

Interactive comment on “Vertical patterns of soil carbon, nitrogen and carbon: nitrogen stoichiometry in Tibetan grasslands” by Y. H. Yang et al.

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[Responses] Thank you very much for your constructive comments! Following your comments, we have moved the description about the study area from Introduction to Materials and Methods section. Also, we have invited a native English speaker (Dr. Rebecaa Sherry) to check the MS. It's a great suggestion to discuss the processes controlling vertical patterns of both SOC and TN in alpine grasslands. Following your suggestions, we have discussed the potential controlling factors of vertical distributions of SOC and TN in the revised MS as follows: “Theoretically, vertical patterns of SOC and TN are determined by a dynamic balance between carbon inputs from plant pro-

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duction and outputs through microbial decomposition (Gill et al., 1999). As a major source of carbon inputs in soil, vertical distributions of roots should play an important role in shaping vertical distributions of SOC (Jobbágy and Jackson, 2000). Our previous studies confirmed that shallower root distributions could potentially explain the shallower distribution of SOC compared with global average. In addition, depth-dependent decomposition rates have been proposed as another potential mechanism for explaining vertical patterns of SOC (Weaver et al., 1935). Specifically, Gill et al. (1999) observed that a higher proportion of total root biomass occurred in surface soil than that of SOC, and then ascribed such pattern to the decreasing rates of microbial decomposition along soil profile (Weaver et al., 1935; Gill et al., 1999; Gill and Burke, 2002). In a similar fashion, soil in the upper 20 cm in the Tibetan alpine grasslands contained 64% of total roots (Yang et al., 2009a), but only 49% of SOC. Such differences may also suggest that depth-dependent decomposition rates could affect vertical distributions of SOC in alpine grasslands.”. To test the above-mentioned hypothesis, further studies are required to carefully examine changes in decomposition rates along soil profile. After gaining enough prior knowledge on these two key processes (i.e. root distribution and depth-dependent microbial decomposition), it is necessary to develop a process-based model for predicting vertical distributions of SOC and TN at larger spatial scale. We have added these discussions in Discussion section of the revised MS. Again, thank you for your constructive comments and suggestions!

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