

## ***Interactive comment on “Assessments of the north hemisphere snow cover response to 1.5 °C and 2.0 °C warming” by Aihui Wang et al.***

### **Anonymous Referee #2**

Received and published: 29 January 2018

### General Comments

This paper explores the changes in snow extent in the Northern Hemisphere projected under 1.5C and 2.0C warming. The snow cover fraction (SCF) for pre-industrial and end of century periods are analysed and compared. Furthermore, the role of surface temperature in diminishing snow cover extent is examined. This paper uses simple comparison techniques, including spatial and temporal correlations and trend analysis to determine the changes in SCF. Whilst these methods are appropriate for this work and the results are robust, the presentation of this paper is significantly lacking refinement and the results do not provide significant new information to the literature. Grammatical mistakes are common and general use of the English language is poor.

### Specific Comments

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Many of the early figures seem unnecessary, this manuscript could be significantly condensed by removing these figures and making more appropriate use of the literature. For example, Figure 7a and b are repetitive.

In the analysis of variability in section 5:

- Pg 10, line 1-4: do you mean trends or variability – the variability in the period you are talking about does not seem to change, whilst there is a slight decreasing trend. Please check your terminology.

- Is Figure 4 necessary – many studies have shown that the increase spread of the CMIP5 ensembles is due to model spread. A more informative discussion would be around the uncertainties within the CESM-LE model. This also raises the question as to whether or not the CMIP5 models provide any additional value to this manuscript?

Please provide some discussion of the caveats associated with this work and how future work may address these issues, for example, satellite biases, climate model biases.

It would be useful to present the results in a table (like Table 1) and when discussing area change, use percentage change as well to provide meaningful comparison. Some area averages (eg. North America, Europe, Asia) would also help aid this discussion.

You have discussed the role of LSAT on snowfall, and found it to be contributing to between 10-55% of changes in snow cover, depending on seasons. What else could be contributing? Changes in atmospheric circulation, precipitation trends? Please provide some discussion around this.

#### Technical Comments

There are too many grammatical mistakes/English language problems in this paper to list individually. Some common mistakes are:

SNR stands for Signal to Noise Ratio, CD for coefficient of determination or (R<sup>2</sup>),

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please make sure your terminology is correct

Use of tense – please use either past or present tense consistently throughout the paper

Please review the structure of all sentences. To ensure clarity in writing, put the subject of the sentence at the beginning

Please ensure you know the meaning of the words you are using, and you are using them in the right manner. For example: initialled, annual (I think you mean inter-annual), consensus, reproductions. Please make sure you are using adjectives and adverbs appropriately.

Please ensure all content is relevant, I think this manuscript can be significantly shortened

Please be more specific throughout, for example: Page 2, line 17: Rate of what? Page 3, line 14-15: What scientific gaps? Page 4, line 18: m is a parameter of what? Page 5, line 24: Different evolutions how?

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Interactive comment on Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2017-91>, 2017.

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