Geophysical Research Abstracts
Vol. 17, EGU2015-9090, 2015
EGU General Assembly 2015

Evaluation of algorithms for calculating sub-canopy microclimatic conditions with an extensive dataset

Jakob Garvelmann (1), Stefan Pohl (2), and Harald Kunstmann ()

(1) Karlsruhe Institute of Technology (KIT), Campus Alpin - Institute of Meteorology and Climate Research (IMK-IFU), Garmisch-Partenkirchen, Germany (jakob.garvelmann@kit.edu), (2) Chair of Hydrology, University of Freiburg, Germany

Forested areas represent significant areas in middle European mountain environments and the influence of a forest canopy is crucial for the snow cover dynamics below. Since micrometeorological parameters are seldom measured at forested locations, physically based or empirical approaches are usually used to calculate the beneath canopy microclimatology in snow hydrological modeling. Commonly used approaches for calculating forest microclimatic conditions from open field site measurements often have been developed from observations at high latitude boreal forest study sites. However, climatic conditions as well as forest and conifer tree structures differ across the northern hemisphere. The goal of this study is to evaluate those approaches and test their transferability to middle European forest environments with a complex topography.

The study presents an extensive dataset collected during four winter seasons in the mountainous Black Forest region of southwestern Germany. A stratified sampling design was used with snow monitoring stations (SnoMoS) covering a wide range of elevations and exposures in the study area. Up to 44 station pairs with SnoMoS at open field sites and adjacent forested locations with differing canopy characteristics were available for the analysis of the collected data. Measurements of air temperature, RH, wind speed and incoming global radiation at open field sites were used to calculate the adjacent inside forest conditions with frequently used approaches. Those calculations were subsequently compared to the actual beneath canopy measurements in order to evaluate commonly used model algorithms. First results reveal that calculation of air temperature and RH are relatively robust, while calculating inside forest wind speed and incoming global radiation are much more difficult to simulate due to their high spatial variability.