

Algal Blooms: Coordinating Satellite Imagery with Field Sampling

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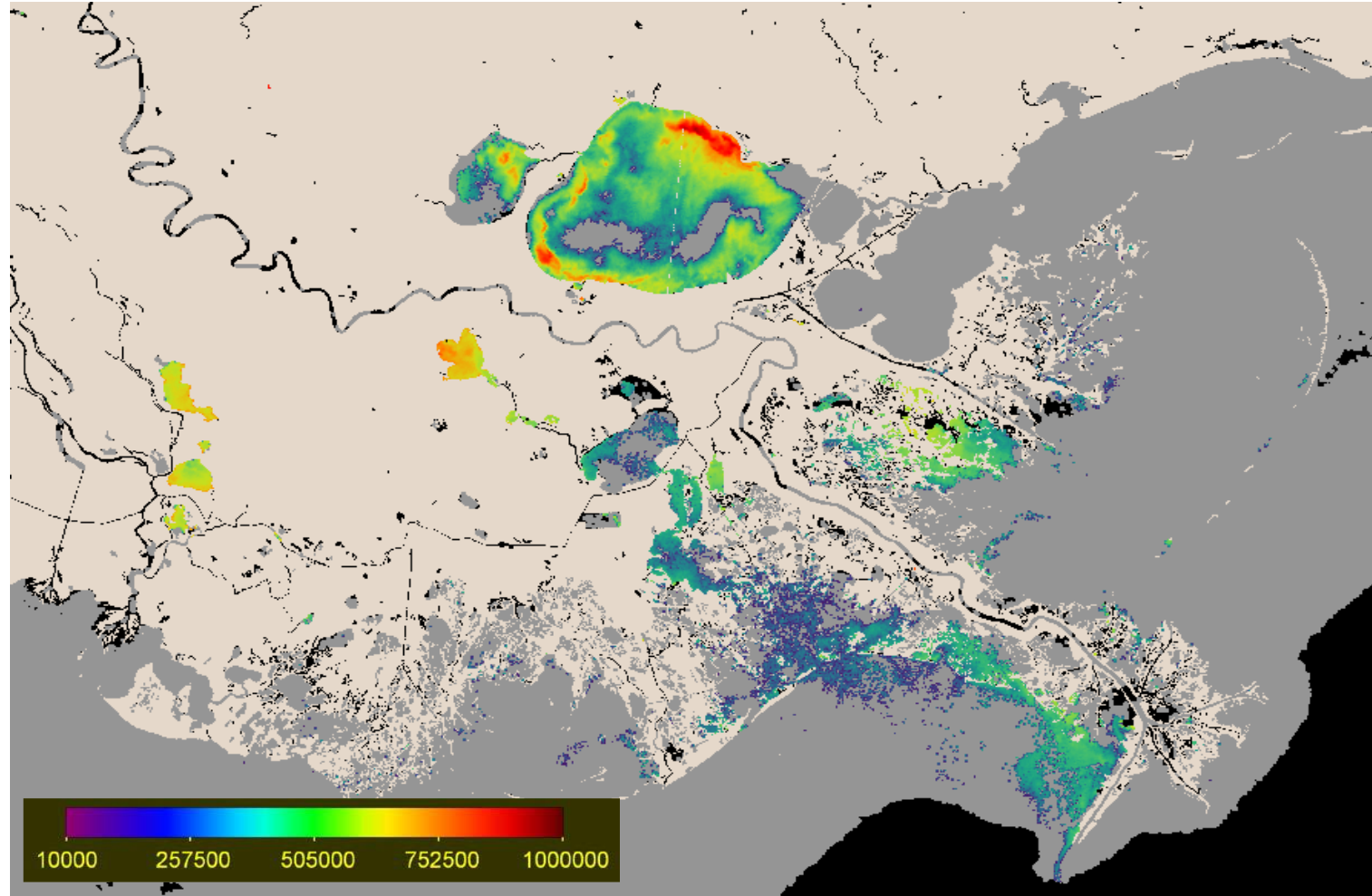
Project Goal & Scope

- To validate the occurrence of harmful algal blooms (HABs), using satellite imagery for detection, with coordinated field sampling for verification.
 - NASA's Ocean Color Cyanobacteria Assessment Network (CyAN)
 - NOAA's National Centers for Coastal Ocean Science (NCCOS)
- Most sampling occurred within hours of satellite detection of algal blooms.
- The study area focused on recreational sites with CyAN coverage in southeast Louisiana. The study area was divided into three regions; a total of 183 sites were sampled.
 - Region 1: Lake Maurepas and Lake Pontchartrain
 - Region 2: Lac des Allemands, Lake Salvador, Lake Verret, and Lake Palourde
 - Region 3: Breton Sound and Barataria Bay

Study Design

- Three recreational seasons (2021-23).
- Cyanotoxins
 - Microcystin and cylindrospermopsin (all sites)
 - Anatoxin-a and saxitoxin (random sites)
- Three cyanotoxin analysis methods
 - Grab sample with lab analysis (all measurements)
 - Gold Standard Diagnostics test strips (added in 2022-23)
 - HACH Lightdeck Mini desktop analyzer (added in 2022-23)
- Ancillary water quality parameters
 - TKN, NO₃NO₂, NH₃, TN, TP, OrthoP, Turbidity, TOC, Na, SiO₂, Chlorophyll a, Phycocyanin, and Phycoerythrin.

Satellite Imagery Example



Study Findings

- Field sampling found algal blooms with a 96% success rate in relation to satellite imagery data.
 - Tides and winds tended to shift the location of blooms.
 - The size of blooms varied between detection by satellite and field sampling.
 - Satellite imagery tended to overestimate cell counts; bloom presence validated.
- Almost all cyanotoxin results were non-detects.
- Due to the high percentage of non-detects, the comparability of methods cannot be fully determined.
 - Saxitoxin test strips had multiple false positives.
- For cyanotoxins alone, no data were found to be greater than national recommended criteria.
 - Maximum measured value: 0.7 $\mu\text{g/L}$ for microcystin (lab measured); EPA criteria is 8.0 $\mu\text{g/L}$.

Next Step

A comprehensive evaluation of water sampling and biological datasets will be conducted.

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