

# Evaluating Methods for Identifying and Monitoring Factors in the Puget Sound that Indicate Eutrophication and Hypoxia

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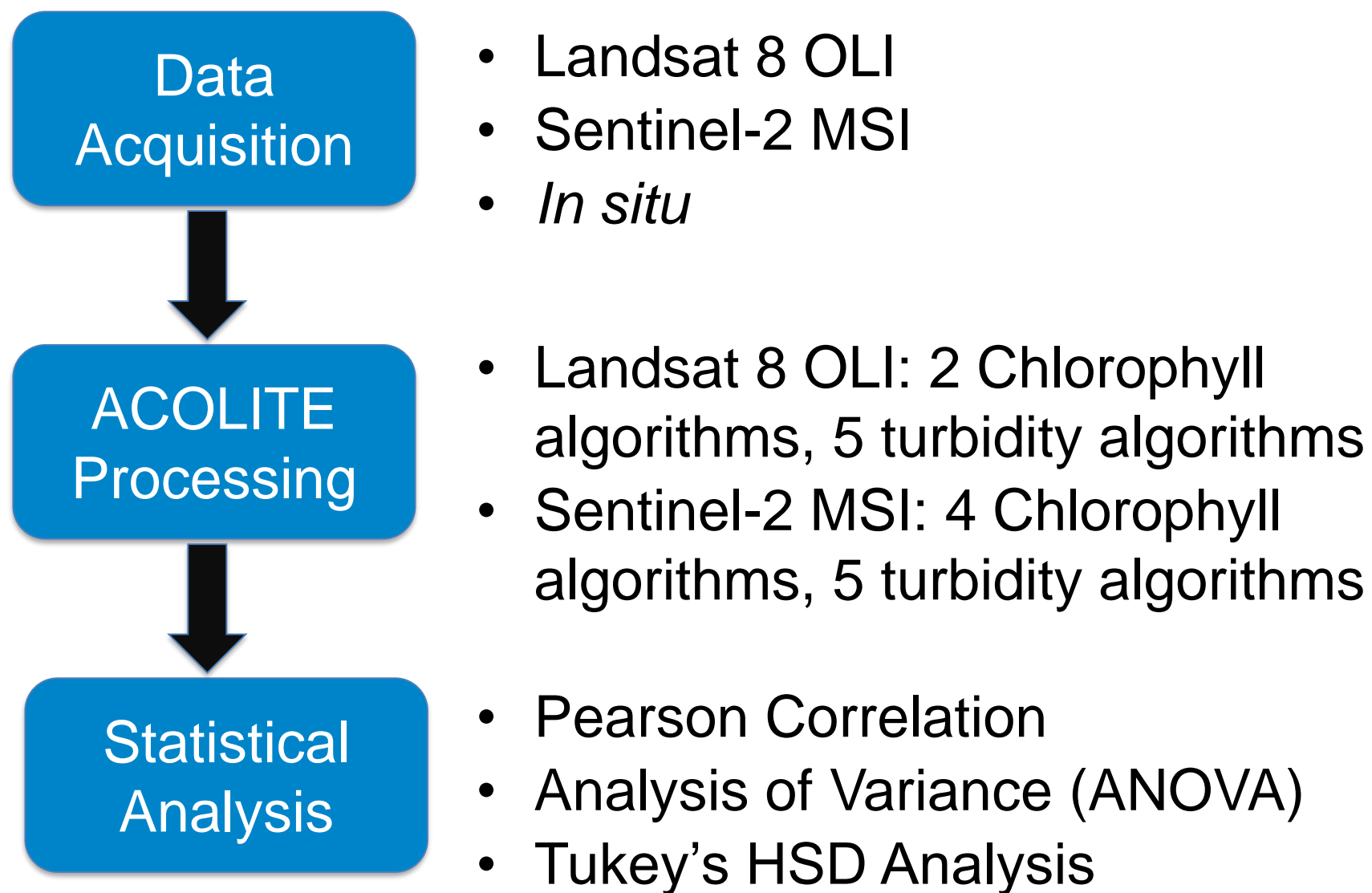
## Overview

