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The Cryosphere Discussions

Interactive comment on "Pan-Antarctic map of near-surface permafrost temperatures at 1 km^2 scale" *by* Jaroslav Obu et al.

Anonymous Referee #2

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Review for "Pan-Antarctic map of near-surface permafrost temperatures at 1km2 scale"

Authors have demonstrated a continent scale high resolution modeling work for Antarctic ground temperatures. The Cryogrid model is utilized for the ice-free areas of Antarctic continent and islands, as MODIS land surface temperatures together with downscaled ERA-Interim climate data is used for model forcing. Model results are compared to 40 borehole sites in different locations. Model performance is subject to subgrid heterogeneity, forcing data scarcity, and continentality/topography of the locations. Overall, the manuscript presents a first continent scale simulated ground temperature map for Antarctica that could be used as a guideline for different fields of science.

General comments:

1. Since the model relies heavily on input data such as satellite observation, it is best to include uncertainty ranges for areas where satellite observations are lacking (cloudy days) or low quality. Otherwise it is wrong to advertise these model results as a generally accepted guideline for Antarctic permafrost conditions.

2. Figures can be improved by proper color choice following other referee's suggestions. Also an overall figure of whole Antarctica with the modelled MAGT should be added at the end to give a general idea of MAGT in the whole continent to guide future studies. Forcing data uncertainty can be added to that figure.

3. The model limitations should also include possible sources of uncertainty for nf,nt, and rk values such as different thermal properties, soil hydrological conditions etc. Also it would be helpful to mention Cryogrid's difference to process-based models that are mainly used for northern hemisphere permafrost studies.

Other than these, I find this paper to be well worthy of the journal and Antarctic research, so I support this paper to be published with the minor improvements I listed.

Minor comments: - fig2: correct the mismatch MAE written on figure (-0.17) and in text (0.06) - stay consistent with abbreviations, MAGTs vs MAGTS (p8l16) - p24l7 correct "The lapse rates are is indicating. . ." - for section 4, please add corresponding figure numbers when discussing specific sites - conclusion at p31lines1-3, snow cover and redistribution effects should be added as an important factor as seen from the validations of this paper

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