

# ***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 #1**

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This manuscript discusses the sources and processes affecting sulfate and MSA concentrations, and the MSA to sulfate concentration ratio, in the continental Antarctica. This is a very important topic, since the MSA to sulfate ratio has been widely used in estimating biogenic vs anthropogenic sulfur source sources as well as in interpreting ice core data. The measurement data used in this paper appears to be of good quality and the analysis itself is, in most part, scientifically sound. I have a few minor issues to be considered before accepting this paper for publication.

Main comments:

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End of section 3.2.2 and Figure 7: separating the data into those with sulfate concentration lower and larger than 100 ng/m<sup>3</sup> seems very artificial. What was the bases for this specific border? Do the authors have any idea why the two subsets showed much higher correlations than all the data together?

The discussion in section 3.2.4 is highly speculative. Furthermore, the authors only mention the destruction of MSA in cloud water in this section, even though multi-phase reactions have also reported to be an important source of MSA as also mentioned in section 3.2.1. The subsection 3.2.4 should be partially rewritten.

Page 10, lines 11-14: I have some difficulty in following the logic here. Please clarify, especially what you mean by overestimation here and what is the actual reason for it.

Page 12: lines 5-13: The linear fits given in Table 4 should also be presented in Figure 11. Besides correlations, how significant were the derived relations? A statement such as "the linear relationship . . . even less linear. . ." is meaningless/incorrect in a statistical sense and should be modified.

Minor issues:

Page 3, line 12: I do not think that this is an acceptable way of citing other ACP papers (Legrand et al. this issue).

Page 5, line 15: weakness in abundance? Strange wording.

section 3.2.2: should it be supermicron particles rather than micron particles?

Page 8, line 8: . . .the higher. . .the higher. Please check out the grammar

Page 9, line 4: des-appearance. Please check out the wording.

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