

## **Evaluation and Validation of EO-1 and Landsat-7 Imagery through an Analysis of Land Cover/Land Use and Rates of Deforestation in Belize, Central America**

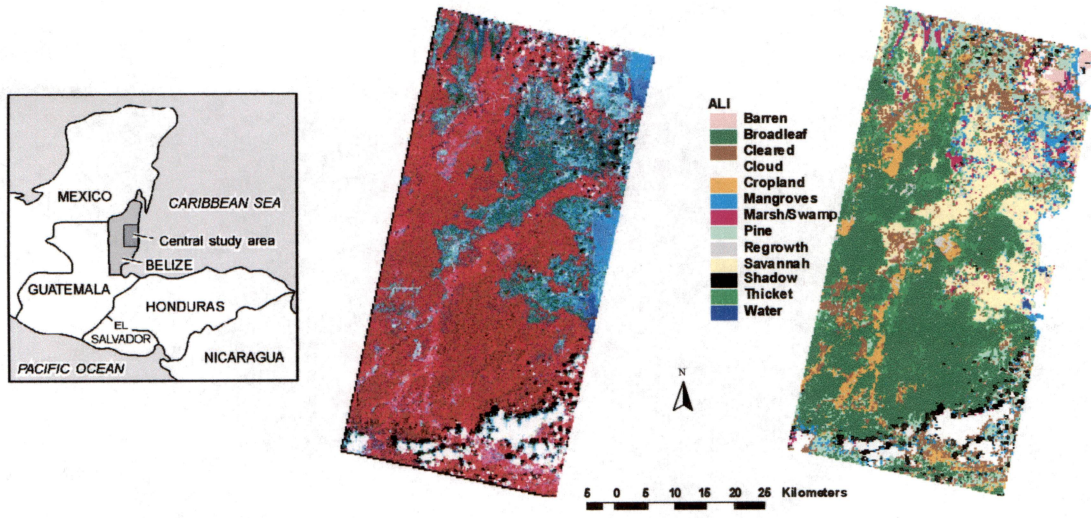
William White<sup>1</sup>, Melba Crawford<sup>2</sup>, Sinan Erzurumlu<sup>2</sup>, Thomas Tremblay<sup>1</sup>, Jay Raney<sup>1</sup>, Amy Neuenschwander<sup>2</sup>, The University of Texas at Austin, Bureau of Economic Geology Jackson School of Geosciences<sup>1</sup>, and Center for Space Research<sup>2</sup>

### **Objectives:**

- Evaluate ALI sensor relative to Landsat TM data in terms of accurate classification of specific types of land cover and land use in central and southern Belize.
- Analyze the capability of ALI sensor to determine extent and rate of deforestation through GIS-assisted spatial and temporal analyses of classified imagery.
- Classify spectral data using both existing statistical methods and new contextual and multisensor algorithms currently developed at The University of Texas at Austin for multispectral and hyperspectral data.

### **Conclusions:**

- Overall classification results of land cover/land use are similar, but ALI is superior to Landsat-7 for discriminating several difficult classes in test data. For example:
  - Regrowth vs cropland often confused in Landsat data. Confusion reduced in ALI.
  - Regrowth vs Broadleaf more frequently confused in Landsat data.
  - Mangroves more accurately classified with ALI than Landsat.
- Analyses of the extent and rates of deforestation as a result of human activities in central Belize and hurricane landfall in southern Belize illustrate that ALI data can be used effectively to determine the impacts of human activities and destructive natural events such as hurricanes on forest cover. For example, analysis of ALI data in central Belize showed that only a small portion (17%) of deforestation from human activities occurred in protected areas such as forest reserves, although forest reserves and other protected areas comprised almost 40% of the study area. Changes in spectral signatures and texture related to deforestation were clearly delineated by ALI data.
- Preprocessing of ALI to remove striping artifacts, align bands, and mosaic data strips acquired by individual SCAs is necessary to achieve adequate classification of complex environments with overlapping signatures.
- Classification accuracies obtained using new statistical classifiers developed for analysis of ALI and Hyperion are usually higher than those obtained from traditional methods. Class dependent band selection methods also improve discrimination, increase generalization, and mitigate striping artifacts.



ALI image acquired March 7, 2001, and associated Land cover/land use classification of central Belize study area (see index map).