

## ***Interactive comment on “Validation of modeled snow properties in Afghanistan, Pakistan, and Tajikistan” by Edward H. Bair et al.***

### **Anonymous Referee #1**

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In this study, snow in the upper Amu Darya and Indus basins is modeled using multiple techniques and a newly available snow depth data record. These data and results provide insight into the likely range of snow depths and snowpack properties in a region where there was previously very limited understanding. The study is well researched and designed and the paper is well written. I think this is a good contribution to the snow research literature for HMA, and provides evaluation of some potential tools that could be used for avalanche prediction. I have some minor suggestions and comments for consideration.

Line 87: Instead of “snow on land melt” use “terrestrial snow melt”

Line 143: Move the reference for APHRODITE to the earlier section (lines 110-111) where all the other global precipitation products are referenced.

C1

Table 1: It is not clear to me why Alpine3D and NOAH MP are run at 25km resolution. Why not run at a higher resolution for direct comparison?

Section 4.4 It's not clear how the AKAH stations are combined with SNOWPACK. Are the observations directly inserted and the model is used to estimate other snow properties (i.e. density, grain size, etc)? Ok, I see in the appendix that it is used as precipitation. I think that should be mentioned in the paper.

Line 266: should this date be “2018-4-1”?

Line 316: remove “are” after values, so it reads “median values between years are a week apart”

Figure 3: I would be interested in seeing a spatial comparison of the individual stations, particularly in 2017. Are there certain stations where most of the disagreement occurs, or it is similarly biased at all stations?

Line 355-356: you say, “The ParBal results are confounding given that the agreement between the modeled SWE from ParBal and SNOWPACK at individual AKAH stations is much better for both 2017 and 2018.” The agreement for 2018 shown in Figure 3 is good, but in 2017 there is quite a large bias – similar to what is seen in Figure 5 for the whole study area.

Figure 6: The Alpine 3D images shows considerably less SCA than the ParBal estimate. Since the Alpine 3D estimate is using the gage data I assume where it shows no snow, the snow depth reported at those sites was zero. Is that correct? The ParBal estimate is using MODIS data, which is presumably showing snow in those areas on that date. I'm surprised there is such a large difference. In fact, looking at the movie there is consistently a large difference in snow extent between those two estimates, even at the lower elevations where there are more stations. Why do you think that is?

Line 404: Is there a reference you can add for the statement “Compared to a previous effort. . .”? Not sure what this is referring to.

C2

