

Interactive comment on “Integrative analysis of the interactions between *Geobacter* spp. and sulfate-reducing bacteria during uranium bioremediation” by M. Barlett et al.

Anonymous Referee #2

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The authors sought to study the dynamic interactions between *Geobacter* and acetate-oxidizing sulfate reducing bacteria (SRB) during in situ uranium bioremediation at Old Rifle, CO. In order to explore these dynamics they employed a polyphasic approach combining laboratory sediment experiments with the dynamic modeling of *Geobacter* and SRB communities. The model simulations were able to accurately predict the microbial activity and shifts in microbial abundance observed in microcosm experiments. In particular, they found that *Geobacter* grew quickly but declined in abundance as the microbially reducible Fe(III) became limiting. In contrast, SRB grew more slowly and did not reach dominance until 30–40 days of incubation. With the modeling approach the authors also predicted the effect of starting microbial community composition on

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activity and the effect of adding additional Fe(III) oxides. The main outcome of these different simulations was that dynamics of *Geobacter* and SRB during bioremediation are primarily controlled by availability of microbially reducible Fe(III) oxides and not the availability of acetate or starting microbial abundances.

Specific comments:

1. Pg. 11340, l. 24: did you really purge with 95:5 CO₂:N₂? This is a very high CO₂ concentration (e.g., extreme) and I wonder why it was chosen as it does not reflect in situ conditions.
2. Pg. 11342, l. 20: do you mean Fe(III) which cannot be reduced by *Geobacter*?
3. Please use consistent definitions and capitalization for the different iron fractions. In some cases you use “Hard-to-Use Fe(III)” and in others it is defined as “Difficult-to-Use”. Please be consistent in both the text and the figure legends.
4. Section 2.3 Analytical Methods would be best moved up before the simulation methods so that it is Section 2.2.
5. Pg. 11345, l. 19: change to predict
6. Pg. 11346, l. 15: you state here that 0, 5, 50, 95, and 100% *Geobacter* were given at the onset of this set of simulations but Fig. 3 shows 0, 10, 50, 90, and 100% *Geobacter*. Which is the correct amount of *Geobacter*? Please correct in the text of section 3.2.
7. References: Please italicize species names and use proper capitalization of the author names, e.g., Pernthaler et al. reference.
8. Figure 1: it would be helpful to have more days labeled on the x-axis so that the figure is comparable to the other figures.
9. Figure 4: please add a and b to the panels and revise the figure legend to reflect the data presented.

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10. Figure 5: please add a and b to the panels.

11. Supplementary Figure S4 is not referenced in the text. Please add a reference as it supports your story.

Interactive comment on Biogeosciences Discuss., 8, 11337, 2011.

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