

Interactive comment on “Rainwater propagation through snow pack during rain-on-snow events under different snow condition” by Roman Juras et al.

Anonymous Referee #1

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The authors describe interesting sprinkling experiment, which were performed to study rain-on-snow events. They measured both outflow volumes and isotopic signals, which was possible due to the use of Deuterium enriched sprinkling water. They found that in cold/dry snow (unfortunately only one replicate) the outflow from the snow was faster both in terms of outflow reaction and rainwater travel times. While this finding could be expected with regard to the latter (i.e. rainwater travel times), the former (i.e. slower response of the outflow in wet/warm snow) seems counterintuitive. One explanation might be the development of preferential flow pathways, but without internal measurements/observations, this remains a bit speculative.

My major concern with this study is the not fully satisfactory explanation of the pro-

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cesses leading to the counterintuitive findings. Here I would find some more discussion/reasoning helpful, including a detailed discussion of potential errors, which could (not) explain this (especially since there was only one sprinkling experiment on cold/dry snow). Beyond this, my comments as listed below are rather minor:

Reading the manuscript, at some point I was confused by the four experiments and four rain pulses Probably it was me missing something, but this could perhaps also be described clearer.

The author present much of their observations in form of tables. The manuscript would become much more attractive if these results could be presented (also?) in form of figures.

While there obviously is a difference in scale, it would be useful to link the isotope studies in the present study to isotope studies at the catchment scale (e.g., Rodhe, 1981, Spring Flood Meltwater or Groundwater?)

P2L33: while melting snow and rain can have (and often have) a different isotopic composition, this difference is not a 'fact'

P3L3: What is meant by discrepancy here? Isn't this just the consequence of the GMWL?

P4L34: is there any evidence for these temperatures being representative?

Eq1: please avoid using x as multiplication sign

P5L15: delta values are no concentrations

Eq 4: where does this Eq and the tan in it come from?

P7L1: the sentence 'Unlike our expectations' sounds like discussion

P7L3: the location of 'only' seems strange, reformulate to clarify what is referred to by 'only'

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While I am not a native speaker myself, I feel that there is some room for improvement with regard to the English. Among other things, the (not) use of ‘the’ seems not always correct and some sentences are a bit unclear to read (e.g. P2L19). The authors are also not fully consistent with the use of the tenses, and the tense used for reporting own work sometimes jumps between past and present.

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