Cyanobacteria Assessment Network (CyAN)

EPA Workshop on Cyanobacteria & Cyanotoxins: Occurrence and Detection Methods: July 30-31, 2012

*Blake Schaeffer	ORD/NHEERL/GED
Robyn Conmy	ORD/NRMRL/LRPCD
James Hagy	ORD/NHEERL/GED
Scott Jacobs	ORD/NRMRL/LPRCD
Darryl Keith	ORD/NHEERL/AED
Keith Loftin	USGS
Ross Lunetta	ORD/NERL/ESD
Bryan Milstead	ORD/NHEERL/AED
Richard Stumpf	NOAA
Lesley Vazquez-Coriano	OST/OW/HECD

Background

- The Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA)
  - Improve monitoring, observational programs, and enhanced communication.
  - Since 1998 no improved monitoring or enhanced communication regarding cyanobacteria HABs using satellite technology.

112TH CONGRESS *1st Session* | HOUSE OF REPRESENTATIVES | REPT. 112–333 Part 1

HARMFUL ALGAL BLOOM AND HYPOXIA RESEARCH AND CONTROL AMENDMENTS ACT OF 2011

Background

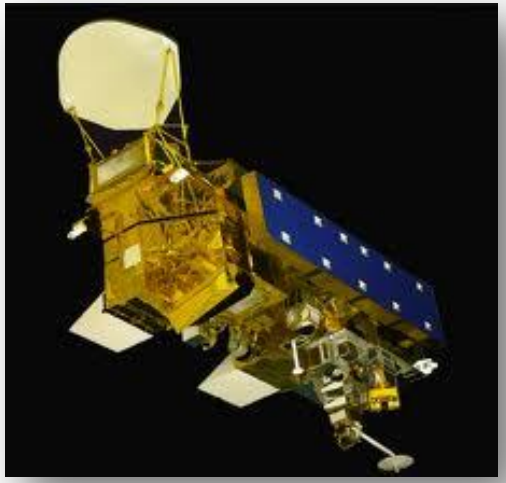
- Cyanobacteria can be monitored using remote sensing technologies based on algorithms to retrieve chlorophyll-a and phycocyanin.
  - Ocean Color Monitor
  - Landsat
  - MODIS
  - MERIS

Background

- Ocean color monitor (OCM)
  - Lack of reliable atmospheric correction
  - Data access
- Landsat
  - 30 m spatial resolution
  - Infrequent revisit cycles
  - ~8 days
  - 2-4 weeks w/ cloud cover

Background

- MODIS
  - Daily repeat cycles
  - 1 km resolution, few bands at 250 m and 500 m
  - Higher resolution bands less sensitive
  - Assessments near the land-water interface difficult

