Atmospheric
Chemistry
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Discussions

**ACPD**

**Interactive
comment**

# *Interactive comment on* "Year-round record of bulk and size-segregated aerosol composition in central Antarctica (Concordia site) Part 2: Biogenic sulfur (sulfate and methanesulfonate) aerosol" *by* Michel Legrand et al.

**Anonymous Referee #2**

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GENERAL

The paper presents measurements, results and analyses of sulfur aerosols at the Concordia station. The work is carefully done, it is a valuable paper for the interpretation of Antarctic aerosols and ice cores. As a highlight I would mention the interesting result of the interpretation of the MSA/nssSO4 and the photochemical destruction of MSA in summer. I can recommed publishing the paper in ACP, I only have minor revision suggestions.

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## DETAILED COMMENTS

The time series is fairly long – are there any statistically significant trends? Yes or no, it would be potentially important.

In the methods section: - sulfate might also come from the stations generator – could it? - was there any sector control?

P4L8-11 "sulfate depletion relative to sodium with respect to the seawater composition .." there is the reference to the full paper but you could add a sentence or two as an explanation of the depletion here, too.

Section 3.2.2 I am missing some comparison of HV and impactor data. I guess it has been done. A scatter plot with explanations would be nice.

In Fig 4: there are the average size distributions of the respective seasons. How about showing there some range? Also Becagli et al. (Atmos. Environ., 52, 98–108, 2012) showed size distributions measured at Dome C – make some comment on the main differences.

P8,L6-8 "Impactor data corresponding to the March-November time period (Fig. 7) show that RMSA is very poorly related to the $nssSO_4$ content (R2 of 0.01 and 0.06 for submicron and micron particles, respectively)". Fig 7 shows R vs MSA, not R vs $nssSO_4$. I suggest adding subfigures where this is shown.

P10L9-10 "Assuming a sulfate concentration of 250 ng m-3 for the continental free troposphere of the southern hemisphere, and applying a dilution factor of 18 based on 210Pb data" Please explain how the dilution factor of 18 was obtained. Any uncertainty estimate for it?

P10L26-27 "Considering a mean sulfate mixing ratio of 0.3 ppbm for the lower stratosphere, we estimate that stratospheric-tropospheric exchange may account for 0.4 ng m-3 of sulfate" Is 0.3 ppb = 0.4 ng/m3?

Table 2 shows R in midsummer. March is not really midsummer any more.

Figures with scatterplots: why don't you show the regressions there?

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