LCLUC Abstract

Study of Land-Use and Deforestation In Central and West African Tropical Forest Using High Resolution SAR Satellite Imagery

<http://www-radar.jpl.nasa.gov/africamap/>

Progress Report, July, 1997 - February, 1999

Sasan S. Saatchi

Deforestation in tropical Africa is driven by a variety of socio-economic and environmental factors, and has resulted in land cover changes that threatens biodiversity, water and energy resources, and contributes to trace-gas emissions. Several conservation and development studies have concluded that the deforestation in Africa is closely tied to demographic conditions such that the greatest loss of rainforests has occurred in countries with higher population growth. However, because of the lack of reliable data and survey information in some countries, the estimation of areas of intact forest and/or under land use change and their relation to economic indicators have been surprisingly difficult to establish. Consequently, the extent and rate of deforestation Africa are less well known than other regions of tropics.

In this study, we propose to use high resolution satellite imagery to map areas of forest clearing and general land cover types in the entire Central African tropical region. Images acquired by JERS-1 SAR instrument during its global rain forest mapping (GRFM) phase will be the main source of data for this study. By using a combination of radar backscatter and texture analysis, and a SAR-specific classifier, we propose to classify the images into five categories of forest, nonforest, savanna, flooded forest, and open water. Approximately 4000 images for two periods of dry and wet seasons will be processed and delivered to the NASA/Jet Propulsion Laboratory and the European Commission Joint Research Center in Italy for generating a geocoded 100 m resolution mosaic of image data and a land cover map. The thematic interpretation of JERS-1 data and the validation of the land cover map will be supported by available Landsat TM images acquired by NASA pathfinder project, ERS-1 mosaic of Africa generated by ESA TREES (Tropical Ecosystem Environment Monitoring by Satellites) project, and vegetation maps and field data provided by collaborators from national institutions in the region.

The proposed work includes four distinct phases:

1. Data collected by JERS-1 radar instrument will be processed at NASDA (Japan) and delivered to JRC (Joint Research Center, Italy). Radar images will be used through a post-processing chain at JRC to generate a 100 m resolution mosaic over the entire area for two seasons.

2. High resolution data (12.5 m) and 100 m mosiac images will be delivered to JPL for data analysis, land cover classification and validation. The land cover and forest inundation maps will be generated for two data sets. The maps will be stored as high and low resolution mosaics.

3. Through a collaborative effort between JPL, University of Maryland Landsat Pathfinder Project and JRC TREES project, the land cover maps will be analyzed in order to estimate deforestation and the rate of forest clearing and to improve the classifcation based on Landsat and AVHRR images.

4. The results of the analysis will be published in peer review journals and technical reports. The 100 m mosaic data setes for two seasons, land cover maps, and inundation maps will be distributed on CDROM and through the web sites.