JAXA super sites 500: a large footprint ecological monitoring project for satellite validation

*Tomoko Akitsu[1], Kenlo Nishida Nasahara[1], Tatsuro Nakaji[2], Toshiya Yoshida[2], Nobuko Saigusa[3], Hideki Kobayashi[4], Masato Hayashi[5], Masahiro Hori[5], Yoshiaki Honda[6]

1. University of Tsukuba, 2. Hokkaido University, 3. National Institute for Environmental Studies, 4. Japan Agency for Marine-Earth Science and Technology, 5. Japan Aerospace Exploration Agency, 6. Chiba University

JAXA super sites 500 is a large footprint ecological monitoring project for satellite validation. This project has been started from 2013. Its objective is to obtain representing values of leaf area index (LAI), above ground biomass (AGB), and fraction of absorbed photosynthetically active radiation (fAPAR) within the 500 m ×500 m scale, particularly for validation of the ecological products derived by the Global Change Observation Mission-Climate (GCOM-C) satellite, which will be launched in 2017.

LAI, AGB, and fAPAR are essential information for studies of vegetation productivity and carbon cycle. Therefore, these accurate datasets on global and regional scales are needed to be derived by satellite remote sensing. Generally, these datasets have been produced in a satellite sensor's moderate resolution such as 0.25 km, 0.5 km, or 1 km. To assess their accuracy, in-situ data measured within such spatial resolution is desired. However, such data are rarely available. Accordingly, in previous researches, in-situ data was measured within a smaller area such as 100 m ×100 m and then scaled up to the satellite resolution using higher-resolution imagery. In another case, assuming the larger area was covered with homogeneous vegetation, the in-situ data was directly scaled up to the satellite resolution. However, such scaled-up data includes influences caused by micro-topography and a mixture of different land covers. Thus, the LAI, AGB, and fAPAR products of such satellite sensor's resolution have been difficult to validate.

In order to overcome this difficulty, we initiated a "JAXA Super Sites 500" project. We have established in-situ observation sites on some typical forest types in East Asia, from temperate to cool ecosystems: deciduous needle-leaf forest (DNF), evergreen needle-leaf forest (ENF), and deciduous broad-leaf forest (DBF). Each site has 500 m ×500 m square research plot in flat topography area. We had carried out pilot studies on each site, and will start full-fledged observations after launching of GCOM-C.

The purpose of this study is to compare their observation methods and sampling designs within this scale, and to evaluate the quality of the in-situ data. Basically, we set five 400 m length parallel line-transects at 100 m intervals in each site. LAI and AGB were measured along these lines. Canopy LAI was measured by three methods: It was measured at 20 m intervals on each line by using LAI-2200/LAI-2000 (LI-COR, USA) and fish-eye digital camera. It was also measured by using litter trap. Understory LAI was measured by two methods: It was measured at 20 m intervals by using LAI-2200 and by using harvesting method. AGB was measured by two methods: It was measured at several points by using an improved Bitterlich's method. It was also measured within several fixed plots by using a tree census method. Furthermore, we plan to measure fAPAR by using accurate and stable quantum sensors [*Akitsu et al.*, in press].

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