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# Parallel estimates of gross primary production of Finnish forests - comparison of two process models

Mikko Peltoniemi (1), Tiina Markkanen (2), Sanna Härkönen (1), Petteri Muukkonen (1), Tea Thum (2), Tuula Aalto (2), and Annikki Mäkelä (3)

(1) Finnish Forest Research institute (METLA), Finland (mikko.peltoniemi@metla.fi), (2) Finnish Meteorological Institute, Helsinki, Finland, (3) Department of Forest Sciences, University of Helsinki, Finland

Land Surface Models (LSM) describe the material and energy fluxes between the atmosphere, vegetation and soils for climate models and earth system models. Especially, for past and future climate change studies, LSMs need to include ecosystem carbon cycle. Process-based forest growth models and ecosystem impact analysis models, on the other hand, benefit from stand-alone predictions of carbon cycle.

In this study, we compared the predictions of GPP made with two modelling systems that are currently applied in Finland. The first one is JSBACH that is LSM of ECHAM6, which is now being applied in Finland with the REMO regional climate model. The second one is the eddy-flux-based GPP and water balance model PRELES that has recently been integrated with large-scale data sets to be run with inventory-based forest data and ground-based meteorological measurements. JSBACH was run with information about plant functional type fractions in 0.167 degree pixels. PRELES applied inventory-scaled information about forest structure on fine resolution (100 m). Both models used same weather data as inputs.

When we compared the results of the two model systems, we found little difference between the model predicted annual GPP when aggregated over Finland. Spatial differences in annual GPP and its inter-annual variation over the simulation period (2000-2011) was also parallel, but differences were detected in the seasonal pattern of GPP. Two modelling system showed remarkable converge in predicted annual total GPP, but both models could benefit from a better understanding of timing of the season start and end, especially regarding deciduous species.