

***Interactive comment on* “Controls on the temporal and spatial variability of soil moisture in a mountainous landscape: the signatures of snow and complex terrain.” by C. J. Williams et al.**

Anonymous Referee #1

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Great paper and a very nice contribution to the literature on soil moisture variations. The authors do a great job bringing together the various conceptual models and then extending them with their own work. One comment – I think that the reason you don't see a decrease in variance with increasing moisture content is that the moisture conditions during your study did not get really wet on average for very long, if at all (Figure 4). Maybe you have addressed this in the paper, or maybe it has already been discussed online. However, if the moisture content keeps increasing, there is only one way the distribution can go – that is, theoretically, all saturated with no variance. So the model variance vs mean moisture content that emerges is one where variance is at a

minimum at the wet and dry ends of the spectrum, with a max (and hysteresis) in the middle.

Another thought is that you have covered the soil moisture variability literature quite well, but not the snow variability. Have you seen any papers on pdfs of snow. I have seen Barry Goodison talk about this in much the same context that we talk about soil moisture. It would be interesting to look at how the pdf of snow (height?; SWE?) compares to that of soil moisture alone (pre-snow season?) and affects the shape of the soil moisture distribution. See the papers by Ryu on rainfall/soil moisture pdfs (2004-WRR) and scaling (2006-GRL)

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