STUDY OF LAND COVER CLASSIFICATION BY USING SAR DATA IN UNDRAINED PEAT SWAMP FOREST

Norichika Asada[1], Kazuyo Hirose[1], Osamu Kashimura[1]

[1]*Japan Space Systems(J-Spacesystems),*
3-5-8 Shibakoen, Minato-ku, Tokyo, Japan, Norichika-Asada@jspacesystems.or.jp,
Hirose-Kazuyo@jspacesystems.or.jp, Kashimura-Osamu@jspacesystems.or.jp

Abstract: With the advent of REDD+ (Reduced Emissions from Deforestation and forest Degradation Plus) as one of the climate change remedies, it has become important to accurately measure the biomass quantity of the peat swamp forests, a source of a large amount of CO2 emissions. Biomass determination by field survey requires considerable efforts and great expenses. In contrast, remote sensing technology enables quick and cost-effective observation of a wide area and suitable for understanding the biomass. In general, the biomass is calculated based on the land cover classification results obtained from optical satellite data. It is difficult in many cases because peat swamp forests in the tropical rainforest climate region are often covered with the cloud. If the land cover of the peat swamp forest can be classified by using the radar satellite data that is not affected by weather, the interpretation accuracy will be improved. The purpose of this study was to evaluate the possibility of using fully polarimetric data of synthetic aperture radar (SAR) and multi-frequency data (L-band, C-band, X-band) for land cover classification as an aid to interpret the optical satellite image of the peat swamp forest. We assumed that peat swamp forest could be classified by the structural features in the land cover using fully polarimetric data and multi-frequency data. In the assessment of fully polarimetric data, we used ALOS/PALSAR fully polarimetric data. Entropy (H)/ Alpha Angle (α)/ Average Intensity (I) were calculated by the eigenvalue analysis on polarimetric data, and the zonal classification was performed by these three elements. The advantage of this classification is that it requires no training data. The PolSARPro software was used for the eigenvalue analysis. In the classification that used the multi-frequency data, ALOS/PALSAR (HH), RADARSAT-2 (HH), and TerraSAR-X (HH) were used. Each data was assigned to RGB to create the color composite image. Results were verified using optical satellite data. The classification map obtained using fully polarimetric data and the multi-frequency color composite image showed the similar land coverage to that observed in the optical satellite image. For land cover classification of the tropical peat

swamp forest under frequent cloud cover, fully polarimetric data of PALSAR and the multi-frequency color composite image demonstrated the ability to augment the optical satellite data and showed the potential to contribute to improving the interpretation accuracy.

Keyword : Peat Swamp Forest, Land Cover Classification, SAR, Polarimetry, Multi Frequency Data