Interactive comment on "Organic matter dynamics along a salinity gradient in Siberian steppe soils" *by* Norbert Bischoff et al.

Anonymous Referee #2

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This study aimed to understand the role of salinity in shaping soil organic matter. The study is somewhat confounded because the salinity gradient covaries with a moisture gradient. The saltiest soil is closest to the water table and had the highest moisture content while the low salinity soil was far from the water table and had much lower soil moisture. Consequently, it is not possible to separate out the effects of moisture and salinity on the soil carbon and microbial community. Despite this limitation the manuscript presents a robust dataset that is, on the whole, well contextualized.

The presentation of the data is quite dense and the manuscript is made less comprehensible by the excessive use of abbreviations. The authors should work to simplify the results where data is sometimes redundantly presented in the text, tables and figures. There also seems to be an excess of supplemental data that is simply an alternate presentation of the data shown in the tables.

Generally, I think the authors could do more to explain why their findings do not match those reported by others. The moisture gradient seems to be the most obvious reason to me yet this is not well discussed in the manuscript.

Page 3 - 31. Suggest start new sentence, i.e. change "OM, while particulate OM" to "OM. In contrast, particulate OM"

Page 8 - 5 If the salt interfered with the internal standard peak how can you be sure it did not interfere with any of the other peaks?

Figure 3 is not referred to in the results section

Note to self salty soils have more clay and more moisture – these are factors that stabilize C

Page 10 - 25 Can you write out SPT this is not used frequently enough to warrant abbreviation

Page 10 -27 Can you just refer to the loss as mobilized C, I think that would make it less confusing. I had to reread the methods to understand this part of the results.

Page 10- 32 I think this is a sentence for the discussion.

Page 10 – 37 What does B.P. stand for ? Before Present?

Figure 4 is also not referred to in the results- only the tables. Perhaps the data should not be redundantly presented in both locations?

Figure 5 – Is there a need to show the grey dots in each panel?

Page 11 – 21-33 Have you considered doing a PerMANOVA to determine if these differences in sugar composition are significant?

Page 11 – 35 this sentence is confusing " The relative contribution of PLFA observed within the PLFA profiles "

Page 12 – 5 As with sugar composition you should be able to test statistically if the

sites and soil profiles are statistically distinct in terms of microbial community structure.

Pag 12- 20 Given the high CV for these soil types I'm not sure that soil type is such a great predictor of carbon stock.

Page 13 – 14 How are you sure the soils are not affected by erosion?

Page 13-15 – Could reduced decomposition due to salt stress and anaerobic conditions from the high moisture content be contributing to the higher organic matter content in the Non-sodic and sodic Solonchaks?

Page 13 – 30 Could you remind us what your second hypothesis was?

Page 13 – it seems that the water availability to plants and microbes might be similar in the dry salt free Kastanozem and the wetter but salty Solonchaks (i.e. similar osmotic pressure). This could explain why above ground biomass was similar and explain the similarities in soil C.

Page 15-19 this lets us assume?