Interactive comment on "A long-term Northern Hemisphere snow cover extent data record for climate studies and monitoring" *by* T. W. Estilow et al.

Anonymous Referee #2

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In this paper the authors provide an updated description and documentation of the NOAA snow cover extent (SCE) climate data record. This update is timely and welcome as the previously published dataset documentation dates back to Robinson et al. (1993). However, the presentation of the material needs some streamlining to improve readability and provide a clearer picture of the historical evolution of the product. There also needs to be a more up-front discussion about the caveats to using the data e.g. recommended mainly for continental-scale analysis; has higher uncertainty in summer months over high latitudes; documented difficulties charting snow over dense forest; issues with treatment of patchy snow; conservative map-

ping of snow in mountainous terrain; evidence of improved mapping of snow cover onset over time. These points are raised in online documentation for the NOAA CDR (e.g. https://climatedataguide.ucar.edu/climate-data/snow-cover-extent-northern-hemisphere-climate-data-record-rutgers) and should also be covered in the official dataset publication. The homogeneity of the product also deserves to be highlighted given its flagship role in long-term monitoring of NH SCE. I think you could probably cut much of the discussion about the differing grids as this seem irrelevant to users of the netcdf version of the dataset. Detailed comments follow:

1. Introduction: This section should be revised to focus on the importance of monitoring SCE and the need to provide a well-documented CDR for NH SCE from the satellite record. As it stands the section is over-generalized, includes dated and somewhat irrelevant references, and makes it seem like the CDR process was somehow responsible for driving the NOAA SCE dataset. Note that the "cryosphere" includes frozen ground, permafrost, land ice and freshwater ice in the opening statement.

2. Historical description of the data product: This section is incomplete and difficult to follow e.g. there is no mention of NOAA being a binary product based on 50% coverage (this is mentioned later in Section 3.2), nor the issue of what day in the week the information represents. There seems to be some overlap between Sections 2 and 3 that needs resolving as this creates some confusion e.g. your comment about 42% of IMS cells doesn't make a lot of sense without putting this in the context of the binary product and the 50% snow cover fraction threshold.

We also don't get any sense in Section 2 how the resolution and number of satellite passes changed over time. Can this information be added to an expanded Table 1? Hüsler et al (2014) provided this information for the European Alps from 1985-2011 (their Fig. 2) and went the step further of testing the impact of the temporally-varying coverage on the homogeneity of the SCE record.

Hüsler et al. (2014): A satellite-based snow cover climatology (1985–2011) for the

European Alps derived from AVHRR data. The Cryosphere, 8, 73–90, doi:10.5194/tc-8-73-2014

3. Dataset set description: Some of this material belongs in Section 2 to provide a chronologically complete description of the dataset evolution. The citing of Robinson et al. (1999) as evidence that there is no step change introduced from the 1998 transition to daily mapping seems premature in hindsight. Is the section on the definition of the CDR grid really necessary?

4.2. Long-term trends: Brown and Derksen (2013) do more than "suggest" that the NOAA dataset has an artificial trend to map earlier snow cover onset; they clearly demonstrate this by comparing NOAA to three other independent data sources.

5. Conclusions: It will take a little bit of work but it would make a nice conclusion to compile the number of publications using the NOAA dataset and show how this has increased over time. You could also classify these by research topic (e.g. climate model evaluation, climate dynamics etc) if you were really keen!

Figures: Way too many – only include figures that convey key messages. Candidates for cutting are Figs 2, 4, 5, 6, 7, 8.

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