

## ***Interactive comment on “pSNOWPACK: a forecasting tool for avalanche warning services” by S. Bellaire et al.***

**S. Bellaire et al.**

sascha.bellaire@gmail.com

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Thanks for reviewing our manuscript entitled “pSNOWPACK: a forecasting tool for avalanche warning services”. We agree that the title did not totally reflect the content of the paper. The title was changed to “Forcing SNOWPACK with forecasted weather data”, which should now reflect the content of the paper better. From our point of view this study should be seen as an initial study testing the performance of SNOWPACK when forced with forecasted data. We believe that the model chain does a reasonable/good job keeping the source of the input data in mind, i.e. forecasted data over complex terrain. However, we agree that the comparison of a single profile is not enough to estimate the overall performance of the model chain. Future work will include a more detailed analysis of snow cover stratigraphy on different aspects and

elevation bands. The main reason for using only one profile is that there is simply only one flat field profile available for this period and region.

The revised manuscript now includes a new section, which shows a comparison of forecasted and measured meteorological parameter (Figure 6), to estimate the weather model performance. In addition, we added three graphs (Figure 9) to illustrate the early season over estimation of new snow amounts resulting in an over-estimation of the total snow height. We stated in the original manuscript that this is related to the fact that SNOWPACK treats precipitation as snow only instead of rain or a mixture of rain and snow. The additional graphs address this issue now. A scatterplot of observed vs. forecasted HN24 amounts does not clearly show the problem, because the overestimation of the snow height was caused by three events only, which are not pointing out in such a plot for the entire winter.

The new revised manuscript is attached.

As for the minor points:

1. The p in pSNOWPACK was used to show that SNOWPACK is forced by forecasted/prognostic data and not by weather station data. We missed to explain that and since it is confusing we deleted the “p” where necessary and are now using “model chain” when needed.
2. We agree to that and changed the sentence as suggested.
3. The sentence was deleted and words added.
4. The authors feel that a more detailed description including some numbers will help the reader not familiar with the North American forecasting problems to better understand the problem of data sparse areas. Therefore we left this paragraph unchanged.
5. For these areas “no” data is available on a regular basis and weather stations are not located in a way that they would provide representative weather information of the alpine regions. However, some information on the snow cover is available from time

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to time. We agree that a forecast is impossible and change therefore “challenging” to impossible. However, these areas are still “forecasting” regions as the information that comes in is used by the CAC to write a report on the situation. Therefore the sentence was changed and should now be clear.

6. Changed as requested.

7. We reworded this sentence to “Finally, we assess the capability of the model chain to simulate snow depth, new snow amounts and provide a case study of surface hoar and crust formation at a study plot located in the Columbia Mountains of British Columbia, Canada.”

8. Changed as requested.

9. Changed as requested

10. The distance to the grid point is 5.7 km, which was added to the manuscripts. GEM15 runs on a 15 km grid and is therefore relatively coarse. As for radiation and air temperature the distance will not have a large influence on the results since the model topography is relatively flat on a 15 km grid and diffuse short wave radiation as well as shading by trees is not covered by the model. The new Figure 6 shows a comparison of the meteorological parameter, which shows that the values are comparable and not substantially different. Grid points further away from the station show similar results for the selected parameter, which are related to systematic GEM model biases rather than a bias based on the location. However, for the precipitation the distance to the grid point does play an important role depending on the location (upwind vs. downwind side, orographic lifting). We consider the grid point “representative” for Mt. Fidelity. The first author is working on a spatial filtering algorithm for GEM15 precipitation on larger domains.

11. Changed as requested

12. This section was rewritten.

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13. Changed as requested

14. Changed as requested

15. Changed as requested

Please also note the supplement to this comment:

<http://www.the-cryosphere-discuss.net/5/C1330/2011/tcd-5-C1330-2011-supplement.pdf>

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Interactive comment on The Cryosphere Discuss., 5, 2253, 2011.

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