Narragansett Bay Water Resources

Using Earth Observations to Identify Trends in Harmful Algal Blooms in Narragansett Bay

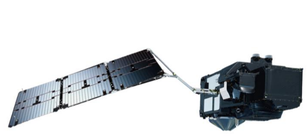
Project Synopsis

Narragansett Bay, Rhode Island is known for its quahog shellfisheries, expansive beaches and frequented lighthouses. However, increased levels in harmful algal blooms (HABs) have posed threats to quahog populations and raised public health concerns due to shellfishery closures resulting from contamination with neurotoxins released by phytoplankton. Partnering with the US Environmental Protection Agency (EPA) National Health and Environmental Effects Research Laboratory and the Rhode Island Department of Environmental Management (RIDEM) the team used Earth observations combined with the partners' in situ data to visualize phytoplankton bloom events within the bay. The team used Sentinel-3 Ocean and Land Color Instrument (OLCI), Landsat 8 Operational Land Imager (OLI), and Landsat 9 OLI-2 to track proposed proxies for phytoplankton over the period of June 2016 to October 2023. Multiple sensors and datasets were employed for more accurate results due to the small spatial extent of Narragansett Bay. Chlorophyll-a and total suspended solids were determined to be accurate parameters to monitor HAB events. Earth observations have proven to help strengthen HAB research, monitoring, and prediction, and will complement the extensive in-situ data in Narragansett Bay.

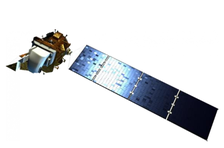
Objectives

- **Identify** proxy parameters for remote sensing models of HABs
- **Analyze** the presence of HABs both spatially and temporally
- **Investigate** the feasibility of remote sensing products to identify small scale HABs

Earth Observations



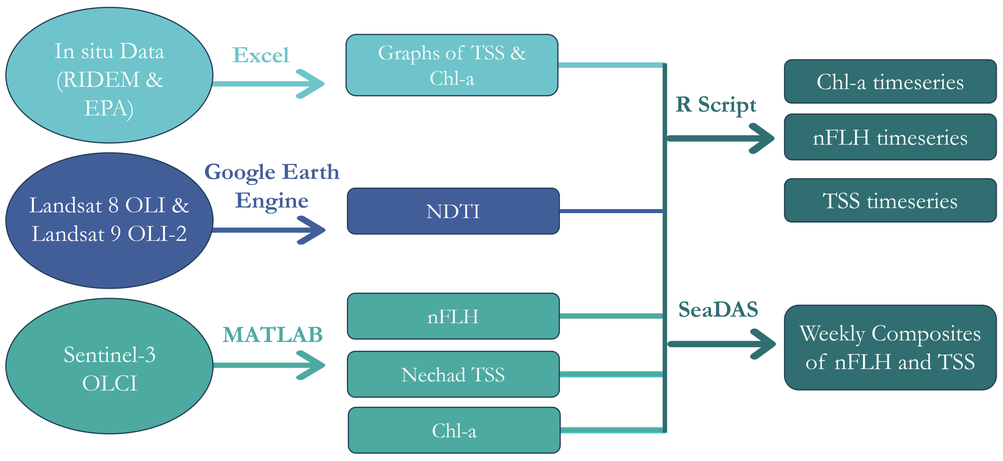
Sentinel-3 OLCI



Landsat 8 OLI

Landsat 9 OLI-2

Methodology



Team Members

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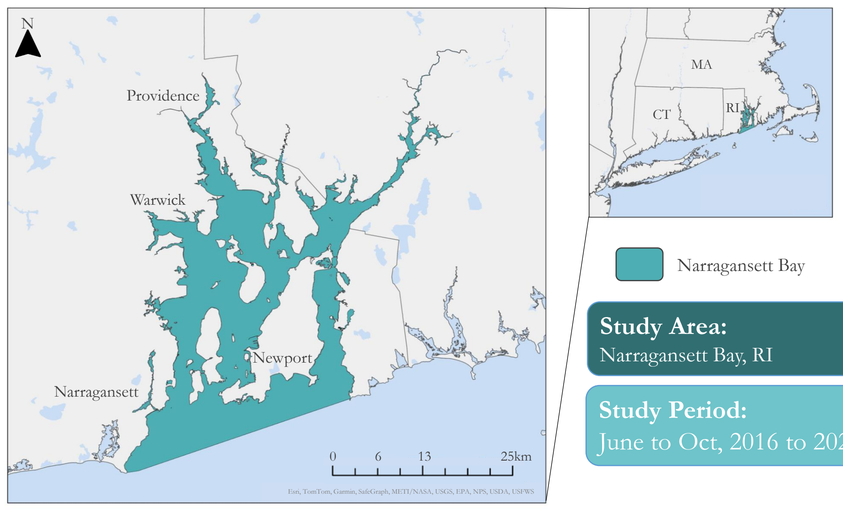
Project Partners

