Estimation of canopy leaf area index in Siberian larch forest and validation

Rikie Suzuki[1]; Kobayashi Hideki[2]; Nicolas Delbart[3]; Keiji Kushida[4]

[1] FRCGC, JAMSTEC; [2] JAMSTEC/FRCGC; [3] FRCGC-JAMSTEC; [4] ILTS, Hokkaido University

Reliable monitoring of the leaf area index (LAI) is required to further understand the carbon, water, and energy cycles of forests. In this study, we used a satellite-based method to estimate the overstory LAI (LAIo) separately from the understory LAI (LAIu) for larch forests covering eastern Siberia. We modeled forest scenes representative of larch forest structure, with particular consideration of the typical clumped shoot structure of larch. Three-dimensional radiative transfer simulations (FLiES) were then conducted under various forest conditions to establish the relationships between LAIo and seasonal increases in the normalized difference water index (NDWI) derived from SPOT/VGT data. Our LAIo slightly underestimated field-obtained LAIo data but reproduced the spatial pattern of LAI retrieved from Landsat ETM+ better than CYCLOPES and MOD15 LAI products. At the continental scale, our LAIo, the CYLOPES version 3.1 LAI, and the MODIS MOD15 collection 5 LAI showed similar ranges in summer. Overall, the results of this study show that our method is a good alternative to MOD15 and CYCLOPES, especially for studies requiring separate estimates of LAIo and LAIu and true LAI instead of effective LAI.