The Cryosphere

Discussions

Open Access

EGU

Interactive comment on "Eurasian snow depth in long-term climate reanalyses" *by* Martin Wegmann et al.

Anonymous Referee #1

Received and published: 9 December 2016

General comments: Overall, this a informative and relevant paper with some issues, which need to be resolved. The paper investigates the performance of different reanalyzes products in representing snow depth in the NE part of Eurasia. The authors use daily snow depth measurements from 820 Russian meteorological stations to compare climatologies and 13 long-term stations to analyze temporal differences. The topic of the investigation fits very well into the journal's scope. It is one of the very few studies that thoroughly evaluates the snow depth represented in different reanalyzes products. As such, I consider the work as being relevant for the scientific community. For most parts, the methods are described appropriately and the conclusions are well-based on the results obtained. The paper however suffers from a simple overview (look up table) of the underlying datasets. Please see the listing below for further details. These issues should be improved before publication of the paper. For this purpose, only very

few new analyses are required and the basic structure of the paper does not have to be changed. I'd therefore suggest returning the manuscript to the authors for minor revisions.

Major issues:

- For readers not familiar with reanalysis products a paragraph is missing where it is explained which snow variables are provided in such products and how they are calculated.

- A table is missing where the characteristics of the different reanalysis products are listed. Such a table should contain which product belongs to which of the two families, what are the differences in regard to the assimilated data, what are the differences in spatial and temporal resolution, etc.

- I miss a kind of uncertainty assessment. Could you please mention that there is some uncertainty due to the elevation differences between the grid cell and the station. Did you also try to use the neighboring grid cell with smallest elevation difference instead? The temporal resolution of the reanalysis products may also not fit the snow observation time. Do products with finer spatial or higher temporal resolution perform better?

- In order to be able to properly assess the different errors measures for the 15 long-term stations presented in different figures the reader needs to have an idea about the mean and standard deviation of the different analyzed snow depth values of each individual station. I suggest to add this information to table 1 or to add a new table. The information of the percentage of missing values is currently hard to read and could be easily combined with the climatological information of each station.

- In order to test if the relatively poor hitrate is influenced by temporal issues between reanalysis and observation, I suggest to also calculating the hitrate when +/- 1 day shift in the reanalysis is allowed.

Minor issues:

L30: On order to prevent misunderstanding, replace "data sets" with "reanalysis products"

L66: Why "slowly"? Often the state of the snow cover changes very fast.

L116-117: The last sentence in this paragraph cannot be understood by readers unfamiliar with reanalysis products.

L163-174: What is the difference to the "Historical Soviet Daily Snow Depth (HSDSD) product [Armstrong, 2001]"? Would there be more long-term data series than only 15?

L163-174: Please add some information how snow depth was measured. Point measurement on a stake or mean snow depth from snow courses? Just out of personal interest: What did change in the measurement procedure after 1965?

L192: I cannot find "red marked" stations?

L199: daily accumulated snow depth

L213-214: To be able to better follow your explanations, the meridians should be indicated in Figure 1.

L222-225: Please add a sentence mentioning that the depicted snow depth represents the mean maximum snow depth for each shown month.

L252-253: Please explain why you compare Northern Russia (and e.g. not Eastern Russia) in this step.

Figure 3: Is there any argument not to use the same scale on all three graphs?

Figure 4: Is there any argument not to use the same scale on all three graphs?

L293: "Daily" still means monthly maximum snow depth?

Figure 7: Is there any argument not to use the same scale on all six graphs? Are these

hitrates based on 1981-2010 or on the longest period available?

L388-390: Please add links to the table and figure where these results can be seen. What are the arguments to call the correlations "very" high? They are mostly below 0.8.

L391: I don't understand what you mean with "although dealing with a large sample size"?

L400-402: To which period does this statement apply?

L403-404: I guess the RMSE is smallest in October because absolute values are smallest in October!

L449: Crutemp: Please add version and reference.

Supplementary Table 1: What period do these numbers refer to?

Supplementary Figure 3-5: Is there any argument not to use the same scale on all three graphs?

Should the median values of Supplementary Table 1 not be found in Figure 3 and 4?

Supplementary Figure 5: The unit "cm2" for the variance seems strange? Why not use the more common measure standard deviation?

Supplementary Figure 6: Is there any argument not to use the same scale on all three graphs? What is Hadsipr2?

Supplementary Figure 7: Is there any argument not to use the same scale on all three graphs?

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-253, 2016.