

Interactive comment on “Wet-dry cycles impact DOM retention in subsurface soils” by Yaniv Olshansky et al.

Anonymous Referee #1

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This manuscript describes the effect of wet-dry cycles on DOM retention and composition in two subsurface soils. The manuscript is very well written and the description of the experiment and results are clear and sound.

Overall, this manuscript provides valuable insights in the effect of wet-dry cycles on DOM retention and the nm-scale interactions between DOM and mineral soil and is of interest to the scientific community and readers of Biogeosciences in particular.

Specific Comments: - In the methods and results section it is not really stated clearly that an active microbial community was present while the experiment proceeded. As is discussed line 297-311, page 11, microbial decomposition of DOC was clearly relevant. This should be stated more clearly in the method and result section.

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- In addition, it would be very helpful to the reader if a carbon mass balance or estimation of the % carbon lost due to mineralization was reported

- It is reported that the OC content of SCM was effectively unchanged after treatment (line 195). However, given the large error margin on the solid phase OC content measurement, it is also possible the change in OC content due to DOC retention falls within the margin of error of the measurement. The much larger relative accumulation of DOC in the solid phase of JRB is more easily detected, but judging from figure 1, the OC removal from solution behaves similarly. Unless additional evidence is provided to demonstrate a higher microbial biomass, activity and/or higher carbon mineralization, I am not convinced it can be stated that enhanced mineralization took place in SCM relative to JRB (line 303) based on the data presented here.

- The effect of mineralization and/or transformation of DOC during the experiment could have a major impact on the results of both quantity and composition of the OC retained in the soil. In addition, the duration of the experiment (4 times 98 hours) is sufficient for microbial growth to take place in response to the DOC addition and treatment. This should be addressed carefully in the discussion, particularly also in relation to the difference between the continually wet and wet-dry treatments.

- It is stated quite strongly in the abstract (line 20) and conclusions (line 354-356) that the spatial fractionation of adsorbed OM is different from what was expected based on previous literature. Though I agree that this is a very interesting observation, a more detailed evaluation of these observations in relation to previous literature is missing and should be added to the discussion.

- Line 290-296: it could be of interest here to also note the change in ionic strength of the pore-water that occurs due to air drying of the soil and its possible effect on the local Ca^{2+} concentration and thereby potential to form complexes with OM

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