

Interactive comment on “Stable carbon and nitrogen isotopic composition of leaves, litter, and soils of various tropical ecosystems along an elevational and land-use gradient at Mount Kilimanjaro, Tanzania” by Friederike Gerschlauer et al.

Anonymous Referee #4

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The authors infer nitrogen and carbon cycling dynamics from the nitrogen and carbon stable isotopes of soil and plant samples along an elevational gradient. The gradient in the Mt Kilimanjaro area has a number of variables, including water availability, plant type (C3 and C4) and changes to soils. There are also differences referred to as “ecosystems”, where the authors divide the altitudinal gradient into areas as disparate as a ‘maize field’ versus relatively undisturbed forests. The authors classify these ecosystems and have sufficient samples to examine relationships. The spatial

scale of the study is admirable.

While there is much data here to examine relationships between habitat features and C and N stable isotopes, the relations are correlative. They also rely on inferring what is likely a dynamic process with underlying fluxes from static data. What the authors are relying on is that the isotopes integrate the processes with integrity.

There were several instances where I was concerned about the assumptions and the links the authors were making. First, fertilizers and pesticides could change the $\delta^{15}\text{N}$, leading to the wrong interpretation of $\delta^{15}\text{N}$ differences across ecosystems. Is there anything known about this potential artefact? Statements that then follow these N analyses such as “N cycles are tighter” (e.g. L 354) seem too strong. Second, the a priori expectations for $\delta^{13}\text{C}$ patterns was also unclear to me. The paragraph starting L45 was confusing. C3 plants have lighter $\delta^{13}\text{C}$ values but water stress increases the value? How do we think these differences are integrated in Figure 2.

I don't have much in the way of minor edits, etc because I think these broader issues need to be addressed first.

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