**DEVELOP National Program**

Marshall Space Flight Center

**Fall 2012 Project Summary**

**Short Title: Alabama Water Resources**

*Using LANDSAT and ALI datasets to assess transparency in North Alabama lakes*

**Squib:**

Combining field measurements of water turbidity in Lake Guntersville, located in northern Alabama with publicly available NASA imagery improve the effectiveness and consistency of water quality monitoring. Environmental management and protection agencies can utilize spaceborne imaging platforms to supplement field measurement techniques traditionally used for more thorough and continual monitoring of water quality parameters.

**Applied Sciences National Applications Addressed:**

Water Resources, Ecological Forecasting

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**Past or Other Contributors:**

ADEM – Alabama Department of Environmental Management

Alabama SWCC - Alabama Soil and Water Conservation Committee

NASA/SERVIR - Regional Visualization and Monitoring System

**Community Concerns**

* A more resourceful and less time consuming method for assessing water quality
* Clean fresh water sources for human consumption and recreation
* Information on trophic states of Alabama lakes
* Necessity of state water quality data for publicly-owned lakes to prepare biennial Water Quality Report to Congress

**Study Location:**

Lake Guntersville, Marshall County, Alabama

**Study Period:**

10 September 2012 – 16 November 2012

**100 Word Blurb**

Transparency is a key parameter of water quality and directly related to turbidity, which can have both natural and anthropogenic sources of pollutants. Traditional methods to evaluate these parameters solely involve field sampling with Secchi Disks, which tend to take considerable time especially with large bodies of water. Environmental monitoring stations would benefit from a geospatial platform for water sampling to compliment the well-established ground truthing methods for a more comprehensive and continuous monitoring of water quality parameters. This supplementary technique is the focus of this project and will be presented to environmental management and protection agencies in Alabama.

**Abstract**

Inland water quality measurements are necessary to properly monitor and control the conditions of surface water essential for human consumption and recreation. Traditional water sampling with field measurement techniques effectively estimate the parameters of water quality but tend to consume more time and resources, inhibiting the frequency of data collection and limiting the coverage of sampling. Publicly available satellite imagery from NASA facilitate techniques for measuring key water quality parameters quickly and over the entire water body, equipping environmental management and protection agencies with a remote sensing platform to more comprehensively and consistently monitor fresh water sources. This project focuses on the feasibility of estimating the Secchi disk depth in Lake Guntersville located in north Alabama, evaluating the turbidity with EO-1 and LANDSAT multispectral imagery validated with *in situ* field site measurements.

**Earth Observations & Parameters**

 **Satellite Sensor Parameter**

|  |  |  |
| --- | --- | --- |
| EO-1 | ALI, Hyperion | Historic and current water clarity, turbidity, and chlorophyll-a |
| Landsat 5 & 7 | TM, ETM, MS | Historic and current water clarity |

**Future Applicable NASA Missions**

HICO – Chlorophyll

**Models Utilized**

Water Clarity (Secchi Disk Depth) – model using multispectral data

**Ancillary Datasets Utilized**

* Secchi Disk measurements – transparency in cm
* 21 October 2012 LANDSAT7 ETM+
* Census Bureau Tiger/Line – State, County, hydrological boundaries

**Decision Support Tools**

* Remote sensing platform to estimate water quality parameters
* Approximation of turbidity in Lake Guntersville
* Methodology to evaluate additional water quality parameters using open access NASA imagery

**Partners/Collaborators**

ADEM - Alabama Department of Environmental Management

Alabama SWCC - Alabama Soil and Water Conservation Committee

NASA/SERVIR - Regional Visualization and Monitoring System

**Current Management Practices & Policies**

The Alabama Department of Environmental Management (ADEM) establishes standards for monitoring water quality in publicly-owned lakes. The SWCC oversees districts that are responsible for surveying natural resources and providing citizens with best practices for natural resource management. ADEM currently takes a very limited number of samples per lake from ambient monitoring stations on site. The organizations charged with monitoring local water quality generally lack the resources for more continuous and complete data collection. These agencies and their reports at state and federal levels could benefit significantly from a geospatial platform to effectively measure water quality parameters.

**Benefit to End-User:**

* Continuous monitoring and collection of water quality data of Alabama’s publicly-owned lakes
* A less time consuming and specialized alternative for *in situ* water quality sampling
* Potential for expansive historical datasets of water quality and prediction modeling