Interactive comment on "Global patterns of leaf nutrient resorption in herbaceous plants" *by* Zhiqiang Wang et al.

M. W. I. Schmidt

michael.schmidt@geo.uzh.ch

A note upfront from the submitting person: This review was prepared by Silvia Passardi and Tatjana Speckert, master students in geography at the University of Zurich. The review was part of an exercise during a second semester master level seminar on "the biogeochemistry of plant-soil systems in a changing world", which I organize. We would like to highlight that the depth of scientific knowledge and technical understanding of these reviewers represents that of master students. We enjoyed discussing the manuscript in the seminar, and hope that our comments will be helpful for the authors.

Wang et al. present a meta-analysis using a global dataset of nitrogen (N) and phosphorus (P) resorption efficiency that includes 521 observations and 248 herbaceous

species. For this purpose, they used published data which cover the resorption efficiency of nitrogen (NRE) and phosphorus (PRE). Further, to ensure data comparability, Wang et al. solely used papers in which the author specifically guaranteed that the leaf litter samples came from newly fallen trees. Furthermore, Wang et al. excluded plants which are grown under greenhouse conditions, plants under fertilization and leguminous plants (N-fixing species). Their analysis showed that the nitrogen resorption efficiency (NRE) and phosphorous resorption efficiency (PRE) trough all herbaceous plant groups are 54.7% and 64.5%, respectively. Finally, they conclude that NRE, PRE and NRE:PRE increase with increasing latitude and decrease with increasing mean annual temperature (MAT) and mean annual precipitation (MAP).

We appreciated that the research questions are presented very clearly. The text is well structured in sections. Moreover, we appreciate the good explanations of terms like nutrient resorptions, NRE, PRE and of how they are affected by MAT, MAP and latitude.

However, we identified several misunderstandings in this study:

The used data of the 521 observations and 248 herbaceous plants are not clearly presented. There is no information concerning the observations. As the study deals with a global research in NRE, PRE and NRE:PRE it would be important to know from which country/location these data samples originate.

According to the text (lines 138-140), "the dataset broadly covered most of the range of MAT and MAP occupied by the majority of herbaceous species and thus permitted a global level of analysis". From Fig. 2 and 3 is possible to discover something more of the data and, especially for MAP and latitude but they do not seem to be equally distributed.

In our opinion, it is necessary to add to the paper (in section 2.1) some information that support the previous statement. We suggest that some data gaps of Fig. 2 and 3 exist due to their location (desert). However, it would be helpful to add some information

about the data gaps and the distribution of the data in the caption.

Further, there is no clear documentation of the number of observation for graminoids vs. forbs and monocots vs. eudicots (fig.1).

Also, we do not clearly understand, why the data of the monocots are biased and those of the graminoids are not (line 200). We do not understand why the authors not considered the opportunity that the higher values of NRE and PRE could also be achieved due to the phylogeny (monocots/eudiocots).

If one half of all the monocots in the data set are graminoids, probably a significant part of all the graminoids are monocots, and thus the difference in the results could be caused by the phylogeny (and not necessarily by the functional type. Additional information concerning the exact amount of graminoids that are monocots too (intersection between those functional groups) would be helpful to understand the bias.

In the discussion part, the results of the meta-analysis are often compared with studies that focus only on regional scaled observations. We do not clearly understand why the global data set is compared with data of regional observation (e.g. the study of Sun et al., 2015, who focused solely on different regions in China), as that could lead to incorrect conclusions. Additionally, sometimes we do not know where the compared data originated. Thus, it would be preferable to compare the results with other recent studies that cover global scale observations. And to clearly document, to write where all the compared data originate.

Additionally, we found several inconsistencies with other studies which cover solely one plant community or short-term temperature and precipitation manipulation.

We do not understand how the authors extracted the value in percent from table 1 and table 2 (lines 164-169). Another row in the table for the values in percent, or an additional table would be useful to understand the origin of these percentages.

The used tables should be uniform. For instance, table 1 and table 2 are similar. Table

3 differs in the positioning of the different traits and variables. In addition, the reason for combining or discarding variables should be explained in the caption. For instance, in table 1 and 2 the variable latitude is present but not in table 3.

Furthermore, it is not clear why in Table 3 the variable MAT is combined twice with MAP but shows different values for NRE, PRE and NRE:PRE. Our suggestion is to generate two different tables for each model clarifying that two general linear models were used. This should be better explained and also included in the caption.

The sentence (lines 75 - 79) is not clear: do changes in the precipitation and temperature have an impact on soil nutrient availability, plant nutrient status and on nutrient element cycling in those regions where plant growth and development tend to be limited by nutrient availability? Or do changes in the precipitation and temperature have an impact on soil nutrient availability and on plant nutrient status also where plant growth and development do not tend to be limited by nutrient availability?

In our opinion, it could be interesting and coherent to add in the discussion or in the conclusion section a paragraph about the relevance and the consequences of the findings, for example in relation to the climate changes.

Finally, there are several grammar mistakes which should be revised.