Answers to the questions:

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Reviewer #1:

1. Response to comment 1, The reasoning behind different results and the varying environmental factors determining them on two slopes is not clear. In addition, the correlation of various environmental factors with the $\delta^{15}N$ of leaf and soil is very ambiguous and unexplained. I would suggest to authors that the environmental factors and the response variables should be tested with principal component analysis(es) to get a clearer picture.

Answer: Special thanks to you for your good comment. According to your advice, we tested all variables using principal component analysis, the results was displayed in the following figure. In principal component analyses, PC1 and PC2 could represent soil conditions and plant traits (especially leaf N content), respectively. The results of principal component analyses seem consistent with correlation analyses (please see the following Tables 3 and 4). On the north slope, leaf N content had strong positive while leaf C/N had negative effects on leaf $\delta^{15}N$, MAT and MAP also exerted influences on leaf $\delta^{15}N$, however, soil factors almost did not affect leaf $\delta^{15}N$ except silt/clay ratio and soil moisture. Both MAT and MAP had large loadings on soil $\delta^{15}N$, meanwhile, soil $\delta^{15}N$ increased with decreasing silt/clay ratio and increasing soil moisture. Compared with the north slope, representation of PC1 and PC2 on the south slope was clearer. Leaf $\delta^{15}N$ was primarily correlated with leaf C/N, soil $\delta^{15}N$ was significantly controlled by MAP and soil moisture, which might be due to arid environment on the south slope. Principal component analyses and correlation analyses both supported our argument that the relationships between leaf and soil $\delta^{15}N$ and environmental factors are localized.

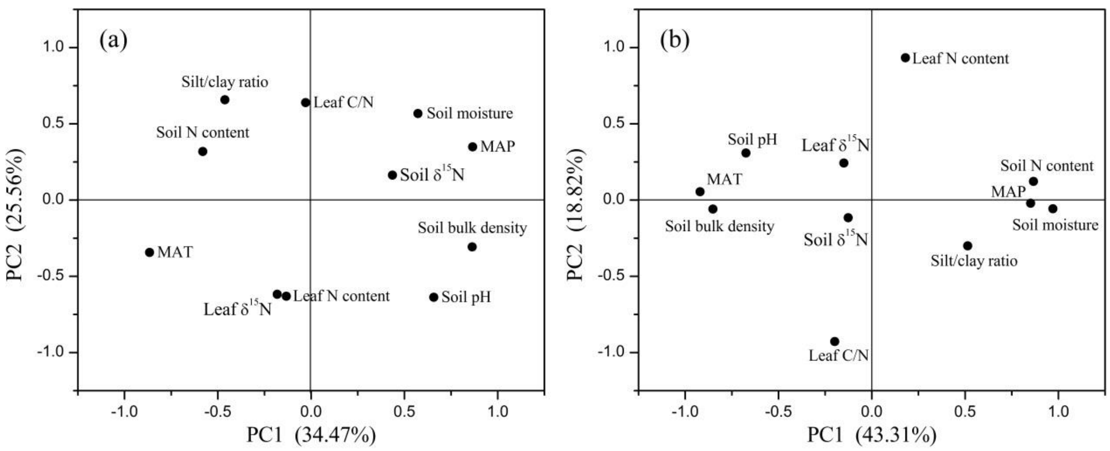

Fig. Variables loading on the first two principle components of the north (a) and south slope (b).

Table 3. Correlation analyses between leaf or soil δ^{15}N and influential factors on the north slope of Mount Tianshan.

