

## Development of Semi-Automated System based on PALSAR Data for Land Cover Mapping in Indonesia: The Riau Province Case

### Project objectives

This study investigates the abilities and the limitations of ALOS FBD PALSAR 50m. mosaic data 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, 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 stock of carbon. However, Riau has been under serious threat because of rapid large-scale deforestation

### Scientific Context

In numerous studies, it was qualitatively shown that forested areas (more generally vegetation) and polarimetric SAR data establish a confusing. Spatial statistics in SAR backscatter data acquired over forests are of interests too. 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.

### Methodology

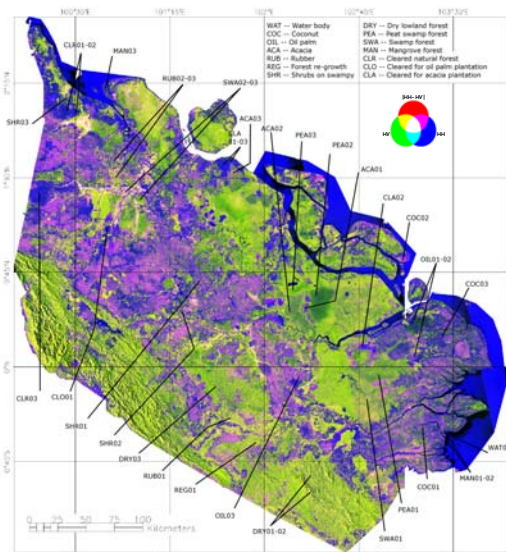
In this study, we use the Normalized Radar Cross Sections (HH and HV channels) and the Haralick's textural information as inputs of the SVM classifier so as to discriminate the different land covers over the entire Riau province. However, the area of interest is very wide (about 14 000 by 24 000 pixels at 50m resolution) 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. This kind of methodology is used providing a small set of optimized textural parameters to be computed at regional scale.

### Results

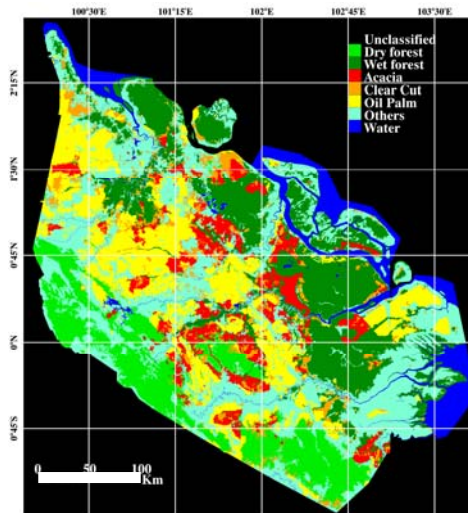
Land cover map over the Riau province are estimated from 50m. PALSAR mosaic product only. We discriminate up to 6 different classes (Dry natural forest, Swamp forest, Acacia, Clear cut, Oil palm and Others). Accuracy assessment is finally carried out over the entire Riau province by using the Landsat-based estimation provided by the WWF. The accuracies are of the order of 70% for the land cover map (top) and 86% for the forest/non forest classification (bottom). These results are relatively good since two channels (HH and HV) only are used.

### Perspective

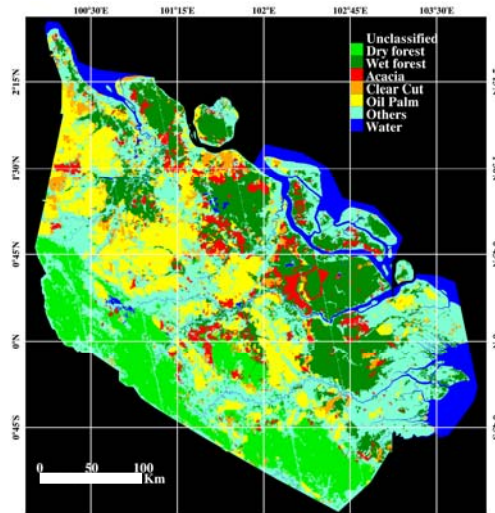
The algorithm will be enhanced by using multi-temporal PALSAR data. Based on this methodology, the land cover classification map over the whole Sumatra Island will be carried out in the coming months. Results are very promising and confirm the relevance of PALSAR sensor for large-scale forest monitoring.



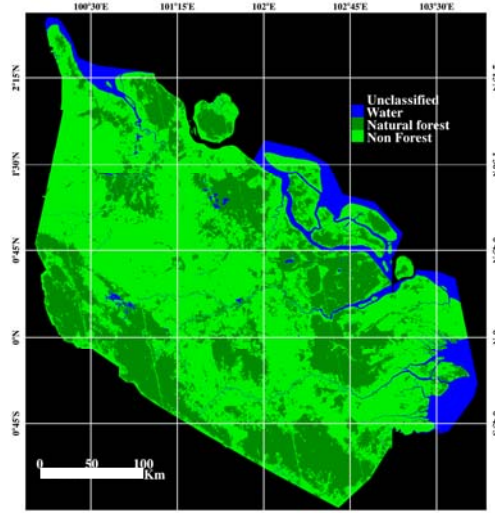
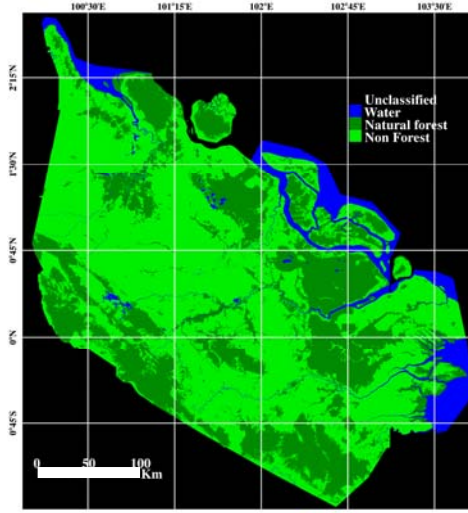
PALSAR FBD 50m. orthorectified mosaic product over the Riau province in 2007



WWF Landsat-based estimation in 2007 manually realized by operator



PALSAR-based estimation in 2007 by the developed semi-automated algorithm (v1.3)



### Science Team

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