Biogeosciences Discuss., 6, C3714–C3716, 2009
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Biogeosciences Discussions

Interactive comment on "Exchange of carbonyl sulfide (COS) between the atmosphere and various soils in China" *by* J. Liu et al.

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Received and published: 28 December 2009

This manuscript is certainly a nice piece of research work with useful data, reporting about the exchange of COS between soils from different provinces of China and the atmosphere. Data was acquired both from laboratory and field measurements showing a general uptake of COS for agricultural soils and forest soils, as already investigated by Van Diest and Kesselmeier [2008] for some agricultural and forest soils. In addition, an emission of COS was measured for two paddy soils. Furthermore, the authors emphasize the importance of ambient COS concentration, temperature and soil water content. Also the compensation points for some soils were compared at 17°C and 25°C, which showed an increase of the compensation point at increasing temperature.

Important comments:

1. Some of the comments are already mentioned by referee #1: e.g. the unclear description of the flux chambers on page 10562 line 11; the meaning of “certain sulfur-producing bacteria”; what is S(effect)?

2. On page 10561, line 6, you wrote “COS concentrations within the desired range were obtained by mixing compressed air (50ppt COS) with high-concentration COS gas (500ppb COS)”. It would be helpful to give more details about the mixing and how you preserve a constant COS concentration of e.g. only 500ppt in the cuvettes.

3. Kesselmeier et al. (1999) found a linear correlation of COS exchange and soil mass up to 100g soil per cuvette, which shifted to a saturation-like exchange behavior with increasing soil masses between 200g and 400g. In this study (page 10561 lines 23-26) you observed a saturation-like exchange behavior with increased soil mass already between 100g and 200g. Did you measure this behavior for all your soils?

4. Page 10562, line 16: “After flushing the chamber for 30min with ambient air,. . .” Please make clear if this air was taken from the ambient outside the cuvettes (in the field) or if the cuvette was flushed with air with an ambient COS concentration of ca. 500ppt? Was the actual ambient COS-concentration measured during the field-experiments?

5. Page 10564, lines 11-13: If the actual ambient concentration was measured and if this was lower than the compensation point (supposing that the cuvette was always flushed with 500ppt COS), is there an emission of COS possible?

6. Another question about the compensation point (page 10564, lines 24-26): What do you expect when the compensation point was measured at more than two temperatures? Is there a linear correlation between temperature and compensation point? It would be worthwhile for these soils to see what happens with the compensation point at a temperature less than 15°C. A linear correlation would suggest an increase of emission or a decrease of deposition with increasing temperature (and a constant ambient COS-concentration). But I would assume, according to the optimum deposition velocity

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you found at temperatures between 15 and 20°C for W1, W2 and F (page 10565, lines 8-10), you should find a higher compensation point at temperatures lower than 15°C (compared to the compensation point at 17°C).

7. Page 10565, line 7 and page 10566 line 9: I suggest adding the error (e.g. ± 80ppt as in line 7 of page 10563).

8. Page 10568, line 25-27: please explain: "the optimal soil WFPS for COS uptake from the investigated boreal soils in this study must be greater than 19%, especially for the soil from the forest".

For further investigations it would be nice to see if there is a correlation between the bulk density of the Chinese soils and the deposition velocity, as earlier found by Van Diest and Kesselmeier (2008) for the 4 arable and forest soils from Germany, Finland, Siberia and China. But I understood, as you already mentioned (authors reply on referee #1), you didn't measured the bulk density for the soils in this study.

9. Figure 3 and 4: Some points have no error bars, does it mean that the error bars are smaller than the symbol? See e.g. figure 3 for soil F (also after correction referee #1). If so, please add the e.g. the following sentence: "Some error bars are smaller than the symbol."

10. Table 3: please add that the water content of the soil is the original as found in the field.

11. Please change "concnentration" into "concentration" as found on page 10561 line 10, on page 10563 line 20, on page 10564 line 12 and on page 10565 line 7.

12. Please change "hifger" on page 10566 line 12 into "higher".

Interactive comment on Biogeosciences Discuss., 6, 10557, 2009.