

Interactive comment on “Response of soil respiration to nitrogen addition along a degradation gradient in a temperate steppe of northern China” by Jinbin Chen et al.

Anonymous Referee #1

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The manuscript reports findings from a replicated N addition study across a disturbance gradient in grasslands. Total soil respiration, above- and belowground biomass as well as a range of soil biogeochemical parameters are recorded. Replication of N treatments within a disturbance category is at a single site only (where three sub-plots are treated as replicates), which limits the statistical power of the analysis, but I found the set-up otherwise quite thorough and convincing.

The findings show some transient effects of N addition at intermediate disturbance, but no overall strong interactions between the two experimental factors. Soil respiration is investigated by means of a ‘factorial ANOVA’, which is appropriate to assess the influence of N addition and disturbance independently, as well as their interaction. I was

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not sure why a range of other soil parameters were not also investigated in the same way, rather than a 1-way ANOVA.

One of the key elements I was struggling with in the approach was the vagueness of the ‘disturbance’ categorisation. There are 4 categories (from no disturbance to severe disturbance), but it is not clear what the nature of disturbance is. Using species composition to characterise the degree of ‘disturbance’ is fine but more information on how grasslands were disturbed, and for how long, is needed. If disturbance is by grazing/trampling, then the experiment itself (for which plots were fenced) would interfere with the disturbance regime, causing confounding influences of short-term recovery and N addition. The interpretation of temporal response to N additions would then also have to take the reduced/removed disturbance element into account.

So on balance, I think that these findings are interesting, and potentially publishable, if the authors are able to clarify the nature of disturbance, and how fencing off for this experiment relates to findings in the first and second year of results

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