

SOIL Discuss., author comment AC4
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Reply on RC2

Zuzana Frkova et al.

Author comment on "Phosphorus dynamics during early soil development in a cold desert: insights from oxygen isotopes in phosphate" by Zuzana Frkova et al., SOIL Discuss., <https://doi.org/10.5194/soil-2021-65-AC4>, 2021

Additional reply to the reviewer's comment: "L287: Can you estimate average evaporation and a water balance from the d-excess data? Would be nice"

We agree with the reviewer that the estimation of the evaporation at sampling site would be interesting. However, the Craig–Gordon evaporation model (Craig and Gordon 1965) that would allow us assessing the hydrological balance using isotopes needs a set of accurately measured hydroclimate variables such as relative humidity, temperature, wind, but also the isotopic composition of precipitation and other water storage (i.e., subsurface recharge) etc. As the isotope mass balance was not a subject of our study and due to the remoteness and extreme climate conditions in the study area, we were not able to collect these data that could allow a reliable estimation of the evaporation/inflow rate. Nevertheless, we have used d-excess and stable isotopes fingerprints to trace the evaporation signal in the hydrological components (snout, glacier, river) and to validate the hydrological connection between water reservoirs and potential water residence time (see discussion in Supplementary Material).

Reference

Craig, H. and Gordon, L. I.: Deuterium and oxygen 18 variations in the ocean and the marine atmosphere, in: *Stable Isotopes in Oceanographic Studies and Paleotemperatures*, edited by: Tongiorgi, E., Laboratorio di Geologia Nucleare, Pisa, Italy, 9–130, 1965.