

## ***Interactive comment on “A statistical permafrost distribution model for the European Alps” by L. Boeckli et al.***

### **Anonymous Referee #2**

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General Comments In the paper titled “A statistical permafrost distribution model for the European Alps” the authors are attempting to create a model of permafrost distribution for all of the mountainous terrain in the European Alps. I feel the concept is very good and exposes a very needed aspect of empirical permafrost modelling in Europe. Although I admit there is a need for this type of study, I believe the manuscript in its current form is somewhat incomplete. Going through this paper as a reviewer I was anticipating the end result however, it was not delivered. I however, understand that that authors are presenting a methodology in this paper and not the mapped results themselves however, I was left wondering if the manuscript would benefit from simply waiting until the final map and modeled results are presented. This being said I must add that I believe the approach of using the debris and rock based models is good. I think what is really missing in this manuscript is a map illustrating how the model will

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predict permafrost distribution across space. I understand that at this point it is likely not ready for the entire Alps however, a test section map would be interesting to see, and I believe is needed. I have recommended to publish this manuscript in The Cryosphere with minor revisions but believe the manuscript can be shortened almost to the point of a short communication rather than a full research paper so this is something the authors might want to consider.

#### Specific comments

- 1) The word Modeling should be written as “Modelling” with two letter l’s, this should be changed through the text.
- 2) In the introduction line 25 (pg. 1421), get rid of the term possible permafrost avoid using these very ambiguous terms. This model is exploring the idea of obtaining permafrost probabilities so in this case use numbers instead.
- 3) In the background line 1 (pg. 1422), the words so-called “rules of thumb” are used. I do not understand the so-called and think it should be removed.
- 4) Line 10 (pg. 1422) I was under the impression Haerberli introduced BTS in 1973 not 1975 please check this reference.
- 5) I really think a study areas section is needed even if it is just to define the lat/long areas that the model will be run for.
- 6) Line 17 (pg. 1425) you mention that your PISR model uses “clear sky” conditions. What does this mean? Does this mean no cloud cover? Please explain this better in the text.
- 7) PISR can be calculated using several programs however, usually only over 1° of latitude, please explain how this will be calculated and speak about the extent area.
- 8) Line 23 (pg. 1425) you mention a constant lapse rate of 0.65 °C/100m is used. This is a constant lapse rate however, these values can be very different from one

mountain location to another and change with the season. Is this measured on an annual scale? I would like to see some kind of lapse rate comparison using sensors at different elevations showing that this assumption is justified.

9) In Section 4 (Statistical Methods) I find the presentation of the equations hard to follow and the terms are also not easy to locate the meanings. I think this section would benefit from a small table showing the meaning of the symbols.

10) I find the conclusions section just summarizes the topics in the paper and think it could be better organized to include what the papers scientific findings are.

11) Table 2 lacks units for terms such as MATT and PISR, these should be included.

12) Same comment for table 4.

13) In figure 1 the country boundary lines should be thinner, in addition an inset map should be added and see if a better shadowing of the topography can be added.

14) As mentioned above a new figure should be added which shows a test of the model for a small section are area within the Alps.

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Interactive comment on The Cryosphere Discuss., 5, 1419, 2011.