Dissolved oxygen levels have been declining in the Puget Sound since 2000 due to eutrophication, resulting in Harmful Algal Bloom (HAB) events which negatively impact water quality and wildlife in the area. Therefore, analyzing and identifying eutrophication and hypoxic events is integral to water quality control and watershed management. The Puget Sound Water Resources team partnered with the Pacific States Marine Fisheries Commission (PSMFC) Habitat Program to test methods for monitoring water quality using remote sensing. The team tested multiple algorithms utilizing Landsat 8 OLI and Sentinel-2 MSI data to detect turbidity and chlorophyll concentrations. Results will assist the PSMFC Habitat Program to fill geographic and temporal data gaps and to enhance local decision-making practices and management of water resources.

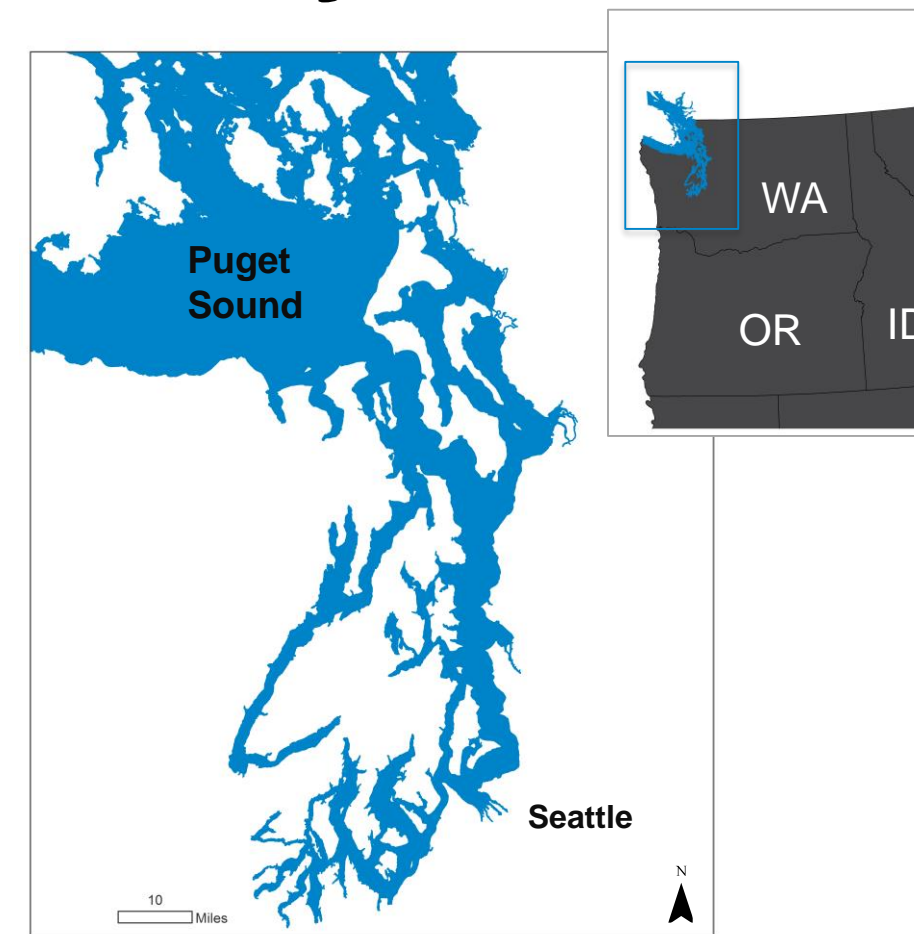
## Objectives

- **Provide** the project partner with a resource to bridge spatial gaps in *in situ* data by assessing the suitability of 9 algorithms utilizing Sentinel-2 MSI and Landsat 8 OLI data processed through ACOLITE to identify indicators of HAB events within the Puget Sound
- **Aid** project partners in enhancing water quality management by identifying areas that are historically prone to development of HABs

