

# Improving the simulation of longwave enhancement on snow cover beneath boreal forest canopies

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Climate models currently display less skill in modelling snow cover for forested than open areas due to the complex relations and processes between forest canopy and snow. One of these processes is the enhancement of longwave radiation below the canopy, i.e. the increase of sub-canopy longwave radiation compared to the atmospheric forcing.

In this study we compare the respective canopy parameterisations of SNOWPACK (WSL-SLF, Switzerland) and the land component CLM4.5 of the Community Earth System Model (NCAR, USA) at an observational site. CLM4.5 displays an overestimated diurnal cycle in sub-canopy longwave radiation resulting in net underestimation, which also extends to the longwave enhancement. Simulations for SNOWPACK are close to the observations. Furthermore, the deficiencies in CLM4.5 are similar to the earlier one-layer version of SNOWPACK and the inclusion of a conductive heat flux in CLM4.5 resulted in a similar improvement as seen for SNOWPACK. Consequently, we aim to increase the complexity of the representation of boreal forests in CLM4.5 using SNOWPACK as a guideline and may subsequently improve the simulation of snowmelt via the effect of longwave enhancement.