

Interactive comment on “Hydroxymethanesulfonic acid in size-segregated aerosol particles at nine sites in Germany” by S. Scheinhardt et al.

Anonymous Referee #1

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The manuscript presents extensive observations of HMSA in size-segregated particles for a range of different types of sites. Although HMSA can represent an important sulfur species, in particular as reservoir of S(IV), there exist only limited measurements. Thus, the work adds to the existing datasets, which is a valuable contribution. Generally, HMSA formation is expected to depend on formaldehyde and SO₂ (and pH), so pollutant plumes are likely as HMSA sources. The results of this work indeed suggests that HMSA is formed during aging of pollution plumes, based on the correlation with oxalate and sulfate. Furthermore, weak pH dependence was observed, which also is reasonable. The experimental work is thorough and the presentation is clear. Due to the limited data available for HMSA, this work fits well for ACP. I recommend publication after the consideration of the following comments:

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My main comment is that the motivation for studying HMSA is presented as its role as S(IV) reservoir species. It would be useful to address this aspect: How important for the sulfur budget is this role as judged by the presented measurements or can this not be evaluated?

Minor comments:

1. It would be helpful if the authors added a figure of the HMSA decomposition pathways to figure 1, or make a separate figure if this would make figure 1 too complicated. This will also help highlight the relationship to atmospheric sulfur chemistry, mentioned in the abstract.
2. P. 32628 line 3-5 “understanding of atmospheric oxidation processes”: This statement is too general. I recommend specifying what (aspects of) atmospheric oxidation processes.
3. First and second paragraph of section 3.1: It would be very helpful to discuss the contribution to total PM for the mentioned measurements already here. I realize this is in section 3.3., but to me it makes more sense to add this in here, especially as section 3.3 is very brief.
4. P. 32635, line 13: “liquid phase” Do the authors mean aqueous? I am not sure this is necessarily synonymous, although aqueous particles or cloud droplets are certainly liquid.
5. Section 3.3: What is the uncertainty of the numbers given and is the difference (2.21 vs 1.79) statistically significant?
6. Section 3.4: Does this mean that larger particles have higher pH? The question is whether multiple properties are correlated.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 32625, 2013.

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