Natural Hazards
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Discussions

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

Anonymous Referee #1

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"General comments"

Dear authors, congratulation to this - in general - scientifically sound and well-written paper. It is about an interesting topic in climate change effects on snow loads in Finnish forests, nicely fits to the scope of the journal, represents state-of-the-art research and is in correct English. I recommend publication after some improvements. The paper could mainly benefit from (i) adding a more detailed description of the methods, and (ii) providing more quantitative measures of uncertainty, particularly for the humidity/rime load calculations.

"Specific comments"

C1

- The paper could be improved in its methodological part by adding a paragraph on the two methods, G08 and FMI, respectively. In general, both methods should be explained in a detail that better supports the understanding of the results. - It would be good to explain why You actually do present the G08 method, because its results mostly correlate with dry snow loads which have little importance with respect to forest damage. If it turns out that this is of minor importance for the paper, You can consider to completely skip the G08 methods and all its results, and only mention it in the introduction. The interested reader won't probably miss it. - You should explain the FMI method with sufficient detail, and provide a meaningful measure of uncertainty for the effect of a changing (modelled and corrected/downscaled) humidity on the riming process which You state is the most important factor leading to heavy crown snow loads. The difference of humidity relative to ice and/or water appeared to be the reason for a 20 % difference in calculated maximum rime load. You should make an attempt to separate this effect from the one originating in a changing climate. - You should also justify in more detail the temporal scale transition from 3-hourly to daily (at least by providing an example). - The role of the thresholds defined by Lehtonen et al. (2014) to determine the number of the two types of risk days is not entirely clear: on the one hand, You state that they may not be suited for the whole country, on the other hand You provide their values with two decimal places (probably table 2 should be modified). I would be good to explain how these thresholds were determined, and how/why they can be applied in Your study (risk days of heavy riming vs FMI-modelled heavy riming). - You should give a short explanation in the introduction how trees are damaged by snow loads (the process(es), and how they are related to the relevant snowfall events; are there observations?), and You should give some more information about the tree species related damage risk in a changing climate.

"Technical corrections"

- Page 2, line 20: dot (".") missing between "Finland" and "In both studies" - Page 15, capture of fig. 2: s, c and n should also be denoted for southern, central and northern

(like in the capture of fig. 6). - Page 18, fig. 5: scale bar of panel section (f) is too small. Values in the map seem to not correspond with the (colors and values of the) scale bars.

Good luck!

C3