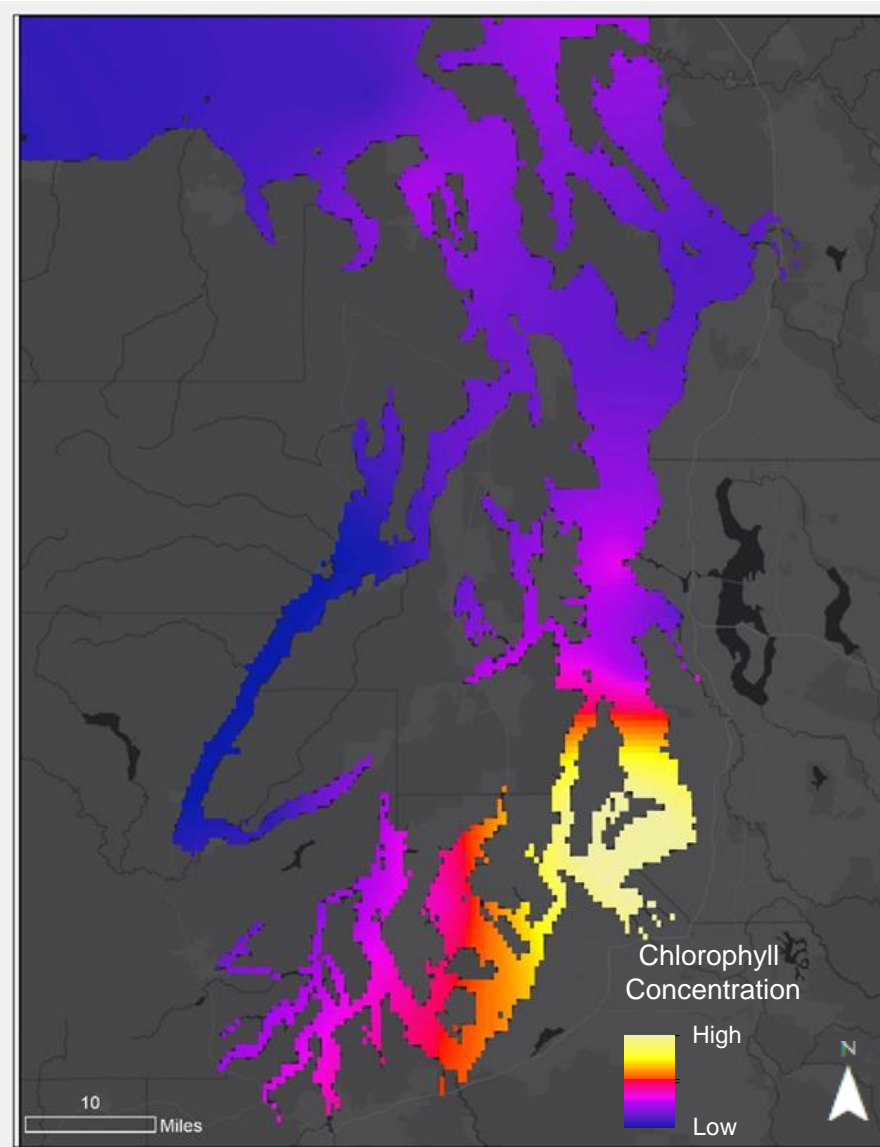
## Methodology



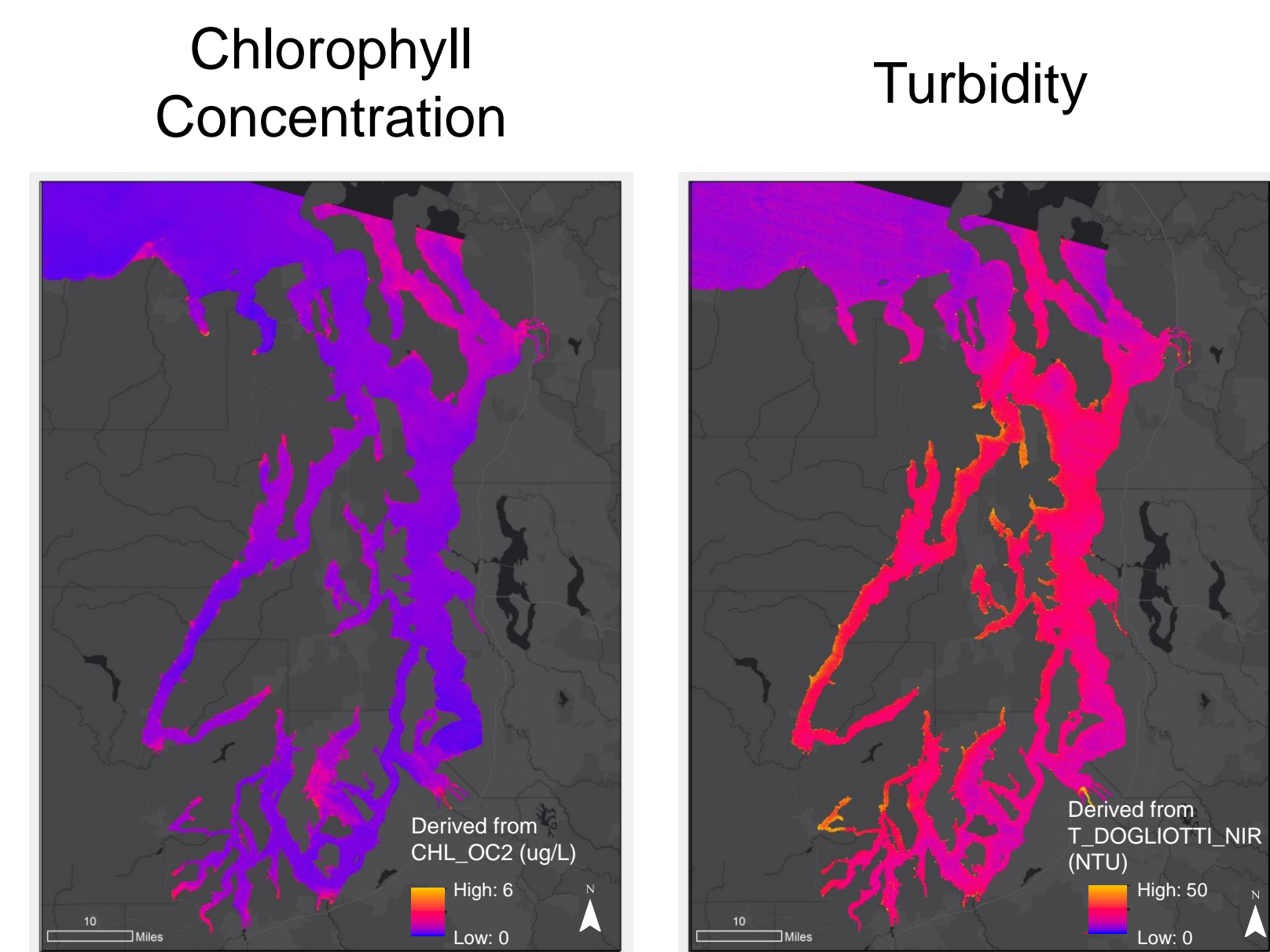
