

Interactive comment on “40 years High Arctic climatological dataset of the Polish Polar Station Hornsund (SW Spitsbergen, Svalbard)” by Tomasz Wawrzyniak and Marzena Osuch

Anonymous Referee #2

Received and published: 28 January 2020

The article "40 years High Arctic climatological dataset of the Polish Polar Station Hornsund (SW Spitsbergen, Svalbard)" by Wawrzyniak and Osuch describes meteorological observation data from Hornsund Station on Svalbard. In the manuscript, the authors present both the climatological appearance of the meteorological variables and their change over time. The according data set is available with different temporal averaging resolution at the PANGAEA repository. The 40 year data record provides a valuable contribution to the monitoring of climate change in this Arctic region. The manuscript is well structured and needs only minor revision as listed below.

C1

— General Comments —

In addition to a climatological analysis, the authors present trends of various meteorological parameters. As trend analysis builds on homogeneous data series, the change of instrumentation during the observation period needs to be considered. For some parameters, the different instrumentation may have had different precision and uncertainties, while for others the time resolution of the measurements may have impacted the homogeneity (e.g. when switching from 3-hourly observations with a mercury barometer to 60-second observations with a Vaisala PTB200A sensor). While the general quality control of the time series is described, please add a statement on the data homogeneity of each individual parameter and its suitability to derive trends.

— Specific Comments —

- lines 22-27: climate change in the Arctic is not just reflecting the global warming trend, but is known to be amplified by various processes that go beyond astronomical factors. Please provide according references here.
- Lines 26-27: what about latent heat release from open water where there used to be sea ice cover ?
- Line 36-37: air temperature changes in Hornsund are the largest on Earth ? What about other stations on Svalbard ? Please put into context of Svalbard region (see e.g. Gjeltén et al., Pol.Res.2016) and North Atlantic Arctic in general.
- Line 54-55: the maximum holocene extent of Hansbreen glacier does not add any useful information here; suggest to skip this sentence
- Line 57: 01003 seems to be the official WMO station number, so I suggest to provide the link to the OSCAR database (<https://oscar.wmo.int/surface/#/>) instead of ogimet
- Lines 94-95: does this citation of Hanssen-Bauer et al. (2019) really refer to the min-

C2

imum, mean, and maximum TA increase found in the Hornsund station data ? Please set the context correctly.

- Line 130-131: when was the humidity sensor replaced ? This should also be mentioned in Table 1.

- Table 1: change in instrumentation needs to be documented more precisely, e.g. the change in pressure sensor is missing completely. Also the other instruments have likely not been changed at the turn of the year, so please provide at least the month of change. Annual mean values containing data from different instruments should be analyzed with care in regard of data homogeneity.

- Line 158: Given uncertainty issues with solid precipitation measurements (e.g. blowing snow, undercatch; see Forland & Hanssen-Bauer, Pol.Res.2013), please provide more details on the precipitation measurement set-up. Are there one or two fences installed around the Hellmann gauge ? Have any infrastructural changes occurred to the measurement site that may affect the blowing snow ?

- Table 2 : For some of the parameters, the given numbers pretend a precision that is not given by the measurements (e.g. relative humidity, precipitation). For the sunshine duration, the total possible duration for each month would be of interest, in particular for the month of February which is partly in the dark season but sees a considerable significant trend.

- Lines 171-172: Since 2001, the pressure measurements are taken every 60 seconds. Please describe how you retrieve the 3-hourly value (is it a mean of +/- 1.5 hours around the time step ?).

- Lines 205-206: The analysis of the atmospheric energy balance requires up- and downward components of the radiative flux, sensible heat flux, latent heat flux and momentum flux . . . Please correct your statement here.

- Lines 286-288: please add a reference

C3

— Technical Corrections —

- Line 7: Southwest instead of SW

- Line 150: The minimum observed quantity . . .

- Line 232: The minimum value of annual mean was observed. . .

- Line 237: The annual cycle. . .

- Line 243: . . . with a marine scale that ranges. . .

- Line 252: add ". . . on the local scale." (consider possible advection of pollution)

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2019-222>, 2019.

C4