

EARTH OBSERVATION SYMPOSIUM (B1)  
Earth Observation Applications and Economic Benefits (5)

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ALABAMA DISASTERS: LEVERAGING NASA EOS TO EXPLORE THE ENVIRONMENTAL AND  
ECONOMIC IMPACT OF THE APRIL 27 TORNADO OUTBREAK IN ALABAMA**Abstract**

The April 27, 2011 Tornado outbreak is the second deadliest U.S. history with 62 tornado occurrences and 250 deaths in Alabama alone. Not only have these tornadoes caused high casualties, but the state economy was greatly impacted. When considering the agricultural and value-added activities such as food and timber processing, farm inputs, manufacturing, transportation, and retail sales, the dollar value of Alabama agribusiness annually exceeds 40 billion (National Agricultural Statistics Service, 2011). In an effort to help economic recovery, remote sensing and geographic information systems can be applied to NASA satellite imagery to determine the characteristics and impact of tornado damage from the April 27, 2011 outbreak. First, vegetation health (crop health) is found using an NDVI (normalized differential vegetation index) on remotely sensed ASTER data, at a resolution of 30 meters, which clearly shows signatures for F2 damage and higher, sometimes capable of detecting F1 damage. Each crop has a specific phenology and related NDVI reflectance throughout its growing cycle. An NDVI assessment allows the user to determine the health of vegetation inside and outside of a tornado path, giving an idea for a 'normal' versus 'damaged' NDVI reading of crops and an initial estimate of predicted losses based on the vegetation health. ASTER will be used along with ground-truthed NASS crop location records to verify the economic impact tornadoes had on the agricultural economy of the state. This swath damage can be calculated by correlating tornado path with NASS statistics on crop yield, precisely showing the fields affected and dollars lost to this disaster. Not only can this be executed manually using ENVI and ArcGIS, but also through the use of Python, a programming language which has the ability to automate the process so that an initial damage assessment can be performed within a short time frame of a disaster event. Thus the ability to make this a web-based operational product down the line and the potential to show detailed information on land damage and other terrestrial parameters which need to be explored to help the local economies recover from the tornadoes. This information is crucial for disaster management and resilience in hazard planning. NASA EOS can provide data to create a methodology and model for response which can be used after any tornado event and demonstrates the value of satellite remote sensing for disaster event recovery.