

# ***Interactive comment on “The role of liquid water percolation representation to estimate snow water equivalent in a Mediterranean mountain region (Mount Lebanon)” by Abbas Fayad and Simon Gascoïn***

## **Anonymous Referee #1**

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This paper presents the application of SnowModel for the Lebanon mountains using the traditional configuration, and a new liquid water percolation into the snow that permits improve the calculations of snow depth and snow density over the study area. The paper is interesting first for showing that liquid water percolation has a major implications in snow modeling; but also to see how with very limited data it is possible to obtain a reasonable good distributed representation of snow in areas where very little information was available. This result itself justifies the publication of the paper in HESS.

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In my opinion, the paper is convincing when demonstrating that the simulations made with new scheme for water percolation produces better simulations than the traditional configuration. The only limitation (that is fully understandable) is the lack of field data to assess that the water percolation is better simulated actually. In other words, are the better results the consequence of better representing the physical processes within the snowpack, or is just because it just provides less SWE that is closer to observations?. I realize that is not easy to demonstrate this, but perhaps if authors show when the two simulations really differ in the temporal series (may be showing the accumulated differences of both simulations), and at that time percolation plays a major role it could point out that there is a real causal effect. It would be also nice to see the differences in the distributed snow duration maps using SnowModel under the two compared model configurations, it may also reveal some interesting finding to see which areas are more benefited from the new percolation model.

Another question, that is out of the scope of this paper but it could be just briefly discussed, is how much room there is for improving the simulations in the area. For instance, authors mention the importance of the determination of liquid/solid phase of precipitation. However, if I understand well it is used a very simple temperature threshold approach, when now there are much more sophisticated approaches. I also would like to know more about the improvement (or limitations) of the snow blowing and redistribution module used in the model. Does it really help to improve the spatial distribution of snow over the area?. Finally, I also guess that sublimation is another important component of the SEB in Lebanon (as in other Mediterranean Mountains), what does the model inform about this process, is it an important source of uncertainty for snow modeling in this area?.

I have not more significant comments about the manuscript. It is well written and structured and very easy to be followed by readers. Figures are simple and nice.

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