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Discussions

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

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We appreciate the reviewer comments as they provide valuable feedback to increase the quality of this paper. We revised our manuscript and corrected the text and figures and included additional descriptions according to the suggestions. Detailed answers are included below. Referee text (R) and author responses (A) are indicated.

R: General comments: 1. I am wondering if the authors can provide information about snow depth and snow water equivalent, which are key elements for the Arctic environment. How about soil temperature and moisture and permafrost information?

C1

A: The time series of snow depth was presented in Osuch, M., & Wawrzyniak, T. (2017). Variations and changes in snow depth at meteorological stations Barentsburg and Hornsund (Spitsbergen). Annals of Glaciology, 58(75pt1), 11-20. doi:10.1017/aog.2017.20 So far the work on historical ground temperature data (from the borehole 1 m deep) is in progress and as new (10, 12 and 20 m deep) boreholes were established two years ago in Hornsund we are preparing an article on modelling of the ground thermal regime in deeper layers. There are plans to measure soil moisture but so far there is none.

Specific comments:

R: 1. Title: Replace "40" with "Forty"

A: Corrected

R: 2. Line 7: Replace "SW part" with "southwest".

A: Corrected.

R: 3. Line 9-10: Start as a new sentence and rephrase it as "Therefore, the described time series of observations in this paper are of unique value."

A: Corrected.

R: 4. Line 11 (also line 58): I would remove ", systematic," as we use "systematic" for errors and not observations. Also, add "and compare" after "analyse" in the line above and remove "and comparing the corresponding data". Change "rely" to "relying".

A: Corrected.

R: 5. Line 16: Spell out "PANGAEA" or introduce it.

A: PANGAEA is a Data Publisher for Earth & Environmental Science, that in our opinion is a recognizable repository of scientific data.

R: 6. Line 19-20: Rephrase the sentence and remove the "if condition".

A: Rewritten "For the analysis of the Arctic climate change, the long term operational monitoring of meteorological variables including reliable observations and measurements is obligatory."

R: 7. Line 23-24: Add references for this claims: "The climatic characteristics are primarily determined by astronomical factors, but there are differences in the mechanisms that cause a regional warming trend and determine their magnitude."

A: We corrected the text and added missing reference: Mechanisms of Arctic amplification are still not fully understood but include feedback of reduced summer albedo due to reduction of sea ice extent and snow cover loss, higher sea surface temperatures, an increase of atmospheric water vapour content, cloud conditions, and changes in atmospheric circulation (IPCC, 2019).

R: 8. Line 26: Replace "ocean and atmospheric" with "oceanic and atmospheric" to be consistent.

A: Corrected.

R: 9. Line 37: Change to read as "There are evidences for anomalies and changes in the recent years in western Spitsbergen, including higher are temperature ...".

A: Corrected.

R: 10. Fig 1 caption: Add "in the Svalbard Archipelago" to the end of the caption.

A: Corrected.

R: 11. Line 46: Replace "became" with "has become".

A: Corrected.

R: 12. Line 51: Use lower case for "Station" here and anywhere else (e.g., in line 53) that does not follow a name. Use short sentences with clear "subject" and "verb" in each sentence. Verbs like "covered, raised, and covered" need a subject. For instance,

it can be used as "it is covered/raised".

A: Corrected.

R: 13. Figure 2 and other figures if relevant: I am wondering if you can add the significant trend values on the figures.

A: Added.

R: 14. Line 121: Check the grammar here and throughout the manuscript. Here, add "are" before "not considered".

A: Corrected.

R: 15. Table 2: Are the numbers with a star sign statistically significant? The caption is confusing. You should assign the symbols for those that are statistically significant not the opposite. Define variable indices in the caption, e.g., What is VV?

A: Changed, we added the description of abbreviations.

R: I suggest removing RH and maybe WS columns as they seem not statistically significant.

A: We would like to show the trends of every analyzed variable in this table, as in our opinion the table serves as a summary of the estimated trends.

R: 16. I suggest removing Figure 3 for relative humidity, because it is somehow presented later in Figure 5 in the form of atmospheric vapour pressure and it does not show any significant trends, not monthly nor annually.

A: Thank you for this comment. The structure of this article is organized with variables and relative humidity and atmospheric pressure and we really want to keep all variables in the presented order.

R: 17. Line 141 and throughout the paper: Replace "a lack of a statistically significant trend" with "a statistically insignificant trend".

A: Corrected.

R: 18. Line 156: Rewrite as: "...creates a relatively moist climate in SW Spitsbergen region, which ...

A: Corrected.

R: 19. Figure 7: Remove the trend line if it is insignificant (e.g., line 197). Same goes to Figure 8.

A: Changed.

R: 20. Figure 9 can be easily merged to Figures 8 and 10.

A: We would like to keep the order and the structure of the paper – to present each variable in the same manner.