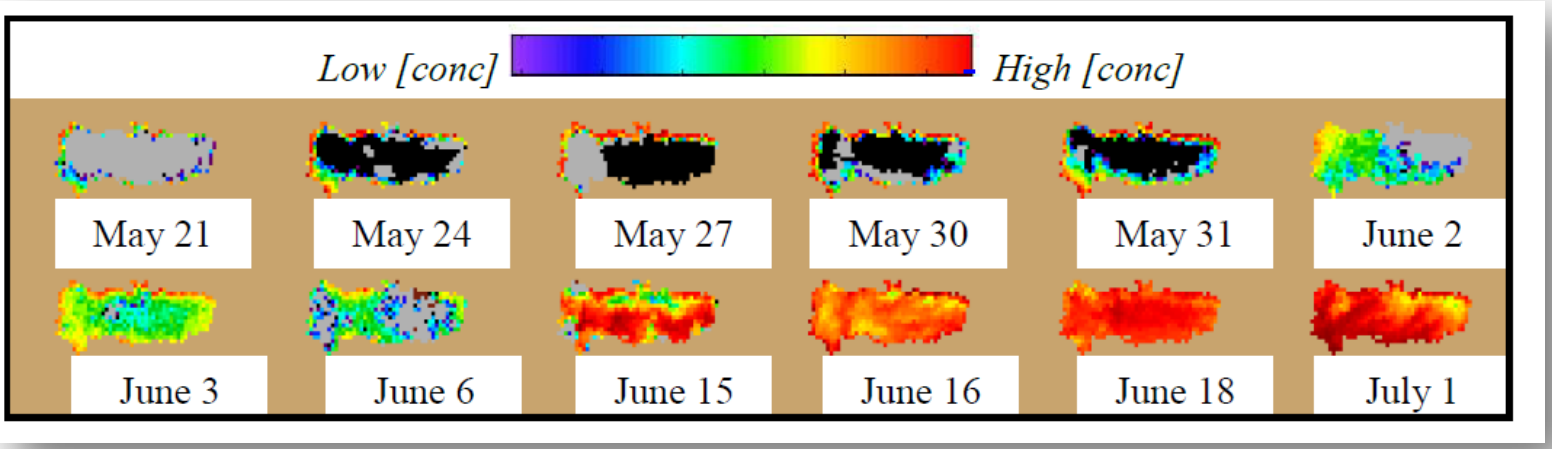


Background

- Airborne platforms or space borne platforms
  - Hyperion or HICO
  - Costly and provide limited coverage.
- MERIS
  - 2-3 day intervals
  - 300 m resolution
  - Potentially cover 57% of the world's lakes
  - MERIS -> Sentinel-3 (2014)

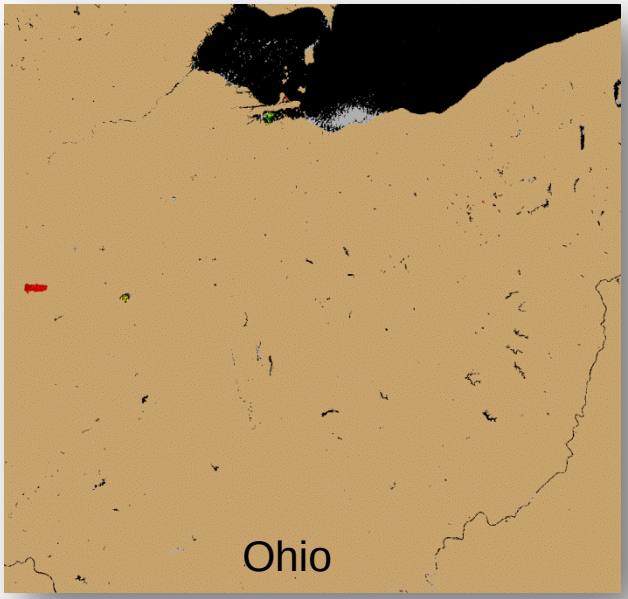
Background

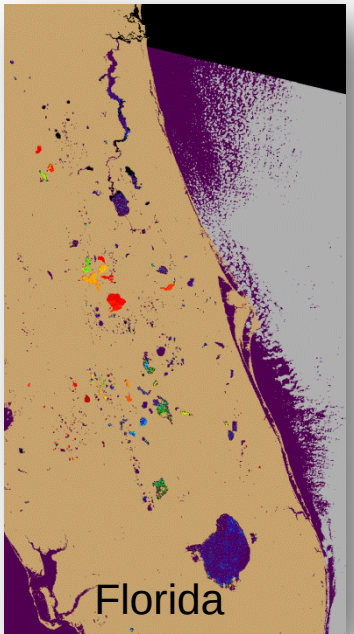
- Previously MERIS algorithms typically fail
- Atmospheric correction errors
- New algorithm proposed in this project will not be subjected to these errors



Background

- Dissemination of satellite data
- “Pictures” or GIS formats
- Need a readily available source of information
- Timely and useful delivery of information from satellite data is required





