

Interactive comment on “Mechanisms of consistently disconnected soil water pools over (pore)space and time” by Matthias Sprenger et al.

Anonymous Referee #1

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The manuscript titled “Mechanisms of consistently disconnected soil water pools over (pore) space and time” describes a study that uses the stable isotopes of hydrogen and oxygen in soil water, precipitation, local streams, and groundwater to identify apparently separate soil water pools and assess specific processes that result in bypass flow in soils. This study adds to the increasing amount of evidence that confirms the occurrence of the partitioning of soil water between tightly bound immobile water and mobile water that moves downward to discharge in streams and recharge groundwater, as suggested by the two water worlds hypothesis. In addition, this study puts effort into assessing the mechanisms that result in this partitioning. Overall, this paper is very well written. It addresses a very relevant scientific question that has implications for determining the proper way to interpret stable isotope data in ecohydrology and for

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better understanding the local water balance in different areas. The scientific methods and assumptions are valid and sound, and the conclusions, which are supported by the results, add significantly to our understanding of ecohydrology.

The only significant modification to the paper that I would suggest is the addition of a figure that shows: 1) The global, regional, and local location of the study area 2) Soil and water sample locations Other minor suggested edits include: 1) Abstract – The second sentence is awkward and should be revised. The third sentence appears to describe an observation from the study before the study objectives and other details are defined. This sentence (and one or two additional sentences) should describe observations of other researchers to define the problem that this study addresses. 2) Page 1, line 28 – Change the word “since” to “for.” 3) Page 1, line 30 – Change the word “unraveled” to “of interest” or something similar. 4) Page 3, line 2 – Add a citation for a reference that describes suction lysimeters or include more details about them. 5) Page 3, line 3 – Include a citation of the cryogenic extraction procedure. 6) Page 12, line 17 – change wording to “. . . mechanisms by which. . .”

Other comments: The figures are quite complex, and it takes time to fully understand them, but they do show a lot of valid information. The authors state that tightly bound water is composed of relatively old water. I am wondering if they could suggest an actual age or range of ages for this tightly bound water (months, years, decades??).

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