- US Environmental Protection Agency, National Health and Environmental Effects Research Laboratory
- Rhode Island Department of Environmental Management

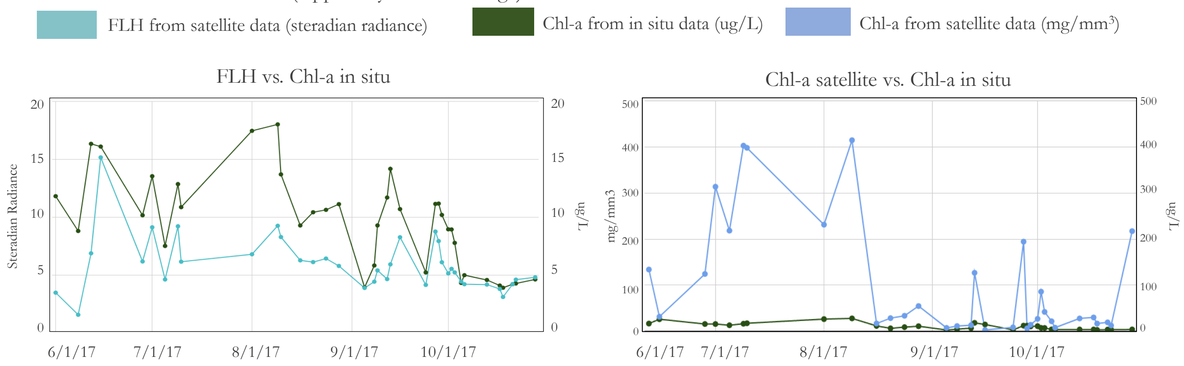
Study Area



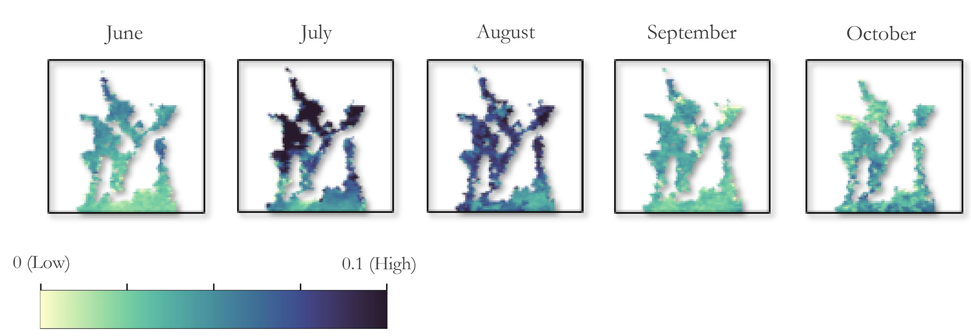
Results

In Situ vs Remote Sensing: Chlorophyll-a

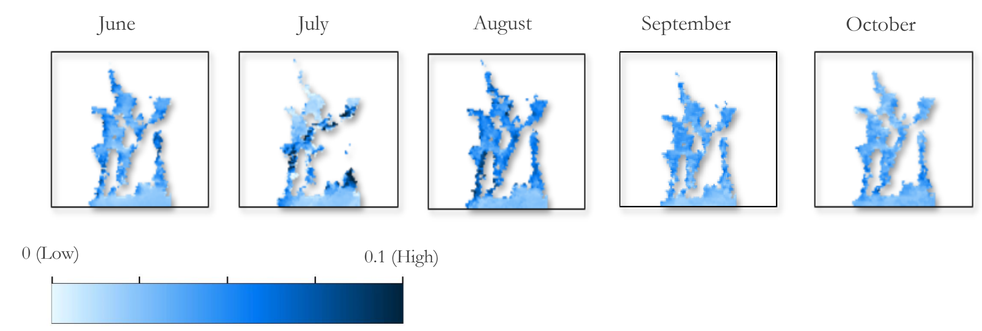
Station B3 - Conimicut Point (Upper Bay – West Passage) 2017



Weekly Composite Normalized Fluorescence Line Height (nFLH) - Week 3 from June to October 2016



Weekly Composite Total Suspended Solids (TSS) – Week 3 from June to October 2016



Conclusions

- Chlorophyll-a and TSS are both effective proxies for tracking HABs.
- nFLH was the best remote sensing product for tracking chlorophyll.
- The Nechad algorithm was the best remote sensing product for tracking TSS.
- Landsat 8 & 9 products were not effective in tracking turbidity because of the lack of data and appropriate bands to analyze this dark body of water.

Acknowledgements

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- **Lead**: Madison Arndt (DEVELOP Massachusetts – Boston)

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