Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-517-RC1, 2018

Biogeosciences Discussions
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EGU

Interactive comment on "Improving the Strength of Sandy Soils via Ureolytic $CaCO_3$ Solidification by *Sporosarcina ureae*" *by* Justin Michael Whitaker et al.

Anonymous Referee #1

Received and published: 30 April 2018

This study examined the ability of Sporosarcina ureae to improve the shear strength of sandy soils via microbially induced carbonate precipitation (MICP) . The ureolytic activity of Sporosarcina ureae was examined and compared to the activity of previously investigated species of Sporosarcina pasteurii and Bacillus. MICP by Sporosarcina ureae was shown to reinforce cemented sand and increase the shear strength the material, at levels comparable to S. pasteurii and superior to Bacillus subtilis.

I believe this paper will be interest to the engineers working on biocementation, perhaps more so than to biogeoscientists. Clearly, the hardened sands have increased strength and performed well under environmental conditions (e.g. water flushing and

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Discussion paper

ice-water cycling simulations). The observation that MICP is susceptible to acid rain is also insightful. I agree with the authors that soil buffering should be considered when applying this MICP technology in certain climate regions to mitigate the effects of acid rain.

I only have one technical comment. In Figure 2, the first time points for the S. pasteurii and S. ureae experiment yielded very high NH3-NH4+ values. What was the NH3-NH4+ concentration at time zero? There appears to be significant ureolytic activity at 1 hour (Figures 2a & b), but there was very little change in the solution pH (Figures 2c & d). Based on ureolytic reactions on page 2 (line 63), I would have expected NH3-NH4+ production to be concurrent to changes in alkalinity.

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