

Review comments on ESSD-2021-83

Yohua Ran et al. present a relevant raster data collection of permafrost related ground quantities, these are the GCOS Essential Climate Variables ECVs: Mean Annual Ground Temperature (MAGT) that the authors refer to at the Zero Annual Amplitude (ZAA), and Active Layer Thickness (ALT) and permafrost probability.

Still there is the mismatch of the MAGT training data set that includes a wide range of non-ZAA measurement depths, e.g. Roshydromet boreholes reach a maximum depth of 3.20 m only, not ZAA.

The MAGT raster product represents mapped MAGT in a ground depth range of around 3 m to 25 m, potential users of the MAGT product Ran et al. should be made aware of this fact, specifically if they want to undertake comparisons with their own ground temperature data or with other map products. The authors should make this statement in the abstract, in the manuscript text, in the figure captions when the MAGT product is shown and also in the abstract of the data publication landing site.

In their edited new version, the authors added more information on the MAGT training data and the reference of Karjalainen et al. 2019 and added a paragraph discussing the variation in ZAA. It is understandable that from this multitude of contributors and programs no data publication of the ground data can be required. However, transparency is still lacking, specifically information on the range of the depth of the MAGT value. In this context, it is inevitable that the authors need to show an overview – in the form of a table on the content of the MAGT training data covering the time window 2000-2016

This information is needed stratified related to program/source/author contributing the MAGT values: program/source/author for the time window 2000-2016

i) the authors should indicate the number n of stations that they used from the respective sources, ii) important: the authors need also to indicate the potential depth range min, max – or in case of Roshydromet the chosen depth of 3.20 m iii) the authors should indicate the estimated percentage of known ZAA depths to this group (the authors provide in the text an estimation of ca 75% for the full data set), e.g. in case of Roshydromet it would be zero.

The authors should add following discussion points

i) the authors need to include a discussion and a reference on the most actual mapped permafrost GCOS ECV products that are available: the European Space Agency ESA provide in their Climate Change Initiative CCI program also GCOS ECV Permafrost products. The first version of Permafrost CCI MAGT, ALT and permafrost probability products were released already in 2020, these products were already available when Ran et al. composed this manuscript. Since spring 2021, the newest version of Permafrost CCI MAGT, ALT and permafrost probability products are available for download to the permafrost and climate science communities.

ii) the authors should add a paragraph in discussion, on the fact if they are comparing the spatial extent of products, often in discontinuous zones permafrost still may occur at deeper layer but has thawed in lower depths. E.g. if the authors compare permafrost probability a product with a low specific product depth, e.g. 2 m, might contain no permafrost, but the Ran et al. product might contain permafrost because it relates to a deeper ground depth.

iii) the authors should be more careful in relation to their ALT map product: Training data are rare for the vast Siberian region. E.g. comparing the Ran et al. product with existing ALT and Active Layer

Depth measurements in Siberia the ALT product shows unreliable ALT data for the lower latitudes: they are far too low for large parts of Yakutia. In contrast, in several Siberian mountain regions ALT (ranges in the Ran et al. product > 1 m) seem to be overestimated by a magnitude of 3 to 5. The authors should discuss carefully these regional gaps in the training data set.

Data publication:

There is no read me file or product description available in the downloaded data package. The authors should add a Read me file

The authors should provide information on the Units for ALT, MAGT, permafrost probability

Also information on no data value is required to enable easy re-use of the product.

Would be good to provide in the read me file the information on the spatial resolution and also in the abstract text of the landing page.