

Interactive comment on “Taking nature into lab: biomineralization by heavy metal resistant streptomycetes in soil” by E. Schütze et al.

E. Schütze et al.

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First of all, we wish to thank the reviewer for his very helpful comments. We implemented all suggestions and feel that this greatly improved the visualization of results in our manuscript.

"General comments: The manuscript provides valuable new information about the microbe-mediated crystallisation of minerals (biomineralisation) by heavy metal resistant streptomycetes on artificial media and in normal and heavy metal contaminated soil. The authors claimed that the implications of these findings should be transferred to the formation of minerals in rock and sediment evolution as well as ore deposit formation. However, the author did not provide conceptual or mechanistic suggestions how this transfer can be figured out." We have shortened the Abstract to omit all spec-

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ulations according to the reviewers suggestion.

"The manuscript is properly written with concise experiments and they are presented in a concise manner. However, the overall manuscript remains very descriptive. Some concern is about the high amount of data presented: table 5 and 6 should be simplified or even converted to text." We agreed on strengthening the paper by converting part of Tab. 5 (the rest is a visualization of formed minerals in soil) and entire Tab. 6 into text. For Tab. 5 the text now contains "Struvite and switzerite (Fig. 1, I-J) were obtained from some of these nutrient enriched soil microcosms (Tab. 5) on soil amended with complex TSB medium. No crystal formation was observed if minimal medium had been added, and only in one case with water added to the contaminated soil, struvite mineralization was found (*S. mirabilis* K7A-1)." Instead of Tab. 6, "Ammonification for at least two pH units were observed with *S. chromofuscus* P10A-4, *S. mirabilis* P10A-3 and P16B-1 (but not with the third strain of this species, P16A-1) and with *S. naganishii* P9A-1." was added

"Table A1 should be simplified by using decimal powers and indicating ranges or classes of the SD by footnotes. Summarised amounts should also be presented in a separate line and the metals contributing to the mineralization should be printed bold faced." This suggestion has been taken up with pleasure! The respective addition to the table heading is: "Metals included into biominerals are printed in bold; ranges of standard deviation are color coded: white, < 1 %; light grey, < 10 %; grey, >10 %; at values >20 %, the deviations are shown; Σ REE, combined values for all rare earth elements": As suggested by the reviewer, F1 and F2 have been added for each of the experimental variants.

"For better visibility, the size of the pictures in figure 1 should be increased." Fig. 1 has been enlarged.

"In addition, the fact that the microbes are wasting ammonia and phosphate for mineralisation should be discussed in more detail. This process is obviously only occurring

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under specific conditions in nature, where these nutrients are available in surplus." We added to discussion: "Taken together, the bacteria have used nutrients, mainly P and N, to be able to precipitate metals by formation of biominerals. This, very likely, serves as a metal resistance mechanism for the bacterial cell."

"Overall, I recommend accepting the manuscript with minor revisions." Again, we wish to thank the reviewer!

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/10/C842/2013/bgd-10-C842-2013-supplement.zip>

Interactive comment on Biogeosciences Discuss., 10, 2345, 2013.