

Interactive comment on “Sval_Imp_v1: A gridded forcing dataset for climate change impact research on Svalbard” by Thomas Vikhamar Schuler and Torbjørn Ims Østby

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Summary:

In this manuscript, downscaled meteorological variables with 1km horizontal and 6hr temporal resolutions were presented for Svalbard in the Norwegian Arctic. The gridded product was obtained from downscaling reanalysis products of ERA40 and ERA-Interim using mountain wave linear theory and validating against observations recorded at the meteorological stations. The method and data used are robust and the dataset presented is very useful for testing the models and diagnosing the changes in the Arctic. The manuscript has the potential to be published after a minor revision. Below are

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some comments that can be used to improve the presentation of the manuscript.

General comments:

1. The accumulated snow on ice cannot be representative of precipitation as snow cover and depth on ice are not uniform because of blowing wind effect on redistribution of snow, roughness of ice surface, and spatial variability of blowing snow sublimation (Line 11-12 and Fig. 6). This is clearly shown by a poor relationship between unscaled ERA-interim winter precipitation and snow water equivalent on Figure 6. Either clarify this or remove the text and figures related to this argument.

2. It is not clear if monthly data for precipitation were used for downscaling the ERA reanalysis products or daily? If monthly data were used, how reliable is monthly-to-6hourly temporal downscaling? If daily data were used, why number of months for precipitation is provided in Table 2? For other variables if daily variables recorded at the stations were used how were the daily values disintegrated to 6-hourly data?

3. I am wondering how many of the stations that were used for validation of the down-scaled meteorological variables were originally used to assimilate the reanalysis products. Is it only the Ny-Ålesund station? If the station data have been used in assimilating reanalysis products, it is not surprising to see high correlations between time series of ERA interim grids and stations.

Specific comments: (P: Page, L: Line)

1. I recommend removing the index of "Sval_Imp_v1" from the title and across the manuscript.

2. P 2 L 13: Rewrite "Whereas operational records are biased to low-elevations . . .".

3. P 4 L 1: Replace "In contrast, elevation in our 1×1 km topography peaks 1600 m asl" with "In contrast, the highest elevation in our gridded topography map is 1600 m asl".

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4. P 4 L 2: Check the grammar in "present" and also in the next line in "and use". Do you mean you have used linear theory?
5. P4 L10: Add ", which was" before "not present in the ERA products".
6. P4, L14-15: The authors have mentioned "we modified the TopoSCALE methodology regarding downscaling of direct shortwave radiation and air temperature, as described in the following." However, the following section is about precipitation and not about radiation or temperature. Use more specific section numbers or names.
7. Use "air" temperature instead of temperature when you refer to air temperature. This can be mixed up with surface or soil temperatures if not specified.
8. P10 L12: Change "Grabiec et al. (2006)." to "(Grabiec et al., 2006)."
9. Is the dataset presented in this paper and stored in the website only downscaled products or both raw unscaled and processed downscaled data (e.g., Table 2)?
10. Check for the typos and English grammar errors across the manuscript.

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