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Insights into the North Hemisphere daily snowpack at high resolution from the new Crocus-ERA5 product

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General Comments

This paper compares Northern Hemispherical snow datasets (snow depth and SCF) from Crocus-ERA5 to long-term in situ station observations and its predecessor model, Crocus-ERA-Interim. It is important to assess the accuracy of this dataset, as both CNRM and ECCC are using it to evaluate changes in Arctic snow cover.

I believe Reviewer 1's comments addressed many of the concerns I had with the manuscript, and the authors' subsequent responses have led to marked improvements. Therefore, I have taken those comments and improvements into consideration in this review.

While this paper has the potential to be a strong contribution to the literature, the manuscript requires significant restructuring. There is a lot of valuable information and analysis, but it is scattered somewhat randomly throughout the sections, making it challenging to follow exactly what the authors did. This is especially important for a paper submitted to *ESSD*, as the journal primarily focuses on dataset production and methodology.

I believe the updated analysis provided by the authors is robust, so my comments mainly focus on providing more detail on the datasets/models and reorganizing Sections 1–3. That said, I believe these changes constitute a major revision, as large portions of text should be moved and better integrated into the appropriate sections.

Specific Comments

1. Introduction

L49–65: As described in more detail below, remove this text and integrate into Section 2.

2. Section 2. Data/Methods: This section contains a mix of background information, data description, and is confusing to read. For example L80-83, the section begins with a topic sentence that is background information that has limited pertinence to the data or methods described in this paper:

“Warming and more frequent winter thaws are contributing to changes in snow pack structure with important implications for snow distribution. The performance of snowpack modelling in this context of climate change, can be summarized by the two main variables used as indicators of climate change because of their interactions and feedbacks with surface energy: the snow depth and the snow cover.”

This is a well written passage, but belongs in the Introduction!

Given this paper being submitted to ESSD, I believe there needs to be a central description of the modeling framework in the Data section. This information could be moved and updated from L49-65. Some questions to think about:

How does Crocus work (i.e., model physics)?

What variables does it need to run?

What variables does it produce?

How are Crocus-ERA5 and Crocus-Interm-ERA5 different?

Some of this information is in the paper but scattered in many different places. Please include a table that clearly shows the difference between Crocus-ERA5 and Crocus-Interm-ERA5 differences (i.e., spatial resolution, time period, model physics, etc.).

I’m not going to go line by line here, but have one subsection describing the models/data used in this study and one subsection describing the methods used to analyze these data. Move all other information that justified the importance of modeling to the intro. Again, I think most of this text is very well written, just needs to be reorganized!

3. L139–148 (and new text added in response): This passage is a great data description. I think it belongs in the Data description section.
4. Figure 2: Updated figure from response document is much improved and addresses all my concerns with the original figure.
5. Figure 4: Change color scheme – this looks like an elevation model. White/gray to dark blue commonly used for snow depth.
6. Figure 5: Use the same color scheme as Figure 4 to keep consistent.

7. L245: Any statistical analysis should be described in the Methods section and not be first introduced here. As noted prior, I would create a methods subsection where all this information can be contained.

8. L352: Please include a paragraph summarizing the findings. The manuscript abruptly ends with discussion of future work.

Technical Comments:

Numerous technical and grammatical errors exist in the document. Please check for correctness closely. I only list a few below.

1. L259: "...reproduced well..."
2. L334: SWE already defined.
3. L339: Check citation.