

Interactive comment on “Alteration of carbon, nitrogen, and phosphorus stoichiometry and their related enzymes as affected by increased soil coarseness” by Ruzhen Wang et al.

Anonymous Referee #4

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The manuscript bg-2016-483 reported soil properties (CNP content, microbial biomass CNP, and CNP-related enzymes) in response to soil coarseness (by mixing of native soil and river sand to different extents) based on a short-term field experiment in a sandy area of Northern China. This topic is relevant to Biogeosciences. Although the field experiment has 5 treatments, 6 replicates, and relatively big (4x4 m) plots, I have few concerns about the experiment design, method, and interpretation.

1. All the results (soil, microbe and enzyme) may be simply a mixing effect. In other words, they are not affected by soil coarseness, but caused by the dilution of native soil (much higher CNP, microbe and enzyme) with river sand (much lower CNP, microbe and enzyme). The authors should report the initial results right after mixing (baseline

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data), and then compare these data with the data measured in 2015. An appropriate way to interpret the “effect” of soil coarseness on soil properties should account for the effect of mixing.

2. It is not clear how the authors calculate the “theoretical dilution”.

3. Any soil (and microbe, enzyme) associated with the “transplant” should be accounted for in the budget.

4. The experimental duration is very short. The soils were sampled in 2015, only one year after plant presence (by transplant in 2014). Moreover, the authors should provide a better description of the experimental design (with a timetable and few photos for various stages of the site).

5. The novelty and uniqueness of this study should be clearly presented.

6. Plant-related data (such as above- and belowground biomass, species composition) should be presented.

7. The three enzymes were assayed at different buffer pH (5.5, 6.0, 6.5), which is different than the soil pH (7.3). Most studies adjust the buffer pH to soil pH to make the results more reliable.

8. Soil pH (for all treatments and depths) should also be presented.

9. The authors should be careful in statements. For example, “Our results also imply that expansion of desertified grassland ecosystems in dry regions of the world due to overgrazing and climate change might weaken the soil C sequestration potential and N retention capability, which in turn lead to changes in grassland productivity and biodiversity in a long run.” The results in this study say nothing about “soil C sequestration potential and N retention capability”, which need sophisticated studies using ¹³C and ¹⁵N isotope tracing.