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## The GRENE-TEA model intercomparison project (GTMIP): overview and experiment protocol for Stage 1

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**Abstract.** As part of the terrestrial branch of the Japan-funded Arctic Climate Change Research Project (GRENE-TEA), which aims to clarify the role and function of the terrestrial Arctic in the climate system and assess the influence of its changes on a global scale, this model intercomparison project (GTMIP) is designed to (1) enhance communication and understanding between the modelling and field scientists and (2) assess the uncertainty and variations stemming from variability in model implementation/design and in model outputs using climatic and historical conditions in the Arctic terrestrial regions. This paper provides an overview of all GTMIP activity, and the experiment protocol of Stage 1, which is site simulations driven by statistically fitted data created using the GRENE-TEA site observations for the last 3 decades. The target metrics for the model evaluation cover key processes in both physics and biogeochemistry, including energy budgets, snow, permafrost, phenology, and carbon budgets. Exemplary results for distributions of four metrics (annual mean latent heat flux, annual maximum snow depth, gross primary production, and net ecosystem production) and for seasonal transitions are provided to give an outlook of the planned analysis that will delineate the interdependence among the key processes and provide clues for improving model performance.

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