## Study Area



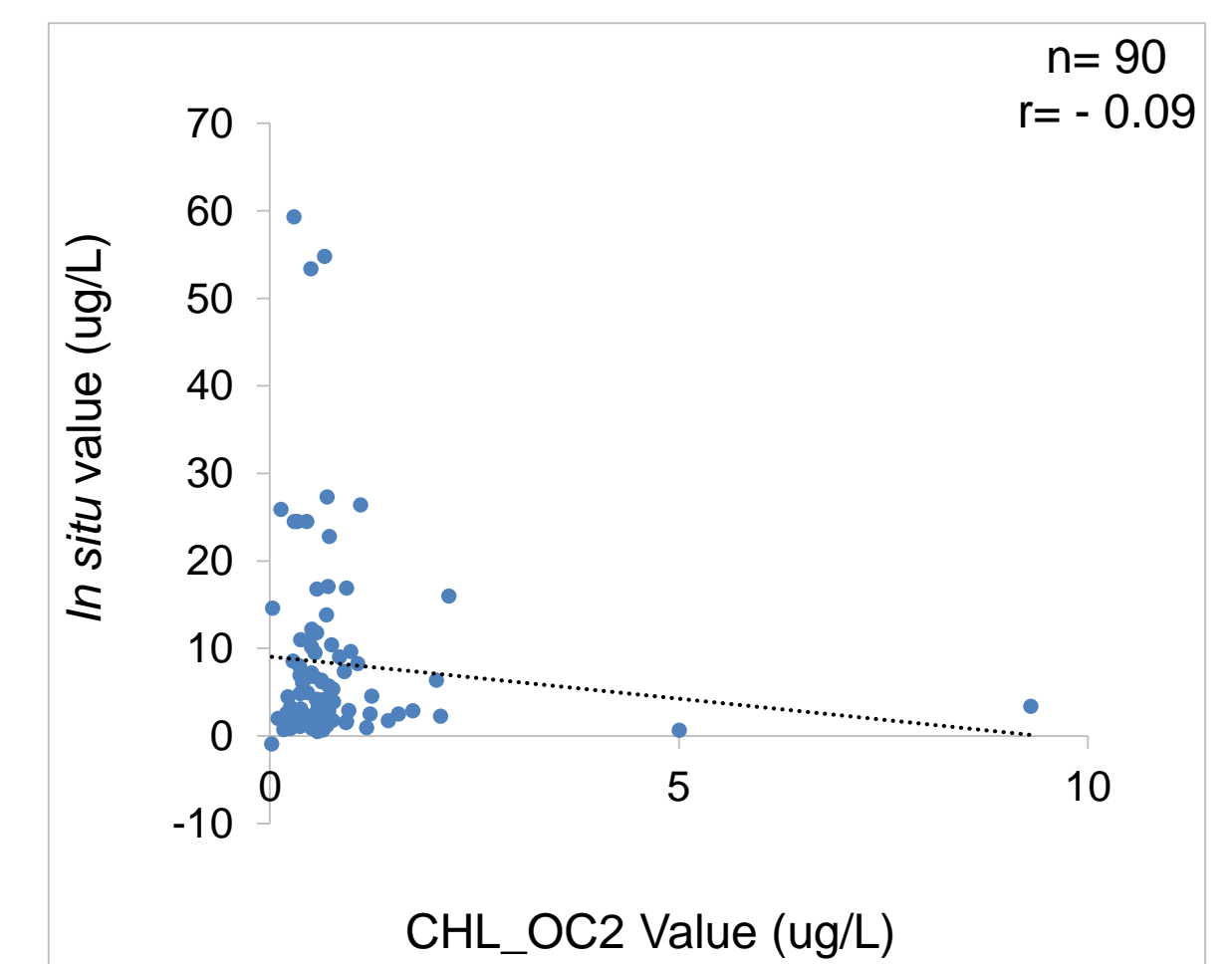