Project

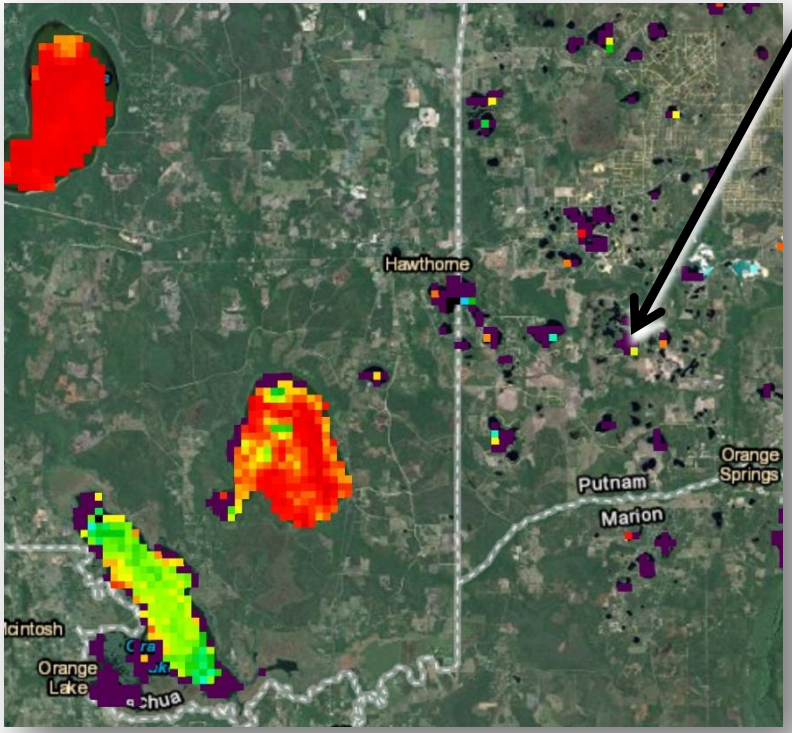
- EPA ORD Pathfinder Innovation Project
  - Start July 1, 2012
  - End July 1, 2013

Project

- Goal
  - Assess and validate new algorithm for identifying cyanobacterial blooms in freshwater
  - Develop the cyanobacteria predictive model
  - Mobile application

Project

- Testing approach on diverse set of freshwater systems
- Any U.S. freshwater body
  - >1.5km by 1.5km
- Early warning indicator
- Existing *in-situ* data
- Ground-truth MERIS

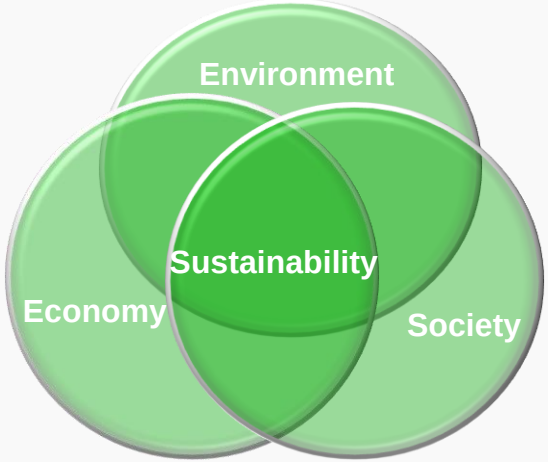


Project

- Predictive capabilities
  - Algorithm w/ temperature, wind speed and direction
  - Crowd source technology
  - Mobile application
  - Probability of cyanobacteria blooms developing over the next several days and the likelihood of existing blooms dissipating
- Model performance

Potential outcomes

- Predictive capabilities for cyanobacterial blooms
- Assist best management practices for ecological and human health
- Developing threshold indicators for public advisories
- Cyanobacterial index products and advisories into mobile phone / web infrastructure



Potential outcomes

- Fiscally constrained environment
- Low cost solution with high returns
- Could provide a useful tool to states as monitoring budgets continue to decrease

high return

low cost

Cyanobacteria Assessment Network (CyAN)

EPA Workshop on Cyanobacteria & Cyanotoxins: Occurrence and Detection Methods: July 30-31, 2012

*Blake Schaeffer	ORD/NHEERL/GED
Robyn Conmy	ORD/NRMRL/LRPCD
James Hagy	ORD/NHEERL/GED
Scott Jacobs	ORD/NRMRL/LPRCD
Darryl Keith	ORD/NHEERL/AED
Keith Loftin	USGS
Ross Lunetta	ORD/NERL/ESD
Bryan Milstead	ORD/NHEERL/AED
Richard Stumpf	NOAA
Lesley Vazquez-Coriano	OST/OW/HECD