

## ***Interactive comment on “Now You See It Now You Don’t: A Case Study of Ephemeral Snowpacks in the Great Basin U.S.A.” by Rose Petersky and Adrian Harpold***

### **Anonymous Referee #2**

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General Comments: This paper addresses an important topic in the hydrology of snow dominated regions. Ephemeral snowpacks are a significant, yet understudied, component of the mountain water balance. This paper identifies key unknowns related to ephemeral snowpacks, presents clear thorough analyses designed to address those unknowns, and concludes recommendations that other investigators can use in future studies. I think the paper falls within the scope of HESS, and is worthy of publication after some moderate revision.

Specific Comments 1. In section 5.1 there is a lot of attention given to lag between date of snow disappearance and date of peak soil moisture in ephemeral vs seasonal

C1

snowpacks. In ephemeral snowpacks the lag times are 79 and 48 days for shallow and deep soil moisture, while in seasonal snowpacks the lag times are about 5 days. However, the actual dates of peak soil moisture are not very different. From figure 5 it appears that the dates of peak soil moisture tends to occur in mid-late may regardless of when the snow disappeared. Does this imply that the timing of snow disappearance in ephemeral snowpacks doesn't really matter to soil moisture? Late winter rain keeps the soil wet in the absence of snow, and peak soil moisture is more a function of the timing of evapotranspiration?

2. The introduction should be modified to better introduce the actual topics in the paper. Specifically, the relationship between ephemeral snowpacks and soil moisture is a dominant theme in the paper, but receives little attention in the introduction. Except for a brief mention in the opening paragraph, the term soil moisture doesn't appear again until the research questions in the final paragraph.

3. The writing in some sections needs to be tightened up. Although well organized and generally well-written, it has a feeling of having been written by multiple authors. Section 5.3, for example, has quite a few awkward and complex sentences while other sections are more clear. I suggest a thorough edit of the entire manuscript by a single author.

4. I am not a fan of combined Results and Discussion sections, although I understand the appeal. It is sometimes difficult to decipher what is a result of this study from what is an interpretation of others. Consider separating the sections. This is not a publication deal-breaker, but just something to consider.

Technical Corrections (Page, line) 1,13 Cold content should be defined 1, 32 Is “intermittent” and “ephemeral” the same thing? 4, 8 Goal should be about research questions. . . 4,15 The soil moisture problem has not been adequately introduced Fig. 2 I don't see the value of this figure. I could be deleted with any impact on the paper if space is a concern 9,11 I don't think these are proper sentences 12,19 Awkward

C2

sentence Fig 8. Panel c has alignment issues 16,2 I don't think the first sentence is necessary. This idea was already introduced. Just start the section with "We propose a..." 16, 5-10 These sentences are redundant with the introduction. They seem out of place in a Results and Discussion section. 16,11 Awkward, complex sentence. I'm not sure what the "based on..." phrase means. Table 1 Average winter temperature estimates should cite the source and method. What duration was used? Probably should round elevations to integer values. Degree symbol is used in caption, but text is used in column heading. 17,6 LaMontagne 2009 is an MS thesis. Better to cite Tyler et al (2008) Tyler, S.W., Burak, S.A., McNamara, J.P., Lamontagne, A., Selker, J.S, and Dozier, J. 2008. Spatially distributed temperatures at the base of two mountain snow-packs measured with fiber optic sensors. *Journal of Glaciology*, 54(187): 673-679.

Fig 12 Consider putting the years within the figure boxes rather than above them. At first glance, it looks like years should be the x-axis titles.

20, 27 I don't think the problem of defining the length of snow covered periods is an algorithm problem. It's a conceptual understanding, or community definition problem.

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