

Modeling of soil moisture dynamics in a larch forest in eastern Siberia

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An earth system model under the RCP8.5 scenario projected that boreal forests in eastern Siberia (near Yakutsk) would experience significant climate changes. According to this projection, the mean annual air temperature would turn to positive, and the annual precipitation will double by the end of the 21st century in this region. Since the continuous permafrost underlay the forests in this region, increasing temperature and precipitation can affect the forest dynamics through the soil water processes. To investigate such effects, we applied a newly developed terrestrial ecosystem dynamics model named S-TEDy (SEIB-DGVM-originated Terrestrial Ecosystem Dynamics model) to a larch forest in eastern Siberia. This model simulates “the way of life” of each tree and resulting tree mortality under the future climate conditions mechanistically. So far, we have already confirmed that this model successfully reproduced the above-ground biomass and individual tree transpiration compared to the literature and measured data, respectively. Now we are developing soil physics submodels considering the effect of thawing-freezing processes. However, we have not yet achieved the soil water balance submodel that incorporates the frozen layer’s impermeable impact on soil moisture dynamics. In this presentation, we will show the solution to this problem.

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