Bruce Davis
NASA Stennis Space Center

Comparison Of The Advanced Wide Field Sensor To Landsat For Supplying General Land Cover Land Use Change Detection Products Needed For NASA LCLUC Program Science

With the Landsat data gap imminent, NASA's Land-Cover/Land-Use Change (LCLUC) program may require alternative data sources for producing regional to global-scale mapping products depicting land cover land use distributions and/or terrestrial environmental changes. The Mid-Decadal Global Land Survey and the U.S. Climate Change Science Program may also require alternative data sources as a result of a Landsat data gap. One such alternative is the Indian Remote Sensing Advanced Wide Field Sensor (AWiFS) on the current and future RESOURCESAT missions. While AWiFS collects data similar to Landsat, system differences may impact potential for LCLUC product development. We propose to help the NASA LCLUC Program prepare for the impending Landsat data gap by analyzing the potential of AWIFS data for use in LCLUC product generation normally done with Landsat data. The analyses will include calibration-validation studies, image classifications, and map accuracy assessments. We propose to do this study over a 2-year time frame as part of the Landsat component to the ROSES 2007 LCLUC RFP. Little published literature discusses the characteristics of AWiFS reflectance data compared to Landsat data or the potential of AWiFS for generating higher order LCLUC products normally produced from Landsat. Most relevant studies are preliminary. The research team will comprise NASA Stennis Space Center Staff and researchers from the Geography Department of the University of Maryland and NASA Stennis. This team has multiple years of experience in remote sensing data calibration-validation, LCLU classification, and LCLUC detection for both spaceborne and airborne multispectral systems. The proposed work will exploit remote sensing data calibration-validation experience gained from Joint Agency Commercial Imagery Evaluation Team participation, including recent efforts to quantitatively cross-compare data characteristics and LCLU mapping information obtained from AWiFS and Landsat data sources. An initial study done over Stennis Space Center in Mississippi suggests that AWiFS data yields LCLUC classification products similar in overall accuracy to those from Landsat data. Our approach will include systematic geospatial studies comparing AWiFS to Landsat data for multiple areas within the United States. We will 1) characterize, compare, and assess near-coincident AWiFS and Landsat data collections in terms of spatial, radiometric, and geometric data parameters; and 2) prototype, characterize, and compare thematic map accuracy of LCLUC mapping products derived from AWIFS, Landsat, and Landsat-simulated AWiFS data to assess the impact of the reduced spatial resolution and spectral bands of AWiFS. For LCLUC thematic mapping products, we will use the LCLU classification system adopted by the United Nations' Food and Agriculture Organization and will assess classification results compared to in-situ reference data, as well as to the geocover datasets used by the LCLUC program. We will also compare AWiFS to Landsat-based vegetation indices often used to derive LCLUC products. As a new activity to improve on previous work, we will perform case studies over multiple areas to assess the impact of bidirectional reflectance effects resulting from different viewing geometries on AWiFS reflectance data and on higher order data products in conjunction with LCLUC product accuracy. The expected outcome of the proposed work is an understanding of the ability of AWiFS to function as a Landsat replacement in

LCLUC activities. Anticipated products and deliverables will include reports, conference presentations, and a journal article.