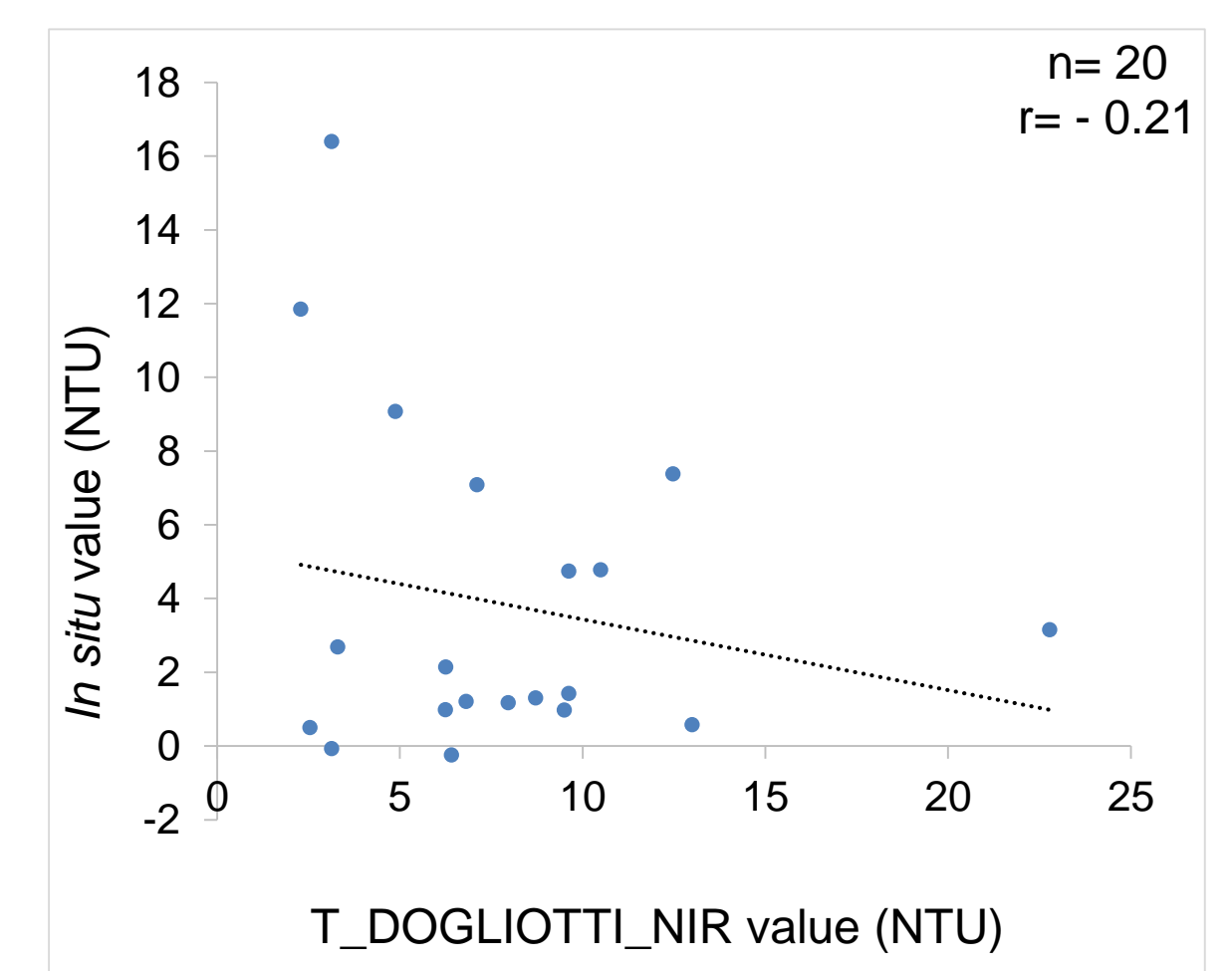
## Chlorophyll Concentration Buoy Interpolation



