

Responses to Reviewer #1

This paper calculates the rate of change (rate of change: %/decade) of seasonal snow cover in the Arctic region using multiple publicly available snow cover data sets and evaluates the effects of 1) length of data period, 2) reference period, 3) the application of a statistical method to improve agreement between datasets, 4) ensemble size, and 5) differences in product versions on the Arctic SCE trend. The results show that while there is variation in SCE among the data sets, a consistent trend is found in the May and June SCE rates of change in the Arctic region, which is very significant in terms of providing the community with material to judge the reliability of the previously reported Arctic SCE trend and is worthy of publication. However, there are some figures that need to be replaced and there are some errors in the figures (Figure 3 and Figure 5) that may cause confusion to the readers. The manuscript appears to be in the process of being completed and needs to be revised to be clearer referring to the comments (mostly editorial) shown below.

We are pleased the reviewer sees the values in the analysis for informing the community on the state of Arctic snow cover trends. Apologies for the editorial errors, which we have cleaned up in the revised manuscript. We have responded to all the review comments as outlined in the supplement and made a number of other minor changes to improve the paper as will be noted in the track changes version of the revised manuscript. All line references refer to lines in the version with changes tracked.

L117: Shouldn't "section 3.2" be "section 3.1"?

Yes, this is now changed to "Section 3.1" (line 130).

L154: Figure 2. As in Figure "1", but for June

The caption to Figure 2 is now corrected to properly refer to Figure 1.

L167: Figure 3b is for June, NOT October. Please replace them.

The proper version of Figure 3b has now been added, which illustrates the scaled SCE time series for October.

L169: Figure 3. As in Figure "1", but for October

The caption to Figure 3 was corrected to properly refer to Figure 1.

L200: "NOAA-CRD" should be "NOAA-CDR"

This typo was corrected (line 215).

L200: "<SD>/SD_x is the ratio of the standard deviation from the dataset under consideration (denoted SD_x) to the average standard deviation of all datasets (denoted<SD>)"

This sentence should be "<SD>/SD_x is the ratio of the average standard deviation of all datasets (denoted<SD>) to the standard deviation of the dataset under consideration (denoted SD_x)"

Good catch. We have corrected the text as you suggested (lines 216-217).

L227: In addition, the symbols “P1” through “P18” are confused with the reference period “P0”- “P3” and should be change.

In equation 6, we have changed the subscripts to j1 through j18 (lines 242-245). Additionally, Equation 7 was corrected (lines 254-257).

L234: “3.4” Dataset Adjustments

The section number was added to make this “3.4 Dataset Adjustments” (line 249).

L240: “andthe” should be “and the”

This text no longer appears in the revised manuscript.

L263: “Section 3.2-3.4”?

Thanks for catching this. Changed to “Section 3.2 – 3.4” (line 281).

L265: In Figure 5, positive values above zero indicate a stronger SCE rate of change and negative values below zero indicate a weaker SCE rate of change. However, the description in the figure is incorrect (“Weaker SCE change” is written on the positive of the axis).

The caption to Figure 5 was correct but the descriptive text on the y-axis of was reversed. We have corrected Figure 5.

L266: “peaking at approximately 2%”. This value should be “-2%”

Correct. Value changed to “-2%” (line 284).

L273: “the rates appear weaker relative to the most recent reference period”. Shouldn’t the “weaker” be “stronger” here?

Correct, we have changed the wording to ‘stronger’ (line 291).

L274: “3% decade⁻¹”. In Figure 5 I cannot find the impact of “3%” in June. Is this correct value? “2%”?

Good point. 2% more accurately reflects what is shown in Figure 5, and so this change was made (line 292).

L276: “reaching 5% decade⁻¹ in June”. The dataset adjustment process seems to weaken SCE rates of change in June. So, “-5%” should be here as also indicated in Figure 5.

Correct, we have changed this to “-5%” (line 295).