

## ***Interactive comment on “Heavy snow loads in Finnish forests respond regionally asymmetrically to projected climate change” by Ilari Lehtonen et al.***

### **Anonymous Referee #2**

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#### General comments

I liked the paper a lot. It was concise and well written. Topic is highly interesting, and it has also practical importance when thinking about forestry and how prepare the forestry sector to probable changes in the winter climate and extreme weather events.

The method used is valid and enough attention has been paid to use a set of climate scenarios; especially the bias correction has been done with plenty of thought and effort.

In Introduction there was material that belongs to Material and methods. On the other hand, aims of the work have not been given clearly in Introduction.

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This study is built on earlier FMI work. Most of the earlier works referred are Finnish. It would be interesting to hear about earlier work done on this subject also in other parts of the world, if any. Also the importance of the topic could be broadened by telling about the snow damages internationally. Terms “forest damage” and “snow damage” could be defined, what sort of damages are we talking about.

There are also more detailed snow accumulation / unloading models available. Could you add a short explanation of these models in the paper?

#### Specific comments

Page 2 You talk about effects of temperature on the processes. How does the moisture affect? Effects of forest management options: tell more about these. There is something wrong with the logic of the sentence on lines 14-16. Effect of soil frost: did you discuss about this in this paper also? Line 24: would be -> will be? Line 28: please check the word order in a sentence beginning “We use...” Lines 30-31: please tell a bit more about the RCPs.

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Line 9: Historical simulations? Explain better. Line 30: Delta-change method does not tell anything if reader is not familiar with this term. Explain more. Lines 10 and 11: so here you could tell a bit more about RCPs.

Page 4: There is good discussion about humidity effects here, but perhaps it should be in Discussion? Line 20: your winter period is from November to March. How well can you compare the results to earlier work, when normally the winter period is from December to February?

Page 5 Line 7: other transformations? Please list. Line 13: what do you mean “on average rather well”? Line 22: reference to this information of riming efficiency?

Do you feel that possibility to use e.g. 3h data would improve the results at all? Perhaps in case of wet snow and unloading the processes may be rather fast. And did I

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understand correctly that daily precipitation was divided evenly during the day? This may also have some effect, because for sure the precipitation intensity (and other conditions during snow fall) affect. Check that you have covered this type of discussions in the paper.

Page 6 Do you have any observational data to compare the simulation results with? I understand this work is mostly about scenarios, but reliability of the modelling method should be discussed somehow and relate this to some data. If this kind of discussion is found e.g. in the earlier papers referenced, please make this clear. Line 26: Sentence beginning "However, the..." is complicated and should be rephrased.

Page 7 Paragraph on lines 3-6 belongs to Discussion, together with other uncertainty –discussion? Line 23: Please check the word order of the sentence beginning "Most uncertain...".

How does the tree species and other forest characteristics affect? You mention that they affect, but discussion could be expanded.

This would also be a good place to discuss about the model you use, and other snow accumulation / unloading models (some sort of comparison in terms of processes and time resolution, for example).

Page 8 This page has discussion that is rather long. There is some repetition when comparing to Introduction and parts of the text are rather speculative. So please consider shortening here. Especially part beginning from line 25 is a bit disconnected.

Page 11 Reference list seems adequate. I did not go through it in detail, so please make sure once more that it is in accordance with the journal instructions.

Page 14 Values in Table 2 are given with too much precision.

Technical corrections

Page 2 Line 20: a dot is missing

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