



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-237-RC1>, 2022  
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## **Comment on egusphere-2022-237**

Anonymous Referee #1

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Referee comment on "Using snow depth observations to provide insight into the quality of snowpack simulations for regional-scale avalanche forecasting" by Simon Horton and Pascal Haegeli, EGU sphere, <https://doi.org/10.5194/egusphere-2022-237-RC1>, 2022

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### **General Comments:**

The manuscript entitled 'Using snow depth observation to provide insight into the quality of regional-scale snowpack simulations for avalanche forecasting' by authors Horton and Haegeli discusses the potential of snow cover models while forced with forecasted data to provide additional information on the snow cover on the regional scale especially for the regions where observations are sparse. In particular, this study focuses on assessing or quantifying the quality of such simulations for different regions with different snow climates across Western Canada with the overall goal to identify regions with high or low confidence in these model simulations. The paper is well written and structured and provides valuable in-sight into the benefits as well as shortcomings of such model chains for avalanche forecasting and other applications.

### **Specific Comments:**

As I understand from the manuscript forecasted precipitation amounts of a single grid point were used to force the snowpack model. Although taking the closest grid point with the smallest vertical difference to the location of interest is meaningful, it is also common practice in verification of forecasted precipitation amounts to use an average of at least 9, i.e. closest grid cell plus 8 surrounding cells. Selecting a single grid point might represent the tree-line elevation, but might not represent orographic effects and the grid point might get less or more precipitation depending on the prevailing wind. E.g. in line 369 the authors state that HRPS does overpredict precipitation on the windward side of the Coast range. Could the authors comment on the effect of using a single grid point in particular for precipitations amounts from a single grid point instead of an average of multiple points on their results? To be more precise. How do results change if more than one grid point is

used?

Please indicate how SNOWPACK was forced. Incoming short and long wave radiation? Surface Temperature? Air temperature (2m diagnostic air temperature or first atmospheric level? Although, as also stated by the authors, simulations are most sensitive to precipitations amounts the other meteorological parameters have also an impact on the simulations. Please comment.

Using a correcting factor  $k$  (Equation 6) for precipitation amount solely based on observed and modeled snow depth seems a little dangerous and maybe not very meaningful, because different snow heights might not stem from the inadequate modelling of precipitation amounts alone but rather from different new snow densities due to different forecasted air temperatures and windspeeds. Please comment or elaborate a little further around Lines 318-320.

**Technical Comments:**

No technical comments. As stated above the manuscript is well written.