

# ***Interactive comment on “Anthropogenic climate change versus internal climate variability: Impacts on Alpine snow cover” by Fabian Willibald et al.***

## **Anonymous Referee #1**

Received and published: 30 April 2020

### **General comments:**

The authors present a very relevant manuscript about the impacts of climate change and internal climate variability on snow cover at 8 stations located in the Swiss Alps. This is one of the few studies addressing the role played by internal climate variability in the future evolution of snow properties. The methods are sound and the manuscript is well-written. I thus have only minor comments outlined below.

### **Specific comments:**

- Title: As the study focusses on 8 stations all located in the Swiss Alps, I think this should be clearly stated in the title of the manuscript. Currently, the title misleads the reader into thinking that the study encompasses the impacts on snow over the whole

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Alps.

- Most figures and tables could benefit from a more explicit caption, to make sure that they are self-explanatory. For example, Figs. 2-5 and 8, and Table 2 should mention something like "See Table 1 for the acronyms of case studies". Additionally, the caption of Table 2 should remind the reader what "MAE", "NSE", "d" and "R2" are. In Figs. 5-6 and 9, the meaning of the black dots (outliers?) is not given in the caption, nor any explanation about how to read the box-and-whisker plots (those are standard representations, but still a short sentence to explain them could greatly improve the comprehension of the figures). The caption of Fig. 6 should be changed to: "Winter mean maximum and mean snow depth...".

- As a general recommendation, please avoid double parentheses (for example, line 69, or line 209, ...).

- Line 379-380: what do the percentages inside parentheses refer to? Scuol? If so, the sentence should be rephrased: "For Montana (Scuol), IAV increases from 50% (40%) ... up to more than 80% (70%)...".

- Section 4.2: I understand that it is convenient to compare results of this study to another study (Schmucki et al., 2015) that focussed on the same stations. However, would it be possible to have some general comparison with other alpine studies outside of Switzerland?

### Technical corrections:

- Line 27: Please rephrase to: "In large parts of the world, water stored...".

- Line 46: "Typically, studies compare different emission scenarios".

- Line 73: "the following hypotheses".

- Line 78: please remove the comma between "a" and "dynamically".

- Line 111: "the lack of".
- Line 131: "The ClimEx LE consists of".
- Line 196: Please consider splitting this sentence into two after "parameters".
- Line 212-213: "from 1980 to 2009... from 2010 to 2039..., 2040 to 2069 ... and 2070 to 2099".
- Line 266-267 (caption of Fig. 3): please replace the comma by a full stop.
- Line 274: please remove the comma after "clarify".
- Line 291: please remove the comma after "Both".
- Fig. 6: the title of the left column should read "Long-term winter mean".
- Line 400: there seems to be a word missing before "just reach". Maybe "but"?
- Line 422: please remove the comma after "While".
- Line 436: "we presented".
- Line 446: please remove the comma after "found".
- Line 446-447: please replace the two occurrences of the word "between" by the word "of".
- Line 470: please remove the comma after "station".
- Line 472: "the present work".
- References: I noted a typo at line 676. Please check all references for other typos.

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Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-84>, 2020.

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