

Project: Quantifying changes in agricultural intensification and expansion in Monsoon Asia

Funding Sponsor: NASA Land Use Land Cover Change Program

Overarching Goal: Provide updated information on agriculture and intensification (irrigation, cropping intensity) in Monsoon Asia, as observed from Landsat and PALSAR images

Objectives:

- (1) maps of cropping intensity and irrigation in monsoon Asia from multi-temporal Landsat and PALSAR images;
- (2) Geospatial datasets of changes in cropping intensity in monsoon Asia;
- (3) Maps of cropland and paddy rice in monsoon Asia
- (4) An enhanced geo-web system for data distribution, collection and evaluation from both experts and citizen scientists, and decision makers

Summary:

The Food and Agriculture Organization (FAO) of the United Nations and the World Food Program estimated that about 1.02 billion people are undernourished in 2009, the highest number in four decades. Resilient and sustainable agricultural development is critically needed to ensure more self-sufficiency in crop production, food security, and the livelihoods of poor people in developing countries. This requires updated and accurate information on the area and spatial distribution of cropping intensity (single, double, and triple crops per unit land in a year), irrigation, and crop production; however, these agro-ecological attributes are sensitive to climate change, extreme weather events (e.g., drought and flood), and macro-scale socio-economic (e.g., use of food crops for bio-fuels) and demographic (e.g., population growth, urbanization) conditions which creates agricultural assessment challenges.

The Mid-Decadal Global Land Survey (MDGLS) project is assembling approximately 9,500 Landsat images (Landsat 5 and 7) in 2004 – 2007. The MDGLS project is now gradually migrating from Phase I (collection and archival) to Phase II (scene selection and ortho-rectification). In Phase III, the MDGLS project aims to develop a suite of high-level land cover and biophysical products, which can be used to support a number of national and international projects and the US Climate Change Science Program, for example, FAO Forest Resources Assessment 2010. To achieve the goal of generating land cover data products for the globe, there are a number of technical and institutional challenges, some of which are largely attributed to the fact that Landsat images are from optical sensors and not very sensitive to structure of the land surface. Here we propose to develop land cover data products (both land cover classification and biophysical parameters) for Monsoon Asia through the integration of Landsat and multi-temporal PALSAR data. The study area domain covers eastern India, Southern China and Southeast Asia (within 30°N to 10°S, 70°E to 160°E), where multi-temporal PALSAR ScanSAR images over the period of 10/2006-2008 are available to this project.