	Leaf δ^{15}N		Soil δ^{15}N	
	r	*P*	*r*	*P*
Leaf δ^{15}N	1	---	-0.120	0.264
Soil δ^{15}N	-0.120	0.264	1	---
MAT	**0.266**	0.012	**-0.385**	< 0.001
MAP	**-0.272**	0.010	**0.387**	< 0.001
Leaf N content	**0.340**	0.001	-0.090	0.397
Leaf C/N	**-0.452**	< 0.001	-0.036	0.739
Soil N content	-0.048	0.659	0.088	0.408
Soil moisture	**-0.271**	0.011	**0.388**	0.000
Soil pH	0.162	0.132	0.070	0.513
Soil bulk density	-0.056	0.604	0.145	0.174
Silt/clay ratio	**-0.236**	0.027	**-0.370**	< 0.001

Note: the r values were in bold when P < 0.05.

Table 4. Correlation analyses between leaf or soil δ^{15}N and influential factors on the south slope of Mount Tianshan.

	Leaf δ^{15}N		Soil δ^{15}N	
	r	*P*	*r*	*P*
Leaf δ^{15}N	1	---	0.175	0.074
Soil δ^{15}N	0.175	0.074	1	---
MAT	0.157	0.109	0.115	0.244
MAP	-0.168	0.087	**-0.203**	0.038
Leaf N content	0.119	0.229	-0.073	0.459
Leaf C/N	**-0.228**	0.021	0.062	0.533
Soil N content	-0.173	0.078	0.014	0.888
Soil moisture	-0.141	0.150	**-0.229**	0.019
Soil pH	0.04	0.686	-0.138	0.161
Soil bulk density	0.151	0.125	0.041	0.679
Silt/clay ratio	-0.07	0.477	-0.004	0.964

Note: the r values were in bold when P < 0.05.

2. Response to comment 2, The location of the two observatories on shady slope covers almost the whole range of the sampling gradient. However, on the sunny slope the two observatories merely cover half of the total gradient of the altitude sampled. How would the authors justify the use of climate data obtained from these observatories for the entire gradient of the altitude sampled and studied?

Answer: Your comment is right! In this paper, MAT and MAP were interpolated by two observations on each slope. We have to admit that the interpolated climatic data might be not very reliable, but we have no better ways to obtain more reliable climatic data. It is well known that this is also the greatest difficulty that the researchers studying global changes encounter. In fact, the case that two observations distributed at each slope is very rare in the world, and this is also one reason why we conducted the investigation here.

3. Response to comment 3, L48: localized is a better word that "local-dependent".

Answer: Thanks, "local-dependent" has been changed to "localized" in revised manuscript.

4. Response to comment 4, Various instead of varied.

Answer: Thanks, "varied" has been changed to "various" in revised manuscript.

5. Response to comment 5, L316-320: Should the plant not discriminate against the heavier isotope during N uptake, even if it's very low, thereby resulting in low leaf ^{15}N signature, when higher N uptake is the routine?

Answer: Sorry. We did not offer a clear explanation in the original manuscript. We did changes for this in the new version. The explanation is as follows. This is a widely accepted fact that plants are depleted in ^{15}N relative to its N sources because of ^{15}N discrimination, but in this paper, we meant that the plants grown in N-limited environments will enrich more ^{14}N compared with the plants in N-rich condition. The reason is that soil N transformations, such as NH_3 volatilization and NO_x emission are enhanced when soil N nutrient is rich, consequently, more ^{14}N losses from soil. This causes ^{15}N enrichment in soil, subsequently, plant $\delta^{15}N$ is more positive. Conversely, plants have more negative $\delta^{15}N$ values when soil N is limited because weak soil N transformations and less ^{14}N loss.

6. Response to comment 6, L336-340: This explanation presented here just says that cold temperature caused high leaf $\delta^{15}N$ on shady slope. But how ?

Answer: Sorry. We did not present a detailed mechanism for this (a positive effect of temperature on the shady slope) in the manuscript, and the reason is that we are not sure about the mechanism. The probable mechanism is that higher temperature favors more complete plant nitrogen assimilation and transformation, which might decrease isotopic fractionation during N assimilation and transformation, then causes ^{15}N enrichment in plants. We will add the probable mechanism in the new version.

Special thanks to you for your good comments.