

Earth Syst. Sci. Data Discuss., referee comment RC2
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Comment on **essd-2021-249**

Kristian Förster (Referee)

Referee comment on "The S2M meteorological and snow cover reanalysis over the French mountainous areas: description and evaluation (1958–2021)" by Matthieu Vernay et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-249-RC2>, 2021

Review

"The S2M meteorological and snow cover reanalysis over the French mountainous areas, description and evaluation (1958 - 2020)"

by Matthieu Vernay et al.

This data paper presents a new snow cover reanalysis dataset for mountain areas in France. In contrast to other reanalysis products, the data is prepared for elementary areas, referred to as massifs. Delineating these elementary elements is based on the assumption that meteorological forcing is similar across each massif. For each of them, elevation bands and aspects are considered separately in order to summarize computational time and data. A set of models is used to downscale atmospheric reanalysis data (SAFRAN) and to predict snow cover (e.g., with Crocus) in the historic period 1958-2019. The paper comprehensively evaluates the accuracy of the data set (compared with station data), starting with meteorological data. Consequently, snow depth is evaluated. Finally, limitations are discussed in a well-balanced way, acknowledging uncertainties inherent in data and methods. I believe that this dataset is of great value for other researchers and I would recommend to publish this manuscript in ESSD, which is an ideal journal for this kind of research (data). I see only a few minor points that could be considered before publication:

General comments:

- Besides snow depth, snow cover duration could be a very important quantity. It would be great to have another time series chart, showing how snow cover duration evolved over time (similar or to or as a sub-panel in Figure 5). It would be also interesting to see whether observed trends in snow cover duration are reproduced by your reanalysis (as addressed by Reviewer #1). Moreover, this would also demonstrate how the dataset could be used by others.
- The definition of massifs as elementary elements for computation is a very interesting methodological approach of the paper, which could be interesting for future research. I found the description of this approach, however, rather vague. Here, I would expect a more comprehensive review of literature (e.g., summarizing areas with similar snow coverage is not so new, see, e.g., snow cover units etc.). Moreover, I was wondering how the variability of one of the massifs could look like. Maybe you could add a figure (appendix, supplement?) that shows the areas that are summarized in terms of aspect, elevation etc.
- When reviewing the nc files (meteo and snow, respectively), I was a bit confused about the dimensions: In the allslopes datasets, time series are provided for each number_of_points. Indeed, it would be possible to check for each number the combination of terrain characteristics (slope, elevation) but I couldn't find any further information (sorry, if I missed something). Even the shape files do not include any relation to the numbers and their associated terrain characteristics. I think that this could be better explained in the appendix / the repository. For users just interested in, say, south heading slopes in massif #1 at elevation above 2000 m, it would be helpful, if they could easily retrieve the relevant number(s).

Specific comments / Technical comments:

- There is no reference to Table 5
- Please rewrite "precipitations" in the manuscript (the plural doesn't make sense in my opinion)

I am looking forward to your final revised paper!

Best wishes.