to be not correct.

Interactive comment on Clim. Past Discuss., 11, 3973, 2015.