Introduction of GCOM-C/SGLI Leaf Area Index & Fraction of Absorbed Photosynthetically Active Radiation products

*Toshiyuki Kobayashi[1], Yoshiaki HONDA[2], Yuhsaku Ono[2], Hideki Kobayashi[3], Wei Yang[2], Shin Nagai[3], Tomoko Akitsu[4], Kenlo Nasahara[4], Risa Miyazaki[1], Masahiro Hori[1], Hiroshi Murakami[1]

1. Japan Aerospace Exploration Agency, 2. Center for Environmental Remote Sensing, Chiba University, 3. Japan Agency for Marine-Earth Science and Technology, 4. University of Tsukuba

The Japan Aerospace Exploration Agency (JAXA) launched the Global Change Observation Mission - Climate (GCOM-C) satellite on December 23rd, 2017. The Leaf Area Index (LAI) and the fraction of Absorbed Photosynthetically Active Radiation (fAPAR) product (Algorithm ID: T2B) is one of the GCOM-C standard land products. The dataset is being produced from Second Generation Global Imager (SGLI) at 250-m resolution on a daily basis. At the present time, there are several limitations on the product. In this research, we summarize the early results and limitations of the T2B products.

The LAI is defined as one half of the total green leaf area per unit ground surface area. In the GCOM-C product, LAI is estimated for overstory leaves. The information for understory vegetation is added as understory NDVI. The fAPAR is defined as the proportion of the effectively absorbed solar radiation by plants in the photosynthetically active wavelengths (the spectral region from 400 to 700 nm). LAI and fAPAR were estimated based on the Look-Up Tables (LUTs) showing the relationships between the multi-angle atmospherically-corrected land surface reflectance data and the LAI or fAPAR. The LUTs were produced to fit with the field-observed reference data collected from literatures using a radiative transfer simulator, the Forest Light Environmental Simulator (FLiES) [1]. It simulates radiative transfers in the forests and grasslands based on the Monte Carlo method.

The accuracy of the retrieved LAI and fAPAR was assessed using the in-situ observation data which was collected at several sites. The product has the tendency of overestimating LAI especially at the needle-leaved forests. One of the reasons is that the current algorithm cannot distinguish the difference between the overstory LAI and the understory vegetation well at the forested areas with sparse trees. The accuracy of the T2B product should be improved by revising the algorithm and the LUTs for retrieving LAI. We are planning to revise the land cover datasets which are the basis of retrieving LAI. The LUTs will be revised by fitting the vegetation parameters for FLiES with the SGLI data.

[1] H. Kobayashi *et al.*, A coupled 1-D atmosphere and 3-D canopy radiative transfer model for canopy reflectance, light environment, and photosynthesis simulation in a heterogeneous landscape, *Remote Sensing of Environment*, **112** (2008), 173-185.

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