

Interactive comment on “Contrasting pH buffering patterns in neutral-alkaline soils along a 3600 km transect in northern China” by W. Luo et al.

Anonymous Referee #1

Received and published: 5 October 2015

General comments:

With elevated acid deposition (especially for atmospheric N deposition) in the large scales of China, it is necessary to explore the responses of soil buffering capacity. Luo et al. have addressed pH buffering patterns in neutral-alkaline soils along a 3600-km transect in northern China. They found that mechanisms controlling pHBC differed among neutral-alkaline soils of northern China, with carbonate-rich soil having greater soil pHBC. Different buffering capacity will lead to different rates, risks, and impacts of acidification. It is a meaningful study for predicting the rate of soil acidification and assessing vegetation dynamics in response to predicted rates of acid deposition. The manuscript has been written fluently throughout the whole paper. Though I like that, I have some concerns that should be addressed before publication.

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Major concerns:

- (1) The key problem in this study is how to separate carbonate containing soils from non-carbonate ones. I am very curious that there is no carbonate in alkaline soils ($\text{pH} > 7$). In addition, I have noticed that there are some overlaps for soil collecting sites between this study and Yang et al. (2012), where they put out carbonate-rich regions vs low soil carbonate regions. Maybe the authors can consider this kind of expression.
- (2) Because soil pH is widely used in many studies, and can be used as an effective and direct parameters to assess soil acidification status, I would like to see the pattern of soil pH, and its relationship with soil pHBC, and other environmental parameters.
- (3) I think the new point in this study is the different patterns of soil pHBC in regions with different aridity index. So it is better to put it out in the abstract.

Special comments:

- (1) Line 98, I would like to see the response to the second question in the discussion question. If possible, please show the data of acid deposition in the studied regions.
- (2) Line 190,201: AI is an important index in this study, please show how to calculate it in detail.
- (3) line 280-281: please give the reference.
- (4) Line 314-315: Please add some references for this statement.
- (5) L333-339: I would like to see the confirmation on clay mineralogy type in this study.
- (6) L358, "...effects" is not exactly here. It is just a positive relationship.
- (7) L366: Figure 4.
- (8) L370-371 can not find climate information in Fig. S1. Please have a check on all Figures, so that they can be matched well.
- (9) L404-409: "the first" sounds not very exact, considering there are similar studies in

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the same regions, and soil pHBC can be an alternative parameters for assessing soil acidification except soil pH.

(10) Table 1, please give how to measure soil pH. Did the authors measure it using water suspension (e.g., a soil: water ratio of 1 : 2.5)? If so, please give an annotation.

Interactive comment on Biogeosciences Discuss., 12, 13215, 2015.

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