

## ***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.***

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

[response] Thank you for your very valuable suggestion. Your suggestions have been incorporated. We have added factorial ANOVA table about other soil parameters influencing Rs (Please see Supplemental materials Table S1). Analysis results related to this ANOVA table has been added in our revised manuscript and we also revised data analysis description in Method section.

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[comments] 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.

[response] Thanks for your very useful advice. The disturbance is mainly grazing. The extremely degraded grassland was open to local grazing. The severely degraded grassland was a high-quality pasture about two decades ago, but had degraded due to overgrazing until 2011. The moderately degraded grassland was a pasture under management, with relatively low biomass under managed grazing. The mature grassland was fenced from 2000 to prevent grazing and the species richness was high. We have added more information in Method section about disturbance history. In addition, we do agree with your idea that 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. Your suggestion has been incorporated and we take the reduced/removed disturbance element into account in the discussion section to interpret the temporal response to N additions.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2016-119/bg-2016-119-AC1-supplement.pdf>

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