

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

Anonymous Referee #1

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This work studied the exchange of COS between the atmosphere and different soils in China using a dynamic chamber or dynamic incubation system. Besides the study of 18 different soils, the COS exchange flux was also studied as function of COS concentration, temperature and soil moisture. The study adds significantly to the existing data basis of COS fluxes and of COS compensation concentrations. It furthermore adds to our knowledge how COS flux is regulated by soil variables, temperature and moisture in particular. The data show for example, that soil temperature stimulated production of COS more than consumption so that soil tends turning into a source for atmospheric COS at elevated temperature, while it usually acts as a sink for atmospheric COS at lower temperatures.

There is not much by which the study can be improved.

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1. There are more than 10 provinces where samples were taken; Guangdong is the eleventh, Beijing the twelfth. Please check Table 2 and the text.
2. The description of the flux chamber on p. 10562, L.11 ff. is not quite clear. I assume the Teflon tubes were connected to the four inlets at the outside of the chamber, but I am not quite sure.
3. What do the equations (3) and (4) signify. Are these just best fitting equations or do they have also a theoretical background? Why were these equations chosen and not, for example, the Arrhenius equation?
4. What are “certain sulfur-producing bacteria” (P. 10566, L.5) ? I know phototrophic bacteria or H₂S-oxidizing bacteria which produce elemental sulfur. However, I am not sure whether it is these bacteria, which are here addressed. Please be more specific and precise in terms of bacteriology.
5. When comparing the range of COS flux with literature data (p.10568, L.15 ff.) it would be good to explicitly mention the range of flux found in the present study.
6. P.10568, L. 22, The next two sentences starting after “Van Diest and Kesselmeier (2008) investigated COS exchanges...” I did not understand the meaning of these sentences. Please rephrase.
7. Reference Conrad and Smith (p.10570, L. 19) is not correct; it is only Conrad, Smith is not a co-author.
8. Table 1: $OM = 1.726 \times C(\text{organic})$, which is a constant conversion factor. It is not worth listing both OM and C(organic) in the table. What is S(effect)? Please explain what it is and how it was measured.
9. Table 3: Conrad and Meuser (Atmos.Environ. 34, 2000, 3635) report compensation points of 785 and 1470 ppt in laboratory experiments at 25C. Please add any other report on soil compensation point.

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10. Soil water in Table 4 and Fig. 4: Since percentage water is sometimes used as gram water per 100 g dry soil and sometimes as gram water per 100 g moist soil please define soil water content at some point. Since soil texture affects water availability, percentage moisture does not tell much about the ecological effect. Water-filled porosity would be nicer, or since sieved soils were used, I would suggest using percentage of the maximum water holding capacity. This would allow a better scaling of soil moisture. If the authors still have some of the soil samples, I would suggest measuring maximum water holding capacity (which is very easy) and use these values to scale the soil moisture. This would give data with more information.

11. Fig.3 and 4: It is not easy to see the effect of temperature or moisture on the flux. I suggest making the y-axis larger to emphasize the effect on flux.

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