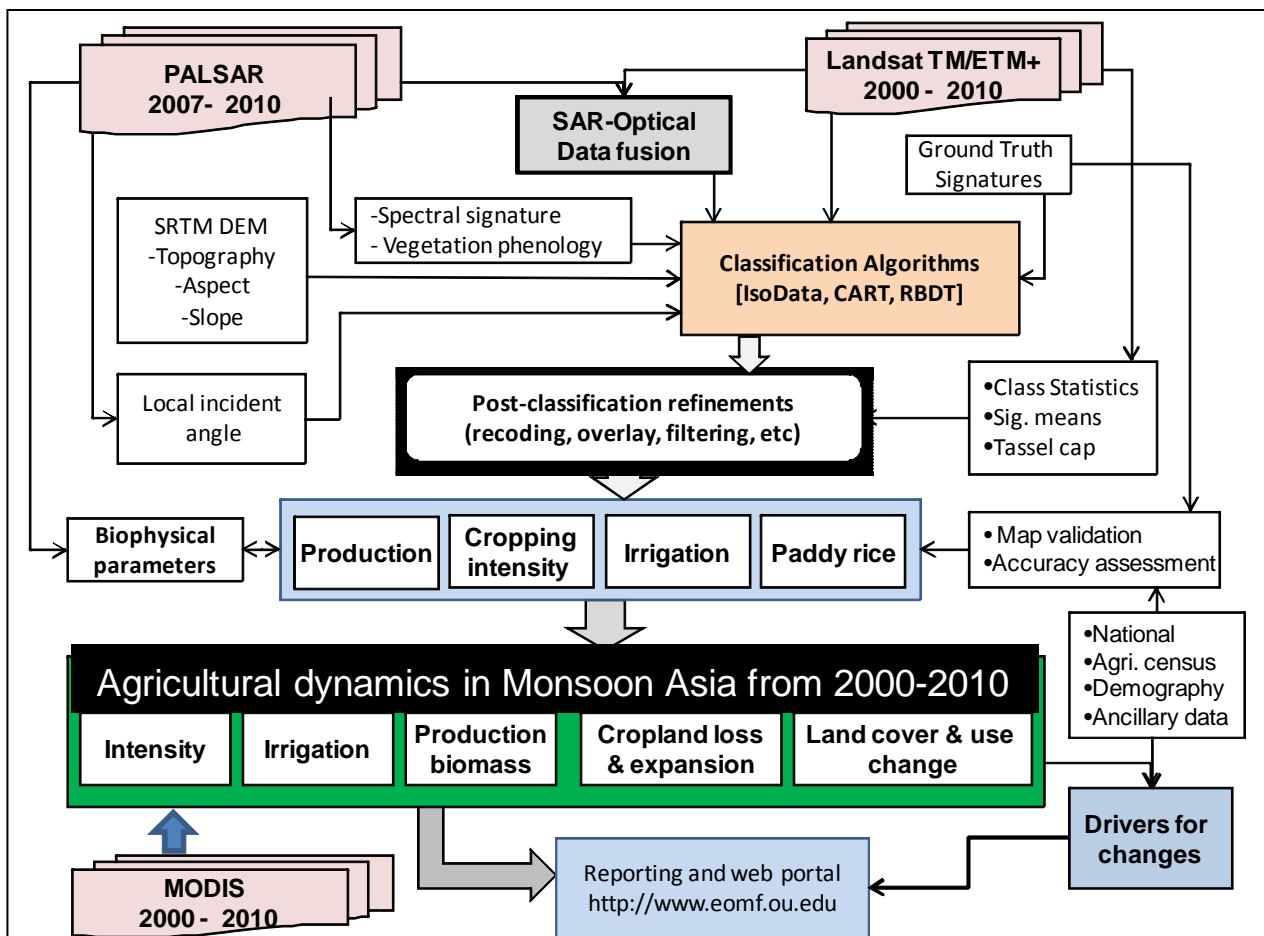


Figure. The schematic diagram of the proposed research. Here we highlight the workflow for Landsat and PALSAR fusions. The time series image data used are PALSAR data (8-12 visits per year), Landsat (16-day interval) and MODIS (8-day interval).

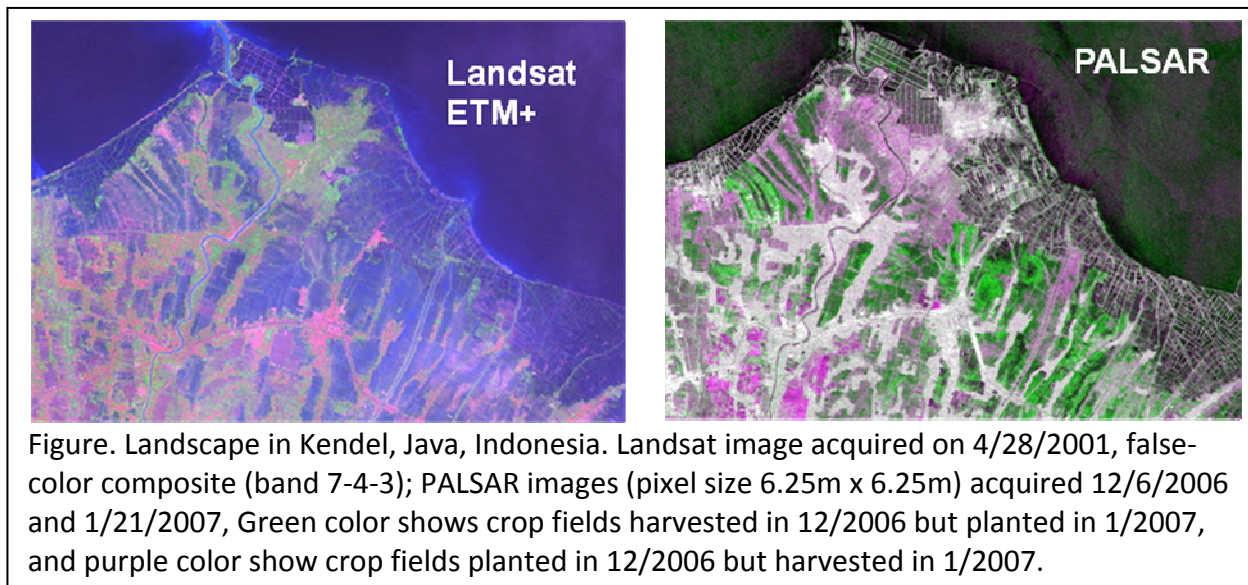


Figure. Landscape in Kendel, Java, Indonesia. Landsat image acquired on 4/28/2001, false-color composite (band 7-4-3); PALSAR images (pixel size 6.25m x 6.25m) acquired 12/6/2006 and 1/21/2007, Green color shows crop fields harvested in 12/2006 but planted in 1/2007, and purple color show crop fields planted in 12/2006 but harvested in 1/2007.

