Biomass mapping by ALOS/PALSAR over boreal forest in Alaska accompanied with ground-based forest survey

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For the better understanding of the carbon cycle in the global ecosystem, investigations on the spatio-temporal variation of the carbon stock which is stored as vegetation biomass is important. The sensor 'PALSAR (Phased Array type L-band Synthetic Aperture Radar)' of the satellite 'ALOS (Advanced Land Observing Satellite)', which was launched in January 2006, provides the information which can be used for the above-ground biomass estimation.

To derive the biomass from satellite measurement, it is inevitable to acquire in situ biomass by ground-based survey. Moreover, such ground-based information has to be acquired at as possible many sites for developing a reliable estimation algorithm, so a quick measurement method is required. We applied a way that is a combination of Bitterlich Angle Count Sampling method and Sampled-tree Measuring method (BACS-STM) as a quick method. First, a tree which has wider trunk than a threshold viewing angle is identified by the relascope from a representative point in the target forest. Next, the biomass of the tree is estimate by the allometric equation with the tree height and diameter measurements. Through these processes, the biomass per unit area in the forest is estimated. This paper examined the applicability of BACS-STM to the forest biomass measurement which is used as the ground truth for the satellite measurement.

In July 2007, a forest survey was carried out in the south-north transect (about 300km long) along the Trans-Alaska Pipeline which profiles the ecotone from boreal forest to tundra in Alaska. Since several papers reported that the recent secular change is apparent in the ecotone in Alaska, this transect would be appropriate for the long term biomass monitoring. 29 forests along the transect were targeted for the survey, and their biomasses were measured. Consequently, it was revealed that the forest biomass distribute from 5 to 100 ton/ha (dried matter). BACS-STM took only about 30 minutes for measuring the forest biomass at one point, and was demonstrated that the method was very suitable for the acquisition of the ground truth biomass for the estimation by the satellite measurement.