

## ***Interactive comment on “Atmospheric dry and wet nitrogen deposition in agro-pastoral catchments of the China and Mongolia Altay” by Jin Ling Lv et al.***

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The manuscript (BG-2017-55) reported field measurement of atmospheric nitrogen dry and wet deposition in different land uses in China and Mongolia. The chosen topic is interesting but the manuscript is not well written and there are some concerns about the methodology and discussions. Some scientific issues. (1) The experiment was conducted only for one year, which is not enough for a field observation of nitrogen deposition. Nitrogen deposition is influenced by emission, weather conditions, which have high variation among years. The manuscript try to estimate annual N deposition in several land uses by one year observation, the results are not representative. Response: Thanks for your suggestion, the more year's experiment, the better result for

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the N deposition. However, due to the difficulty to collect the sample, for example, we often trekked hundreds of miles from mountain to plain, and we also need to cross the boundary to Mongolia to carry out relevant tests. Although we know that there may be some differences for atmospheric dry and wet deposition in different year, we were as much as possible to arrange well the experiment to ensure every points can represent the characteristics of the region for atmospheric dry and wet deposition.

(2) The study measured gases and particulate N concentration and use dry deposition velocity  $V_d$  to calculate nitrogen dry deposition. But authors choose  $V_d$  values from a reference (Flechard et al, 2011). And from Table 3, authors use same  $V_d$  of  $\text{NH}_3$  and  $\text{NO}_2$  for all three canopy and two countries. This methodology is not valid.  $V_d$  is affected by weather conditions and canopy types. It is changed diurnal, seasonal, and yearly for different plant types in different places. Therefore, it is not proper to European  $V_d$  data to represent  $V_d$  in China and Mongolia. Since weather data are available for authors from meteorological stations,  $V_d$  (hourly, daily or monthly) for different canopy of different  $\text{N}_r$  could be calculated easily. There are many widely used methods for this calculation, such as using big-leaf model. Response: Thanks for your suggestion. The  $V_d$  is an important parameter for the atmospheric dry and wet deposition. At the beginning of this manuscript, we read a lot of related reference to choose suitable  $V_d$  according to the similarly land use. Even so, we also according to your request, and use the model recommend by Dr. Shen (Institute of Subtropical Agriculture, the Chinese Academy of Sciences) to simulate  $V_d$ .

(3) This study used the self-made wet collection equipment as shown in Fig. 3. However, the equipment is not well designed. The top of the equipment is open without a lid, which may also collect some dry deposition especially particulate N deposition, therefore, the collected deposition by this kind of equipment is usually considered as a mixture of wet deposition and part of particulate dry deposition. By using this equipment, the wet deposition is therefore overestimated. Authors did not include any correction for this either, which resulted in high uncertainty of the reported N deposition

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amount. Response: Thanks for your suggestion. Indeed, such a rain collection method will lead to a part of dry N deposition into our self-made rainfall collectors, but this was the best way can be used this kind of areas we thought, because the lack of electricity and manpower, it is difficult to collect samples after every rainfall event. Therefore, based on this, at the farmland point, we collected the samples both the self-made rainfall collectors and after every rainfall event to compare the difference and correct the result include other points. For the mountain point, very little particulate matter deposition into the grassland due to the fresh air, even so, we also collect timely rain in June to compare the difference with man-made equipment in the same month in order to make correction. So, the wet deposition data can represent the real result in our research area.

(4) The discussion needs improve. All discussion section just repeat some results and simply compared with several other studies but no detailed and deep discussion was presented. The difference of total N deposition amount and contribution of different Nr forms for different land uses could be due to the difference of fertilizer input, management, emission, and deposition process. And the difference between two countries might reflect the difference of management tradition and urban development. The discussion about Nr deposition and their potential sources among different land uses and between China and Mongolia are much more important and interesting than the comparison of the annual values with other studies since one year observation result in the manuscript is not enough to represent annual N deposition. Response: Thanks for your suggestion. It is more meaningful to compare the differences between the two places because of the difference of farming practices, population and social development levels, we will strengthen this part of the elaboration in our discussion section.

(5) The section 4.3 try to discuss the uncertainty of N deposition, but authors just discussed about NH<sub>3</sub> compensation point. It will be better if authors could add an uncertainty analysis about N deposition, which could partly compensate the shortage of one year observation. Response: Thank you for your suggestion. we will supplement

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the uncertainty of the N deposition in our discussion.

There are many format and punctuation problems in the manuscript. I suggested authors to do some technical corrections about spelling and format at the Initial Manuscript Evaluation report, but unfortunately, these errors were not corrected for the discussion paper. (1) Punctuation problems. Space is needed after each word! For instance, page 1, line 19, add a space before "at six sampling: : ."; page 1, line 24, add spaces before "in China" and before " in Mongolia". There are lots of this problem in the manuscript. Please carefully check the whole manuscript and corrected these problems! (2) Table 3, reference Shen et al. (2011) was not found in References. Please check citation and reference list. (3) Fig.1, please add Nansha Islands for China map. (4) Fig. 6, figure caption should start from the next line. (5) Fig. 7 and Fig. 8, figure captions are not consistent with figures. (6) Fig. 9, remove "liner fit of B" in figure.

Response: Thank you for your suggestion. We have carefully modified the manuscript according to your requirements.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2017-55/bg-2017-55-AC2-supplement.pdf>

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