

Dear authors,
many thanks for supplying replies to the comments as well as a revised version of your paper. It has improved again, but there are still outstanding major issues, which need to be addressed.

1. The lack of focus criticized by reviewer nr. 2 has still not been addressed thoroughly. Please sharpen and distill your own results further in light of the previous and similar work done by Park et al. (2016) and André et al. (2015). What does your paper provide in terms of substantial progress beyond the current scientific understanding? What are the necessary implications? Please rewrite especially abstract and conclusions accordingly.
2. The English language needs clarification, the format of the figures and tables needs improvement. I have listed a few examples below. Please go through the entire manuscript and check thoroughly.

Please address these points in a “point to point reply” and re submit a revised version with “tracked changes” mode.

Specific comments

Page 2: laps rate should be lapse rate

Page 3: “The mean annual ground temperature (MAGT) is currently only in some cases provided by the data owners within the Global Terrestrial Network on Permafrost (GTN-P) database.

This sentence is unclear- do you mean that “Only the mean annual ground temperature...”? Are data series available, just not the means?

Please clarify the sentence.

Page 4. ECMWF ReAnalysis should be reanalysis

Page 4: “The most frequent sensor depth is found at 5 m. Permanently installed multi-thermistor cables showing an accuracy between 0.002 - 0.1°C are most commonly used for measuring continuous ground temperatures at specific depths (Romanovsky et al., 2010).”
Please correct: Romanovsky et al 2010 report "Measurement systems currently in use generally provide an accuracy and precision of 0.1°C or better.”

Page 4: which suggest es

Please correct typo.

Page 4: “Most records of North America are accompanied with meta records which suggest es sensor depth for approximation of the MAGT”.

Please be specific: Do you mean approximation of the MAGT at zero annual amplitude?

Please also specify the MAGT – which depth you are referring to?

Page 6: Only sensors with more than 1m depth have been used as the MAGT near the surface can be much colder than at larger depth.

Awkward sentence: Do you mean sensors instrumented below 1 m depth...?

Page 6: “To explore the dependency of the results on snow melting events, the permafrost extent estimation from ASCAT data was carried out excluding the melt days in the count of frozen days (FT) and a second analysis counting the melt days as frozen grid cells (FM).
Sentence unclear: do you mean that in the second analysis the melt days were counted as frozen days? Please clarify sentence.

Page 6: “In the study of Park et al. (2016) a threshold of half a year was chosen for the delineation of permafrost extent.”

Threshold of half a year of “frozen days”? Please clarify.

Page 7: “The relationship between MAGT and frozen day of year was further examined..”
MAGT at which depth?

Overall, please specify in text and all figure captions at what depth you refer to when reporting MAGT, including all figure captions (example Figure 6).

Page 7: “R2 between MAGT from meta records and MAGT at coldest sensor depth is 0.994 (Fig. 1).”

MAGT from meta records- what source and which depth? Be specific and also add this information in caption of figure 1.

Page 10: The results based on SSM/I are mostly warmer in the continuous zone.
Sentence unclear- how can results be warmer?

Page 10: “The model result for ASCAT FM is about two degree colder than what is obtained from the in situ records in the first case”.

Please clarify sentence.

Page 11: “...order of the actual extent but the error of commission is relatively large“.
Awkward wording.

Page 11: ...”Westermann et al. (2015) reported a model accuracy of 2.5°C.”
Model accuracy of what?

Page 12: “...200 days corresponds to approximately 0.5°C in case of ASCAT FT.”
0.5°C of model derived MAGT? Which depth?

Page 12: “A threshold higher than the previously suggested half year leads to better performance of ASCAT than for SSM/I especially..”

Better performance of what?

Page 14: Please complete reference to (e.g. Smith and Riseborough).

Overall format issues

-Check correct spelling: degree C and degree Celsius is used throughout the paper, please unify.

-Check the tenses throughout the paper- it switches between present and past throughout

-Change all figures to digital decimals (not commas, used in Figure 14 for temperature and standard deviation)

-Provide all information required for understanding the data presented in the figures.

Examples: Figure 1. MAGT at coldest sensor depth- please add the source of data

-Improve quality of Tables and Figures (example Table 3, 4, Figure 7)