

## ***Interactive comment on “Geomorphic control on the $\delta^{15}\text{N}$ of mountain forest” by R. G. Hilton et al.***

### **Anonymous Referee #2**

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Actually PN has been frequently ignored in studies on N biogeochemistry and it is good if the importance of PN on N biogeochemistry of the forest ecosystems. In this paper, the authors revealed some correlations between  $\delta^{15}\text{N}$  of surface soils and slope angles, and discuss the importance of PN (or soil erosion) that can shape the  $\delta^{15}\text{N}$  of soils.

Questions are

1. The  $\delta^{15}\text{N}$  signature observed here can be attributed to PN loss? 2. The dataset looks quite small. Is the dataset enough to discuss ecosystem N loss? Surface soil (0-10cm) can be a representative parameter of whole forest ecosystem? 3. different slope angle can be simply linked to PN loss? Lots of other mechanisms that can be affected by different slope angles should be considered.

I think the authors discussed too much with too small dataset – with no direct informa-

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tion of PN on  $\delta^{15}\text{N}$  of surface soils in different ecosystems. There are lots of possible mechanisms that can explain the relationship between slope angles and  $\delta^{15}\text{N}$  of soils (see the latest review on soil  $\delta^{15}\text{N}$  by Hobbie and Hogberg (2012) *New Phytologist*). How can the authors consider that PN loss (or erosion) is the most important factor shaping the  $\delta^{15}\text{N}$  trend observed in this paper? It seems to me that MAT would be more important (From Table 1) as Amundson et al. (2003) considered.

Page 19596 Line 7 Is it appropriate to cite Fig. 1 in this sentence??

Page 12599 Line 3- Where did the authors collect the soil samples in a mountain? Slope position of the sampling point would be important if slope angle is the important parameter controlling  $\delta^{15}\text{N}$ . Microtopography can also affect the  $\delta^{15}\text{N}$  of soils and should be considered when soils are sampled...

Page 12599 Line 6 The soil from 0 to 10cm can be representative for the N status in each ecosystem?

Fig. 2 I think that it is easier for the readers to understand the distribution of  $\delta^{15}\text{N}$  data if the number of data is set as y axis. Why probability density (because the number of data is not so large)?

Page 12600 Line 15-

The difference in  $\delta^{15}\text{N}$  between grass and pine should be clarified. The authors mentioned that the difference between two species was "non-systematic" when they used the averaged values, I think this is not appropriate. The differences are (from Table S2)

Site 6: -2.5 vs -3.0 = +0.5 Site 10: -0.5 vs -2.2 = +1.7 Site 14: -3.7 vs -2.2 = -1.5 Site 23: 1.6 vs 3.8 = -2.2

Large differences in  $\delta^{15}\text{N}$  for each site..... So, I am not convinced that inter-species variability in  $\delta^{15}\text{N}$  was minor (Line 17-).

Page 12600 Line 20.  $\delta^{15}\text{N}$  data from two species can be combined simply??? I think

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weighted-average (based on biomass or basal area, for instance) should be applied because the biomass of grass would be much smaller than pine.

Page 12600 Line 25 In Result section, I found some sentences that would be in Discussion section, and this sentence is one example.

Page 12601 Line 3 I am not familiar with  $^{14}\text{C}$  but the normalization with  $\delta^{13}\text{C} = -25\text{permil}$  can be applied to the samples with C3 and C4 mixed soil???

5.1 Lots of data from outside of this paper, together with many assumptions should be incorporated in calculations.

Page 12611 Line 4- Lack of significant correlation in Peruvian sites (with whole data) simply suggests that the correlations between slope angles and  $\delta^{15}\text{N}$  is not general. No clear reasons to exclude the sites with slope angles less than 21.

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