

Intercomparison of Arctic atmospheric reanalysis data: Deriving observation-based forcing data for terrestrial models

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The goals of the modeling group in the terrestrial research project of the GRENE Arctic Climate Change Research Project (GRENE-TEA) are to a) feed to the CGCM research project for the possible improvement of the physical and ecological processes for the Arctic terrestrial modeling (excl. glaciers and ice sheets) in the extant terrestrial schemes in the coupled global climate models (CGCMs), and b) lay the foundations of the future-generation Arctic terrestrial model development.

In GTMIP (GRENE-TEA Model Intercomparison Project), we utilize the GRENE-TEA site observations to drive and validate the participating models. However, the observation data are prone to missing or lack of the necessary variables or parameters to drive the model. Therefore, we create continuous forcing data in the following manner: First, we create 30-year hourly time series (version 0; v0) of 7 meteorological components from the closest point data of the reanalysis products (a model-based dataset for the sub-monthly variations, and the observation-based CRU for the monthly). Then, v0 is merged with the observation data to create site-fit continuous data (v1) for each GRENE-TEA site. Use of this v1 expects to reduce the systematic biases in the input data in comparing the model outputs with the site observations, to delineate the variations among the models.

So far several atmospheric reanalysis datasets, for example NCEP-NCAR or JRA-55 are available as model input data. In this study, six atmospheric reanalysis datasets are compared in terms of the climatic reproducibility in the region north of 60°N to select the one to be used for constructing the v0 data. The compared datasets are ERA Interim, JRA-55, MERRA, NCEP/NCAR Reanalysis 1, NCEP-DOE Reanalysis 2, and NCEP-CFSR. The CRU dataset is used as a representative of the ground-level observations. We take air temperature at 2m high and precipitation as the key parameters representing the climate condition.

Keywords: Arctic region, Terrestrial model, Reanalysis dataset