We thank the reviewer for the interesting comments and suggestions. Below we provide a detailed point-by-point response (in bold) to the reviewers' comments (*in italic*).

The authors have responded to most my concerns. I understand that substantial or anticipated conclusions were always restricted by limited observations of isotopes in ALPs. However, I partly don't agree that the explanations below about why high fractions of new water (Fnew) were more likely in small catchments.

Thank you for acknowledging the implemented changes. We additionally address the final issues raised in the revised version of the manuscript.

First, high-elevation catchments have greater subsurface storage leading to longer transit times. However, it is widely reported that rainfall can directly drain to drainage networks as new fractions in high altitude areas in alpine basins. While, in the few existing studies mainly located in lower relief basins as shown in the red circled part of FIGURE 10, regolith seems to be thick to store more water as rain falls (Grant et al., 2017; McCormick et al., 2021).

We now expanded the discussion and added a sentence on the importance of regolith storage: "Previous studies also reported that weathered bedrock or regolith is important in storing water and delaying runoff response (Grant and Dietrich, 2017; McCormick et al., 2021) by enhancing storage capacity especially in steeper catchments where precipitation would otherwise drain to river networks directly."

Second, I agree with Hrachowitz et al. (2021) findings. Many classical studies also verified that new water tends to percolate deeply and quickly to mix with old matrix soil water in preferential-pathway-developed forest catchments (see in Weiler et al., 2005), which may lead to more old water in stormflow. Hence, I argue that the authors should provide more convincing discussions.

Thank you. We now updated the discussion on the effects of forest in the according section of the revised manuscript. "The formation of preferential pathways can be argued to lead to either more or less recent precipitation ending up in streamflow. Preferential pathways may transport precipitation directly to streams, thus

increasing Fnew and Fyw (Brantley et al., 2017; von Freyberg et al., 2018). However, previous studies also argued that preferential pathways tend to increase deep percolation and mixing in deeper storages, thus decreasing Fnew and Fyw (Hrachowitz et al. 2021; Weiler et al., 2006). It remains to be tested whether the correlations between Fnew and the fraction of catchment area covered by forests might also be an artefact of cross-correlations with other variables."

References:

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