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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Seasonal origins of soil water used by trees" *by* Scott T. Allen et al.

Anonymous Referee #2

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The manuscript "Seasonal origins of soil water used by trees" by Allen et al. presents a study from Switzerland showing that in summer beech and oak trees preferably used soil water that was recharged by winter precipitation in contrast to spruce trees that used soil water with more contributions from summer precipitation. The topic is highly relevant because it gives details about the importance of winter and summer precipitation for the growth of three tree species. The manuscript is very well written and most of the conclusions are supported by the data. Below are given some comments relevant for the interpretation of the soil water data and for the conclusions on water uptake by the trees.

Abstract, page 1, line 27/28: there are very good concepts of how water flows through soils, and this statement is not a consequence of the findings of this manuscript because soil water fluxes were not investigated. Therefore, I suggest deleting this statement

Introduction, page 2, line 20: the general literature introduction is rather short. There are studies from humid regions, and I suggest already mentioning some and their findings in the introduction and not only in the discussion (e.g. Brinkmann et al (cited in the study) or Dubbert et al., accepted (doi: 10.1111/nph.15670)).

Page 4, lines 6-15: The applied tension of 60-70 kPa results in sampling water from a large range of different pores. This includes both water from larger and smaller pores, and thus more and less mobile water. In some of the very sandy soils, this could even be the entire pore water pool (depending on the water retention function of these soils). Therefore, it is rather speculative which pore regions the sampled water is representative for. This should be considered in the entire interpretation of the data.

Page 8, lines 3-5: to be more precise, I would add "for humid regions" here.

Page 8, line 18: there are no supporting data that water from finer pores had lower isotopic ratios compared to the pore water extracted with the lysimeters.

Page 8, line 19: see previous comment on soil water sampling

Page 9, line 1: I agree that these trees may be less vulnerable to summer precipitation deficits; however, only when considering short-term effects, as outlined in the next lines.

Page 9, lines 30-32: already mentioned at the beginning of this paragraph (lines 22-28) and thus redundant

Page 10, line 6: considering general low flow velocities in soils, I don't think that it is very surprising to find winter precipitation in these soils.

Page 10, line 11-19: 1) what is the average measured water content in these soils, in summer and in winter? The assumption of a field capacity of 0.35 for silty soils could be okay but is too larger for sandy soils. 2) the 77 days only refers to the time when all water (summer precipitation) is taken up by the roots. The total soil water balance (including up-/downward fluxes below the root zone) need to be considered for an

estimation of mean transit times. 3) mean water contents are higher in winter/spring compared to summer strongly influencing the transit time of water. The back-of-the envelope calculation needs further support by measured data and calculation of water fluxes and could be part of a more thorough, next investigation. From the presented data a more detailed interpretation of soil water fluxes is not possible and cannot be generalized over all investigated sites considering the wide range of investigated soils (see variation of soil texture).

page 11, line 12: see earlier comment on soil water sampling

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