Data assimilation experiments with MODIS LAI observation and the dynamic global vegetation model SEIB-DGVM in Japan

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In the previous study, Arakida et al. (2017) developed a data assimilation system with the SEIB-DGVM (Spatially Explicit Individual-Based Dynamic Global Vegetation Model), and assimilated satellite-observed Leaf Area Index (LAI) successfully over Siberia. In this study, we extend the experiment to a Japanese forest at the Takayama flux site and investigate the performance of the data assimilation system. We estimate the vegetation functions and structures, and model parameters related to the phenology of the deciduous broad-leaved tree and the undergrowth. For the climate forcing data, we used the global reanalysis dataset known as the ERA5. The original data assimilation system developed for Siberia turned out not to be suitable for the Japanese forest because of different LAI variabilities between Siberia and Japan. Namely, LAI stays at the saturated level for an extended period in Japan, while in Siberia, the LAI starts to drop soon after it reaches to the maximum value. Therefore, a model parameter which controls the saturated LAI level was considered for additional parameter estimation. In addition, the undergrowth was changed from deciduous to evergreen. The results show that the DA system performs generally well in Japan with the additional parameter estimation and the modification to the undergrowth.

Arakida, H., T. Miyoshi, T. Ise, S.-I. Shima, and S. Kotsuki (2017), Non-Gaussian data assimilation of satellite-based leaf area index observations with an individual-based dynamic global vegetation model, Nonlinear Proc. Geoph., 24, 553-567, doi:10.5194/npg-24-553-2017.

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