## Results



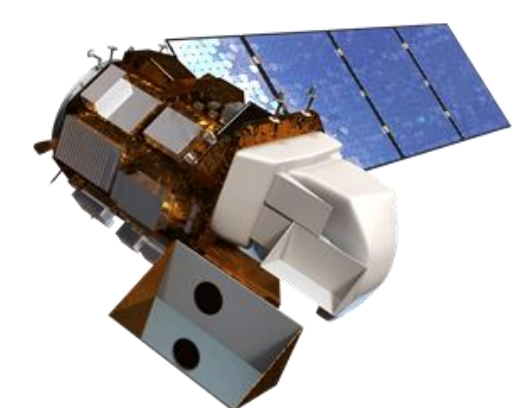
## Correlations between *in situ* values and those obtained algorithms for ACOLITE



## Earth Observations



Sentinel-2 MSI



Landsat 8 OLI

## Conclusions

- Scenes analyzed within the study period illustrated coastal and inlet areas, for example Skagit Bay and Tacoma Inlet, as repeatedly having relatively higher chlorophyll concentrations and turbidity and may need further monitoring for eutrophication and HABs.
- Landsat 8 OLI and Sentinel-2 MSI imagery processed through ACOLITE had low correlation with *in situ* data and thus are not the most ideal for monitoring eutrophication and HABs in the Puget Sound.

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