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

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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 scientiïňĄc 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 efiňĄciency that includes 521 observations and 248 herbaceous species. For this purpose, they used published data which cover the resorption

efiňĄciency of nitrogen (NRE) and phosphorus (PRE). Further, to ensure data comparability, Wang et al. solely used papers in which the author speciïňĄcally 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-ïňĄxing species). Their analysis showed that the nitrogen resorption efiňĄciency (NRE) and phosphorous resorption efiňĄciency (PRE) troughall herbaceous plant groups are 54.7We 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.

Response: Thank you very much for your encouragement.

However, we identiïňĄed 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.

Response: We are very appreciated with this important suggestion. We will list the information of all species in Appendix.

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. Response: Thanks for your comments. But we can not understand why the MAP and latitude should be equally distributed? We do not think that each longitude and latitude must be matched by a MAP? Please see figure 1cited by Yuan and Chen (2009) 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.

Response: As mentioned above, different locations may be matched with same MAP.

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

Response: Thanks for your comment. But we have list the numbers of observation in figure 1. Please check the number in bar.

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).

Response: Thanks for your comment. In our dataset, Monocots plants contain all graminoids. Thus, further studies need to collect more monocots plants which are not graminoids. In addition, in this study, we merely focused on comparing the differences of NRE and PRE in different plant groups, and the global trends in herbaceous species.

If one half of all the monocots in the data set are graminoids, probably a signiïňĄcant 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.

Response: Thanks for your comment. The same as above,

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.

Response: Thanks for your comments. For one thing, previous studies, which focused on local and regional are also showing the relationships between NRE and PRE and Latitude, MAT, and MAP. We need to compare the differences of these relationships with our findings. For another thing, due to sorely lack of the global scale observations, We have to comparing the results with Yuan and Chen (2009) who conducted the meta-analysis on a global data set based on woody plants and Vergutz et al. (2012) who reveal the relationships between nutrients resorption efficiency with climate factors.

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.

Response: Thanks for your comments. Follow your suggestions, we added the AI (Aridity index), PET (Potential evapotranspiration), and Soil N and P, and have re-analyze the data using partial general linear models (GLM) and stepwise multiple regression (SMR) (also see figure 2 and Table 1).

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.

Response: Thanks for your comments. Our data were divided by two groups (graminoid vs forb, monocot vs eudicot). Table 3 showed the results of different groups (FG and ME) respectively

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?

Response: Thanks for your comments. We will correct the writing.

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 ïňĄndings, for example in relation to the climate changes. Finally, there are several grammar mistakes which should be revised.

Response: Thanks for your comments. We will revise the manuscript, and polish the English writing.

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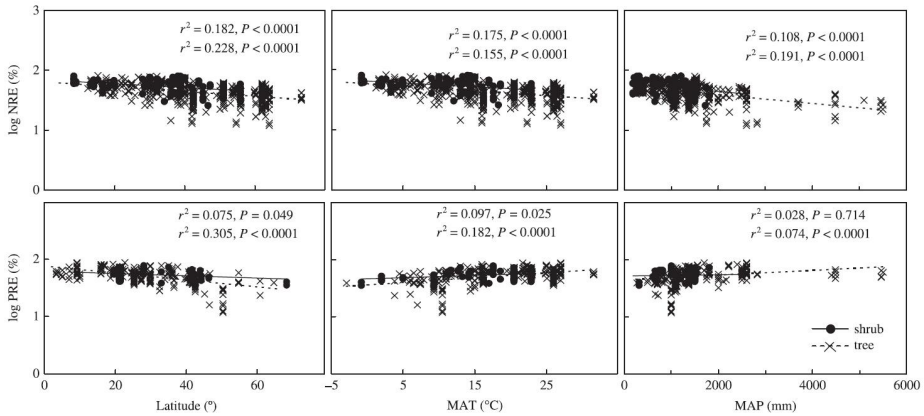

Fig. 1.

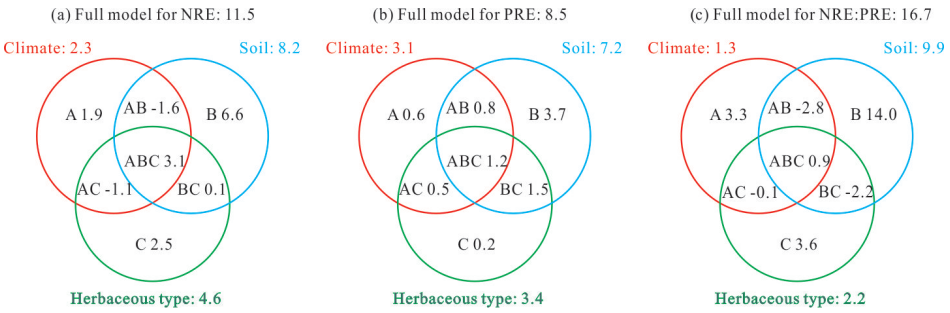

Fig. 2.

Table 1. Results of stepwise multiple regression (SMR) for the effects of climatic factors and soil variables (MAT, MAP, PET, AI, soil element and ratio) on leaf NRE and PRE of herbaceous plants in global. a, b, and c denote significance at the 0.05, 0.01, 0.001 test level, respectively

Element resorption efficiency	Adj R^2 Full model	Partial regression coefficient					Contribution of predictor (%)				
		MAT	MAP	PET	AI	Soil	MAT	MAP	PET	AI	Soil
Monocot											
NRE	0.164	-0.002	—	>-0.001	—	>-0.001c	34.0	—	18.4	—	47.6
PRE	0.090	—	—	>-0.001a	—	>-0.001a	—	—	55.5	—	44.5
NRE:PRE	0.198	—	—	>-0.001c	—	-0.019c	—	—	44.7	—	55.3
Eudicot											
NRE	0.139	0.008a	>-0.001a	>-0.001a	-0.176b	—	6.2	48.9	8.9	35.9	—
PRE	0.222	0.005	>-0.001c	—	0.186c	<0.001	12.5	65.8	—	13.8	7.9
NRE:PRE	0.111	0.007	—	>-0.001c	-0.171b	-0.009	23.1	—	45.0	23.3	8.6
Graminoid											
NRE	0.163	-0.005a	>-0.001c	—	-0.095a	>-0.001c	29.1	35.7	—	8.5	26.7
PRE	0.234	-0.011c	>-0.001c	<0.001c	0.244c	—	40.2	29.8	15.2	14.8	—
NRE:PRE	0.246	0.010b	—	-0.001c	-0.094a	-0.022c	12.4	—	36.4	4.8	46.4
Forb											
NRE	0.120	0.011c	—	<-0.001c	-0.189c	—	16.3	—	17.7	66.0	—
PRE	0.175	0.015c	>-0.001c	>-0.001	0.233b	>-0.001b	18.4	20.6	23.7	20.2	17.1
NRE:PRE	0.173	—	—	>-0.001c	-0.074c	-0.006	—	—	43.5	51.8	4.7

Fig. 3.