

Interactive comment on “Predicting parameters of degradation succession processes of Tibetan Kobresia grasslands” by L. Li et al.

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Dear referees,

Thank you very much for constructive comments on our manuscript entitled as “Predicting parameters of degradation succession processes of Tibetan Kobresia grasslands” (se-2015-54). We have carefully revised our manuscript based on your comments. Please see our detailed responses point by point as follows:

1. The first and main concern is about “Why we used a data set in a short period time in different experimental plots?”

In this study, we selected plots with different degradation stages. We assumed their degradation was mainly caused by time. This allows us using the method of spatial

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series substituting temporal series to analyze correlations between the vegetation and soil characteristics and degradation.

2. The second and main concern is about “Why all plant materials were dried in an oven at 80°C for 48 h and weighed for biomass determination?”

We determined biomass following a standard protocol in a book written by “Chinese Ecosystem Research Network Scientific Committee”, titled as “Protocols standard biological observation and measurement in terrestrial ecosystems. Beijing: China Environmental Science Press. 2007”

3. The third and main concern is about “why matic epipedon was destroyed, and if matic epipedon destroyed, what will impact to the ecosystem?”

Matic epipedon is a special characteristic for diagnosing soil horizon during soil generation. It is mainly consisted of dead and live roots as well as soil. The matic epipedon is mainly caused by grazing. Livestock overgrazing can accelerate the thickness of matic epipedon, especially when the plant community changes from *Kobresia humilis* to *Kobresia pygmaea*. When its thickness increases to a certain depth, the imbalance between soil nutrient supplies and plant uptake, a large number of roots will be dead. Due to freeze-thaw circling, cracks will appear in matic epipedon. This provides spaces for small animals such as pika. Increased rodent activities together with rain washing will destroy matic epipedon. Consequently, alpine grasslands will become “black soil” due to a lack of vegetation.

4. The fourth and main concern is about “Which environmental factors changed?”

“As the matic epipedon thickens, many environmental factors such as the thickness of matic epipedon, and soil bulk as well as soil moisture and temperature have been changed”, see lines 241–243.

5. The fifth and main concern is about “Increase the number of dead roots = root degradation = increase the amount of nutrients in the soil. If increase the nutrients on the

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soil= more root activity from new roots? Try to give a more convenient explanation for this process.

The number of dead roots increased due to altered environmental factors. The decomposition of these dead roots was not enhanced because there are two reasons. First, thick mottic epipedon obstructs the air diffusion and water infiltration, decreasing microbial activity and decomposition. Second, low temperature also leads to slow decomposition of dead roots. Consequently, root activity decreases and causes an imbalance among soil nutrients. At this point, the degradation of alpine meadows is inevitable (Cao et al., 2007). In the new version, we clarify this, see lines 247-253.

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/7/C1187/2015/sed-7-C1187-2015-supplement.pdf>

Interactive comment on Solid Earth Discuss., 7, 2185, 2015.