

Interactive comment on “Spatial consistency and bias in avalanche forecasts – a case study in the European Alps” by Frank Techel et al.

K. W. Birkeland (Referee)

kirkeland@fs.fed.us

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This is an interesting paper that highlights the differences both within and between avalanche warning services in the European Alps by comparing the avalanche danger ratings issued. The authors collected an interesting dataset and, in my opinion, they used appropriate methods for their analyses. I found some parts of the paper difficult to follow, but that might be a combination of my unfamiliarity with some of the regions discussed and also the difficulty in describing all the different warning services and how they produce their products. From my perspective there are no major flaws with their paper and I recommend publication with mostly minor revisions.

Some issues I would like to see the authors address:

C1

- In the Introduction the research questions are listed. However, the first two listed research questions are not – in my opinion – research questions. The first question regarding the “operational constraints” of the various warning services is really just background information that the reader (and the researcher) needs to understand to better understand the source of the data for the paper. The second question is really more of a methodological question and not a typical research question. To me the three research questions addressed by this paper are: 1) Does bias exist within and between warning centers?, 2) (the currently listed research question #3) and 3) (the currently listed #4).

- I found all the avalanche warning service abbreviations a little awkward and difficult to follow. I suggest writing out the avalanche warning service names in the text rather than using the abbreviations throughout the majority of the paper. I think doing so would be especially helpful for readers like myself who might not be familiar with the names of the various warning services. The abbreviations would still be useful for the maps.

- Likewise, in some places the authors spell out a country (Switzerland), while in others they will use one of two different abbreviations (SWI or CH). I suggest writing out the countries for consistency and for those not familiar with some of the abbreviations.

- It was not clear to me why the authors used the 1700 forecast for Switzerland rather than the 0800 updated forecast (p. 14, line 29). Why was this done? Would using the 0800 forecasts have changed the results?

- Section 5 is called “Results and Interpretation”, which is an unusual title for a section of a scientific paper. Normally “interpretation” would be considered part of the Discussion. I guess the paper works this way, but the authors could consider either changing this section to “Results and Discussion” and then bringing in the Discussion to this section, or they could have a “Results” section and move their interpretations to the Discussion section.

C2

- On Figure 5 it is difficult to see the two highest agreement borders. Could all the borders be black, but just very thin? Again, this isn't a big point, but perhaps something the authors could look at and see if it could be improved.

- In Figure 6 the area of Italy that is below the main map should be in a box or something to show that it is an inset and not physically located south of the main map.

- Finally, the authors are in a unique position for a further, in depth, discussion of their results. First, how might they propose to increase the consistency across Europe? With the "matrix" that they allude to but do not describe? Or, with a conceptual model (such as presented by Statham et al. (2017) that proposes a workflow that is now currently in use in many avalanche forecasting operations in North America)? Or, do they have other solutions or ideas? Second, do they have any insights into why the different biases exist? Are there certain practices in certain countries or at different avalanche warning services that can help explain the biases presented? These would be interesting discussions for the reader if the authors can provide additional insights.

Minor issues/typographical errors:

- P.5, line 6, remove "avalanche warning"

- P. 8, line 16, since these are summarized in "five groups", I suggest numbering the groups below rather than listing them as (A), (B), etc.

- P. 8, line 27, delete "issues"

- P. 9, line 3, replace "where" with "when"

- P. 9, line 14, replace ":" with "."

- P. 27, line 24, should be "Figs."

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