

Interactive comment on “Partitioning of canopy and soil CO₂ fluxes in a pine forests at the dry timberline” by Rafat Qubaja et al.

Anonymous Referee #2

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This manuscript describes the study partitioning of canopy and soil CO₂ fluxes in a pine forest at the dry timberline using the measurements of isotopic signatures ($\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$) of CO₂ emitted from bulk soils, fine roots, root-free soils, and carbonate fractions. The measurement and data are interesting. Then, scientific insights, which can be gained from this study, would significantly contribute for improving our understanding the response of dry environment ecosystems to climate change. The writing, however, should be improved more and more as pointed out by Referee #1. Then, please refine every sentence in the manuscript more carefully, because there are substantial typos (e.g. “a pine forests” in the title, “Soil respiration from the atmosphere” in Line 29-30, “Reflux” in Line 369, and so on). In addition to these concerns for writing, I have a technical concern about the estimating $\delta^{13}\text{C}$ for CO₂ emitted from bulk soils

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(i.e. $\delta^{13}\text{C}_{\text{RS}}$ in the manuscript). The authors estimated $\delta^{13}\text{C}_{\text{RS}}$ using the keeling plots for soil CO₂ profile data at 0, 30, 60, 90, and 120 cm depth; however, the $\delta^{13}\text{C}$ of soil organic matters, the major source of heterotrophic respiration, often change along with soil depth increase. Then, these vertical changes in $\delta^{13}\text{C}$ of soil organic matters have significant potentials affecting the $\delta^{13}\text{C}$ -CO₂ profile. This means that the observed relationships between $\delta^{13}\text{C}$ -CO₂ and CO₂ concentration profiles might be affected not only by the change in contribution of source CO₂ and background CO₂, but also by the changes in $\delta^{13}\text{C}$ of source CO₂. Therefore, in my opinion, the authors are needed to provide the reliable justification for their methodology, to quantify the uncertainty for estimated $\delta^{13}\text{C}_{\text{RS}}$, and/or to apply alternative methodology for estimating $\delta^{13}\text{C}_{\text{RS}}$. Finally, please consider to include the photographs showing conditions of each chamber site and the schematic diagrams describing three collars locations within a chamber site.

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