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Interactive comment on "Eleven years of mountain weather, snow, soil moisture and stream flow data from the rain-snow transition zone – the Johnston Draw catchment, Reynolds Creek Experimental Watershed and Critical Zone Observatory, USA" *by* Sarah E. Godsey et al.

Anonymous Referee #3

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This paper presents a detailed hydro-meteorological dataset from a small catchment in the rain-to-snow transition zone in southwestern Idaho, USA. This dataset covers a wide range of altitude and aspect across the rain-to-snow transition zone. The paper is well written and the data are easy to access in a convenient format on the USDA data website with a complete description of the metadata. Therefore, I recommend the publication of this paper in ESSD subject to minor revisions outlined below.

Specific comments

P 2 L 26: the extension of the rain-to-snow transition zone in the Northwestern US in terms of km2 does not mean a lot for the reader who is not familiar with this region of the world. The authors could for example give the relative importance of the rain-to-snow transition for the mountains of the Northwestern US.

P 3 L 7-L21: the results of the meta-analysis is interesting but I am wondering if the keywords used by the authors are sufficient to get a clear overview of the dataset available from sites or catchments lying in the rain-to-snow transition zone across the world. Among the 5 sites listed, 3 of them are located in the northwestern US (with two of them in southwestern Idaho). Does it mean that the terms "rain-to-snow transition zone" is mainly used in the US? For example, as mentioned in the paper, the Col de Porte experimental site in the French Alps is typically lying in this zone but wasn't discovered when searching the keyword.

P3 L 14: the site in Davos is the Weissfluhjoch test site managed by SLF. This site is located at 2540 m in the Swiss Alps. Can it be reasonably classified in the rain-to-snow transition zone ?

P3 L 20-21: Note that Col de Porte and Weissfluhjoch are mainly reference sites for snow observations and one of their main objective is to provide atmospheric forcing and detailed evaluation data for snowpack models. This objective is different from this dataset that provides distributed hydro-meteorological data from a small catchment in the rain-to-snow transition zone.

P 3 L 27: add "and melting" after "snow accumulation"

P3 L 28-30: this dataset concerns the present climate and it is hard to say that it is possibly representing the future evolution. I recommend the authors to remove this sentence. Also, the dataset only covers 11 years which is not along enough from a climate perspective.

P 4 L 11: what are the typical slope angles found on the south-facing and north-facing slopes?

P 4 L 23: “z_s” is not a classical symbol for snow depth. Consider using the symbol from the international classification for seasonal snow on the ground (Table 2.1 in Fierz et al. 2009)

P 5 L 9: are the data from stations 144 and 145 available as well? At P 6 L 13, the author mention a dataset in preparation by Marks et al. Is it the same dataset?

P 5 L 10-11: is there a flag in the dataset that mentions the time periods when gaps have been filled?

P 5 L 13-14: you could refer here to Fig. 3 that shows a nice overview of averaged precipitation and temperature during the 11-WY time period

P 6 L 7: Could the authors include a brief comment on the influence of the surrounding topography on incoming SW? For example, are they shadows from the surrounding topography that modifies incoming SW measured at the stations in early morning or late afternoon? Overall, if available, it would be interesting to know the topographic mask of each station with local horizon angles.

P 6 L 17: it would be interesting to know at which height above the ground are typically measured wind speed and if snow depth is measured at all stations measuring wind speed. This information is useful to know at which height above the snow surface wind speed is measured in wintertime.

P 6 L 18: can the author add a comment about the representativeness of wind speed measurement? Does the surrounding vegetation influence wind speed measurement at some stations?

P 6 L 25: are the raw precipitation data included in the dataset ? It would be interesting to have them if data users want to apply their own methods of correction following for example the recent SPICE project.

P 8 L 2: based on Fig. 3, it appears that wind-induced snow transport strongly affects snow depth evolution at some stations. Could the authors comment more on the influence of wind-induced snow transport on the seasonal evolution of snow depth at this site? What are the stations that are typically exposed to wind-induced erosion and accumulation?

P 8 L 4: can the author comment more on the method use to convert snow depth to SWE? Do they mean using the bulk snowpack density simulated by a snowpack scheme to convert measured snow depth into estimated SWE?

P 8 L 31: At P4 L3 the authors mention that the size of the catchment is 1.79 km2 which differs from 181 ha. The differences are small but what is the actual area of the catchment?

P 9 L 15-16: it would interesting to mention in the conclusion that data are still collected at this experimental catchments and to precise whether the dataset will be updated on a regular basis to include the more recent years.

Figure 1: terrain contour lines are hard to read.

Figure 3 is very interesting and nicely shows the different temperature and precipitation conditions at for this catchment. However, the graphics showing snow depth evolution are hard to read. Maybe make two separate figures. The snow depth times series goes from October to late April whereas all the snow is generally gone in February. This graphics would be easier to read if they showed snow depth evolution from October to late February.

References

Fierz, C. R. L. A., Armstrong, R. L., Durand, Y., Etchevers, P., Greene, E., McClung, D. M., ... & Sokratov, S. A. (2009). The international classification for seasonal snow on the ground (Vol. 25). Paris: UNESCO/IHP.

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