The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2020-146-RC1, 2020

The Cryosphere Discussions

Interactive comment on "Using avalanche problems to examine the effect of large-scale atmosphere-ocean oscillations on avalanche hazard in western Canada" *by* Pascal Haegeli et al.

Anonymous Referee #1

Received and published: 3 July 2020

I believe the paper is very good on snow avalanche information. The authors are right on the difficulty of researching climate and avalanche data from point locations. Therefore, I like the idea on the use of public bulletins. The CMAH related method on avalanche characteristics has been well studied by the authors in previous work. The violin plots in Fig 2 look good. I like the prevalence methods and approaches with the avalanche types.

Unfortunately, the climate basis for the paper definitely needs a lot of thinking and re-doing, and this is my main comment. Their avalanche data cover 2012-2019, clearly limited for climate research use on what the authors were doing. They stated limita-

tions but it mostly comes at the end and not early in the paper. Given this limitation of a 10 year dataset, I am critical on the use of correlations and other statistics given the sample size for confidence intervals, significance and other things. It would be better throughout to focus on the visualization (as they do in Figure 3 very well). The teleconnection indices such as PNA mostly reflect very broad patterns (probably explain at most about 60 percent of the variance in western Canada), as these specific well-known teleconnections really focus on centres of action of circulation centers at very large scales. Also, the AO impact is really more farther north and more North Atlantic centered. The PDO and to some degree the AO suffers from the autocorrelation issues that can extend for several years (see Deser et al article in J of Climate that debates the clarity of the PDO), and this is quite problematic when connecting results with a 10 year avalanche data set. It might be more conducive to employ synoptic classifications more keen to western Canada, such as work done by Ian McKendry and his group. The McKendry synoptic work also may relate much more to how weather is connected to some of the important snowpack processes. Another suggestion is to perhaps the authors devised their own index from circulation data from gridpoints off the BC coast to reflect more specific aspects of the Pacific subtropical high, low pressure off the coast, etc. On Line 229. I don't like the idea of averaging the teleconnection indices since they have some intercorrelation with one another, plus with the PDO's autocorrelation and seem confusing/artificial in meaning. On Line 39. Arctic is misspelled. The paper is clearly a detailed snow avalanche paper. In the beginning of the paper, it should have a paragraph to appeal more to the broad The Cryosphere readership and why avalanches are significant in Cryosphere studies overall.

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