

**Journal:** Solid Earth - SE

**Manuscript ID:** SE-2014-89

**Type:** Research Article

**Title:** Effects of rodent-induced land degradation on ecosystem carbon fluxes in alpine meadow in the Qinghai-tibet plateau

**Short title:** Effects of land degradation on ecosystem carbon balance

## General Comments

This paper attempts to analyze the effects of rodent-induced land degradation on ecosystem carbon fluxes in alpine meadow. This manuscript would be of interest to readers of Solid Earth, ***BUT the article would not be acceptable for the journal in the present form. I suggest minor revision.*** In general, the English should be improved.

## Detailed Comments

### ABSTRACT

Please this is not clear ... is confusing. You say "We conducted a field experiment with six levels of land degradation (D1–D6, degradation aggravates from D1 to D6) to investigate the effects of..." I understand that D1 is the least degraded and D6 the most degraded. However, in the text it is said that..."Soil respiration, ER, GEP and above-ground biomass (AGB) was significantly higher in slightly degraded (D3 and D6) than in severely degraded land (D1, D2, D4 and D5)... it's confusing... seems contradictory...

In line 11-12, "Net ecosystem exchange had....", please use acronyms...NEE.

### INTRODUCTION

The introduction is short. It is very well put, but you limit your introduction to China. Solid Earth - SE is an international journal. I recommend you add something about carbon and land degradation studies in dryland. In this regard, I recommend that you read the works of Parras-Alcántara, L., and Cerdà, A., so that the paper is not a regional study.

### MATERIALS AND METHODS

#### Site description

I recommend adding a small location map.

The text indicates:..." Mean annual potential evaporation is 1316.9 mm"....evaporation or evapotranspiration?.

The text indicates:..." Cryosol according to World Reference Base"... the reference is incomplete.... World reference base for soil resources....2006, 2010, 2014...

The text indicates:..." Permafrost thickness observed near the experimental site is 60–200 m"...Pang et al. (2009)...not shows this data..(Qiangqiang Pang, Guodong Cheng, Shuxun Li, Wengang Zhang. Active layer thickness calculation over the Qinghai–Tibet Plateau. Cold Regions Science and Technology 57 (2009) 23–28. <http://www.sciencedirect.com/science/article/pii/S0165232X09000159#>

### **Experimental design**

Really... what criteria was been used to establish the degradation level (D1-D6)?...As has been made?...In Table 1 and in the text it is not clear....Please explain.

### **Measurement protocol**

I recommend simplifying. You can put a table with the method and its literature, adding a specific feature of the method.

## **RESULTS**

### **Soil Temperature**

The text indicates:..."The average soil temperature was 10.02±1.70, 9.64±2.81, 12.33±4.02, 11.0±2.78, 12.40±3.95 C from D1 to D6"...I imagine that they are the average of all considered months, but ± what it is? standard error, standard deviation, variation...etc, explain in data analysis or get it right in the figure 1.

### **Soil chemical properties and biomass**

I think that it would be interesting to include SOCS (Soil organic carbon stock) in Table 2. So that the SOCS content depends on gravel content and bulk density. And these variables are important especially in degraded soils.

Do not understand how this study the physical soil properties are not incorporated. With respect to physical properties, I recommend reading paper of Parras-Alcántara, L.,

With respect to Table 2....what it is ±X?...explain... standard error, standard deviation, variation...etc.

I think that the C:N ratio, especially in degraded soils, could be an indicator of soil quality .... (suggestion).

## **DISCUSSION**

Be careful with the acronyms, when they are made above, do not write the whole word again. For example, page 3011 line 3 (total nitrogen TN), in page 3010 line 3, TN. Please review the text.

### **Effect of land degradation on soil properties**

Be careful, when we are referring to storage should talk about stock ... I think it is more accurate (more correct).

### **Effect of land degradation on C fluxes**

The text indicates:..."Soil temperature explains most of the variation in Rs"...Why?...can you explain better..?