

Interactive comment on “Decoupling of above and belowground C and N pools within predominant plant species *Stipa grandis* along a precipitation gradient in Chinese steppe zone” by X. H. Ye et al.

Anonymous Referee #1

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This study aims to determining changes in C and N pools in the above and belowground biomass of one plant species along a precipitation gradient in Chinese steppe. Overall, the authors make big claims out of a pretty tin dataset. Only one species, representing only less than 10% of the plant cover at the site (P5001, L11-12), was collected on 4 replicates per site across a wide precipitation gradient. Above- and belowground biomass was sampled, weighted and analyzed for C, N and other nutrient concentrations (but the authors do not discuss results for other nutrients). The findings are confirmatory of knowledge for other ecosystems in that, with drought, aboveground

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tissues N% and belowground biomass allocation increase. Converting this into pools sizes, they found an increase of C pool belowground and no change of N pool aboveground, and therefore a “decoupling” of C and N allocation with increasing drought. I have several major concerns with this study, which I consider not solid enough for publication in Biogeosciences.

1. The work, as said above, was done only on one species representing only less than 10% of the plant cover, thus cannot be extended to the ecosystem C and N pools.
2. Estimates of root biomass are questionable, since it is not clear how the authors differentiated between the roots of the species of interest and those of other species, and there appear to be a large soil contamination, as testified by the low C% of root tissues and its high variability.
3. The methods used for C and N analyses are old and not very accurate.
4. Conclusions are highly speculative, and the claims on effects on herbivory and decomposition rates are not justified. For example, contrary to the authors' claim it could be hypothesized that herbivores may feed less of a more nutrient plant – because it satisfies earlier their nutrient requirements. Also litter C:N ratio cannot be inferred from green tissues because of N retranslocation at senescence.

Specific comments:

Title: Delete “predominant plant species *Stipa grandis*”.

P5000L22: How were the roots of *S. grandis* identified? Provide details at best

P5001L17/ Fig.1b: Very large variation! R2 are very low and root quantification is highly questionable.

P5003L4: Highly speculative. Authors just make huge claims with no foundations.

P5004L15-20: Again highly speculative and with not support – see comment above.

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