

Interactive comment on “Carbon and nitrogen stocks in particle-size fractions of topsoil along a 3000 km aridity gradient in northern China” by X. G. Wang et al.

Anonymous Referee #1

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This study analyzed the relationship between soil C and N, soil particle-size fractions and aridity in northern China. These authors found a negative relationship between soil C and N and aridity in both in bulk soils and fraction soils. It was also detected that sand fraction increased while silt and clay fraction decreased with increasing aridity. This study revealed that the diminishing effect of aridity on soil C and N was due to loss of fine soil particles as well as decrease of C and N in all soil particle-size fractions. The research had appropriate rational and study method which can provide helpful information on understanding C and N sequestration in drylands. Introduction and discussion needs to be improved to strengthen the significance of this study and data interpretation.

C1

Pertaining to introduction, it is not clear on the importance of conducting research in this studying area. It would be useful to give more details regarding to environmental issues or concerns. For example, was this area experiencing increased aridity in recent years? Would local policy makers need suggestions on land or environmental management to mitigate the impacts of aridity? Introduction and discussion need to be expanded on the mechanism of soil C and N decrease due to aridity. Besides wind erosion and lower productivity, other aspects should also be considered, such as decline of soil water availability, soil microbial activity and diversity, aggregates formation, etc. Also, the paper focuses on particle-size fractions but doesn't have discussion on soil texture. Since large range of data was detected for sand (21.62-90.65%), silt (4.19-49.29%) and clay (1.36-33.7%) fraction, it would be good to discuss the changes in soil texture and corresponding soil characteristics.

Below are some specific comments on the paper:

Title:

Consider to include “grasslands” in the title

Abstract:

L16 “Soil composition” refers to soil water, air, minerals and organic matter. Should use “soil texture”.

L19 Change “or” to “and/or”

Introduction:

L41- 44 Not clear why it is important to study C in grassland soils. Add a sentence indicating high percentage (~90%) of C in grassland ecosystems is stored in soil. Literature is also needed.

L62- 64 Reasons for less C and N in dryland other than decreased productivity is not stated here. Materials and Methods:

C2

L123-125 Are soil types the same along this transect?

L126-128 Can 50m × 50m plot represent soils from each sampling area? Information regarding to soil homogeneity is needed.

Results:

L184- 192 Use a table to show the data for C and N concentration and stocks in bulk soil and soil fractions

L208- 223 Don't see discussion for these results.

Discussion

L231-232 Results for soil texture obtained from this study are missing. Would be good to include this data in discussion.

L235-238 Decreased microbial activity and diversity should also be discussed.

L246-248 How did land use affect soil type?

L268-271 Again, the discussion is not completed.

L278-290 Any citations to support this claim/result?

Conclusions:

Conclusions are missing in this paper.

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