ALOS

K&C Initiative

An international science collaboration led by JAXA

Detection of deforestation by multi-temporal SAR

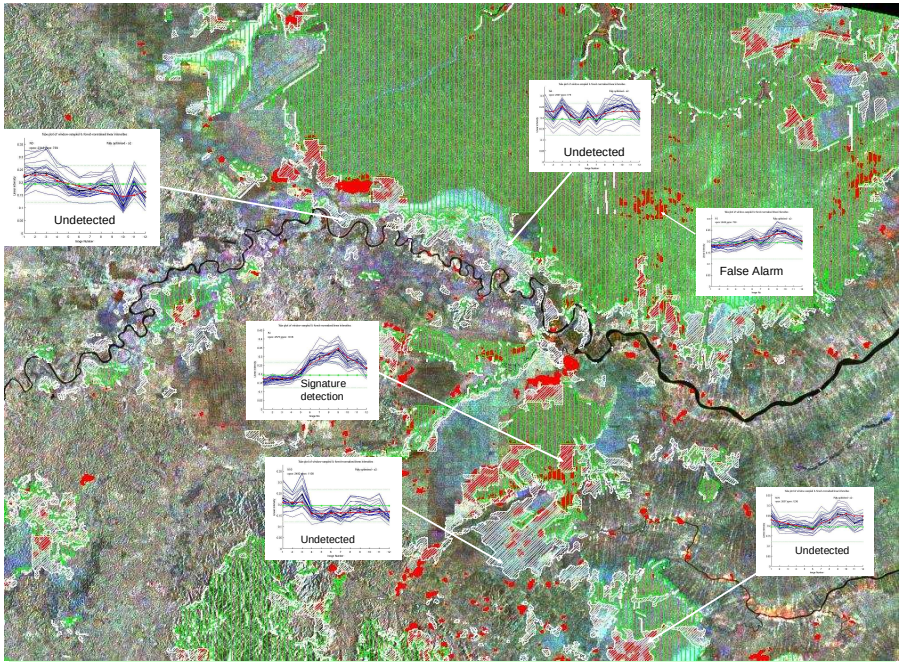
Objectives

1. To develop methods for monitoring and rapid detection of deforestation over large areas using ALOS ScanSAR data
2. To assess the performance of these methods, and the strengths and limitations of ScanSAR for deforestation monitoring.

Results

A comprehensive range of measures for detecting the onset of deforestation in a time-series of ScanSAR was developed and tested, some based on general properties, such as temporal standard deviation, and some based on modelling the "signature" of deforestation, such as a rapid change in backscatter. We found:

- The temporal standard deviation is the best measure to use, and can only be improved marginally by adding other measures
- High deforestation detection rates (Pd) are possible only at the expense of a high rate of false detections in undisturbed forest (Pfa), e.g. Pd = 70% implies Pfa = 35%
- Different performance is found in dry and wet forests; performance is better in dry forests
- Work with the University of Leicester suggests that the occurrence of surface water causes large changes in backscatter; this is a major contributor to the enhanced Pfa
- We would expect better performance in forests less prone to standing water below the canopy
- It is essential in these forests to use FBD data with ScanSAR to achieve high rates of detection with a low false detection rate
- Initial results show that multi-temporal ScanSAR detects some areas of deforestation missed by FBD.



Deforestation
Forest 2008
Detections

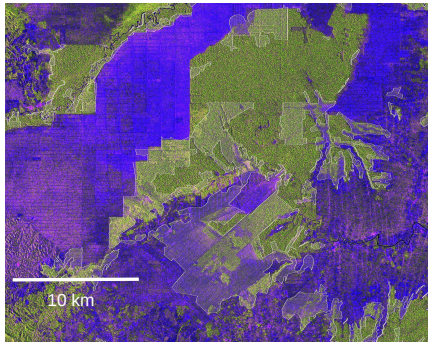
This image shows a RGB composite of ScanSAR images acquired January, September 2007 and June 2008 overlaid by detections for the period June 2007 – June 2008 and compared with regions deforested between April 2007 and June 2008 according to the WWF databases. The area shown is approximately 100x75 km.

ALOS PALSAR data used

18 month ScanSAR sesies over Sumatra aquired between January 2007 & June 2008 with FBD images for the same period

Other data sources

WWF databases 2007, 2008

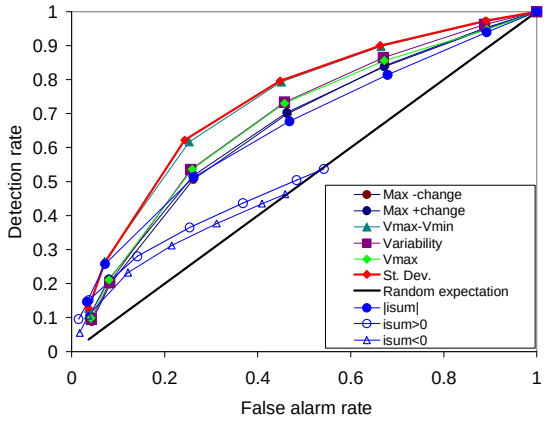


Database 2007-8 Deforestation

FBD channels
HH
HV
HH/HV

Forest canopy and other vegetation tends to depolarise backscatter and hence shows as green. There is a clear discrepancy between the database estimates and an intuitive assessment of the image. Cloud cover is severe in many tropical Landsat images and may contribute to database uncertainty.

Receiver-operating characteristic (ROC) curves showing the ability of a number of temporal measurements to distinguish deforestation from other forms of forest disturbance. Results were obtained from a "universe" of undisturbed forest defined by the WWF 2007 database and the Deforested areas were deduced by comparison with the later WWF June 2008 database.



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