Assessment of PALSAR 25m and 50m Mosaic Products for Land Cover Classification at Regional Scale in Tropical Rain Forest

Begun in 2000, the ALOS Kyoto and Carbon (K&C) Initiative is a global, multi-disciplinary research initiative of the Earth Observation Research Center (EORC) of Japanese Aerospace Exploration Agency (JAXA), aiming to produce remote sensing products which can support international conservation conventions, carbon cycle science, and conservation of the environment. This paper investigates the abilities and the limitations of ALOS PALSAR 25m and 50m Mosaic products for land cover classification in Tropical rainforest as part of the ALOS K&C Initiative Project.

Incorporated with World Wildlife Fund (WWF), Riau province, in central Sumatra, Indonesia, was selected as a test site. Riau hosts some of the most biodiversity ecosystems and unique species. It is covered by vast peat lands estimated to hold Indonesia’s largest store of carbon. However, Riau has been under serious threat because of rapid large-scale deforestation.

In numerous studies, it was qualitatively shown that forested areas (more generally vegetation) and polarimetric SAR data establish a confusing relation between the medium physical properties and polarimetric signatures. Spatial statistics in SAR backscatter data acquired over forests are of interests too (de Grandi et al. 2009). In another hand, classification algorithms based on statistical learning methods such as the supervised Support Vector Machine (SVM) approach are used in a wide range of data mining applications. During the last decade, SVM has been successfully introduced in remote sensing, with recent studies dealing with SAR data (Waske et al. 2008). In this study, we use the Normalized Radar Cross Sections (HH and HV channels) and the Haralick’s textural information as inputs of the SVM classifier so as to discriminate the different land cover over the entire Riau province.

However, the area of interest is very wide (about 14 000 by 24 000 pixels at 50m resolution and twice the size at 25m) and the use of a limited number of parameters is crucial for any future operational applicability. Recursive Feature Elimination algorithm, namely SVM-RFE, is a simple but efficient algorithm which was first built in the context of cancer gene selection. In the framework of a multi-class problem, a new extension, namely the MSVM-RFE, is proposed in Zhou and Tuck 2007. This method is used in this study and provides a small set of relevant parameters to be computed at regional scale.

Land cover maps over the Riau province are estimated by using 25m or 50m PALSAR mosaic products. We discriminate up to 8 different classes (Dry lowland natural forest, Swamp forest, Acacia, Clear cut, Rubber, Regrowth, Oil palm and Water). Accuracy assessment is finally carried out and conclusion on the usefulness of PALSAR 25m and 50m mosaic products are given.


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