Riverine inputs to Long Island Sound: Variability and effects on water quality

Principal Investigator: Dr. Maria Tzortziou

Tzortziou Lab Research Overview

Land-Sea-Ice Interactions in the Arctic

Wetlands and Global Climate Change

Atmosphere-Ocean Exchanges
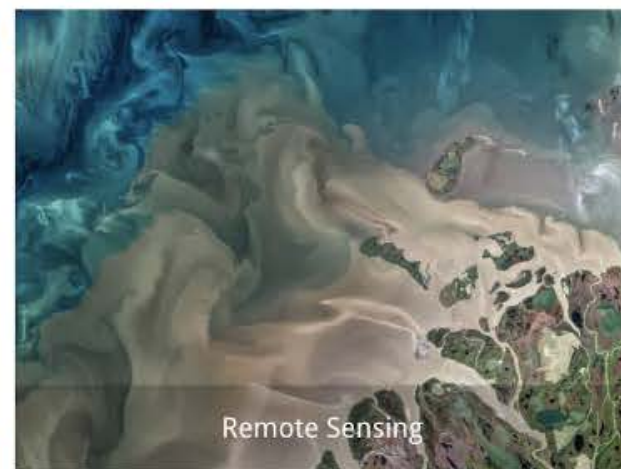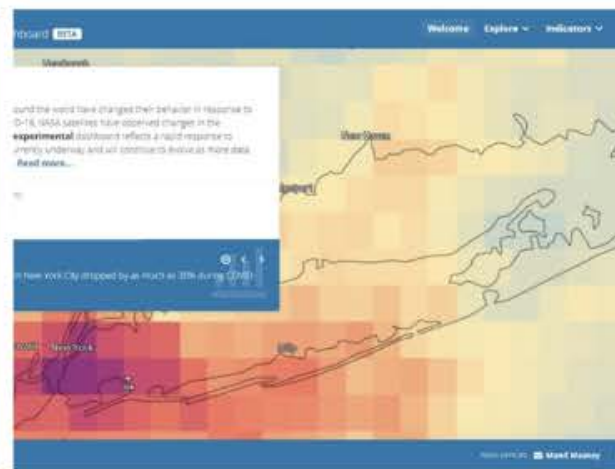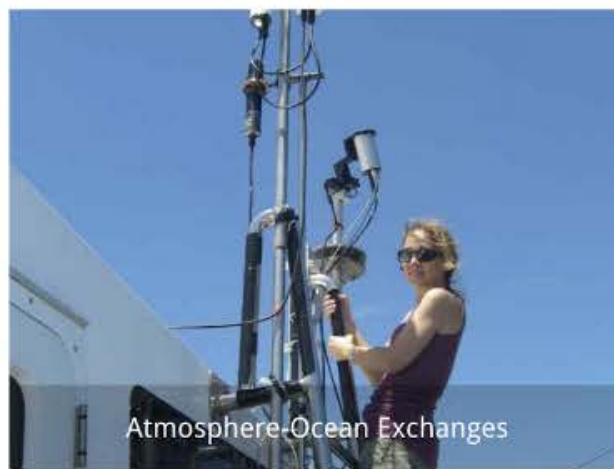
Remote Sensing

- Working across many ecosystems: Alaskan Arctic, Long Island Sound, Chesapeake Bay, Southern India

- Integrating ground-based and satellite remote sensing tools tools and coupling with models

- Partnering with relevant stakeholders, a key objective of our research is applying results to link science to practice and enhance decision support systems

Ongoing Long Island Sound Projects

- **Characterize flux of carbon and nutrients exported from natural systems (such as wetlands)**

- **Understand, model, and predict the role of human activities (such as wastewater influences)**
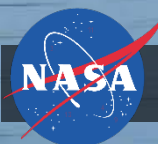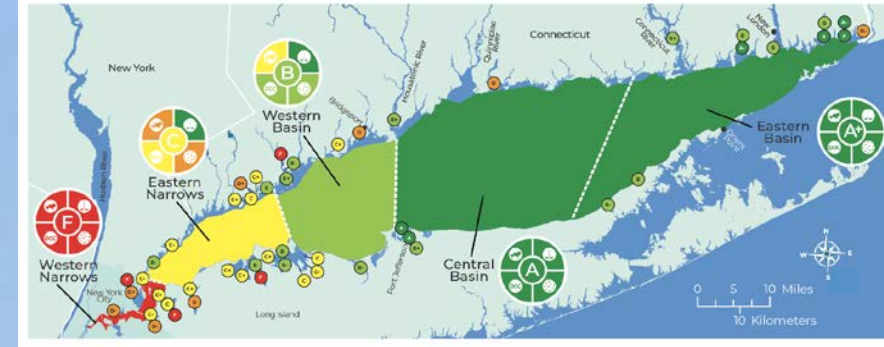
Coastal habitat, biogeochemical cycles, and global change

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- Background: rivers carry nitrogen, carbon, and sediment into Long Island Sound

- Interns will analyze USGS datasets within the Connecticut River, the largest freshwater source to Long Island Sound, and the Housatonic River to identify trends and extremes of freshwater discharge.

- Discharge data will be compared to satellite remote sensing ocean color retrievals of colored dissolved organic matter, dissolved organic carbon, chlorophyll *a*, and total suspended matter to better connect riverine activity and Long Island Sound water quality.
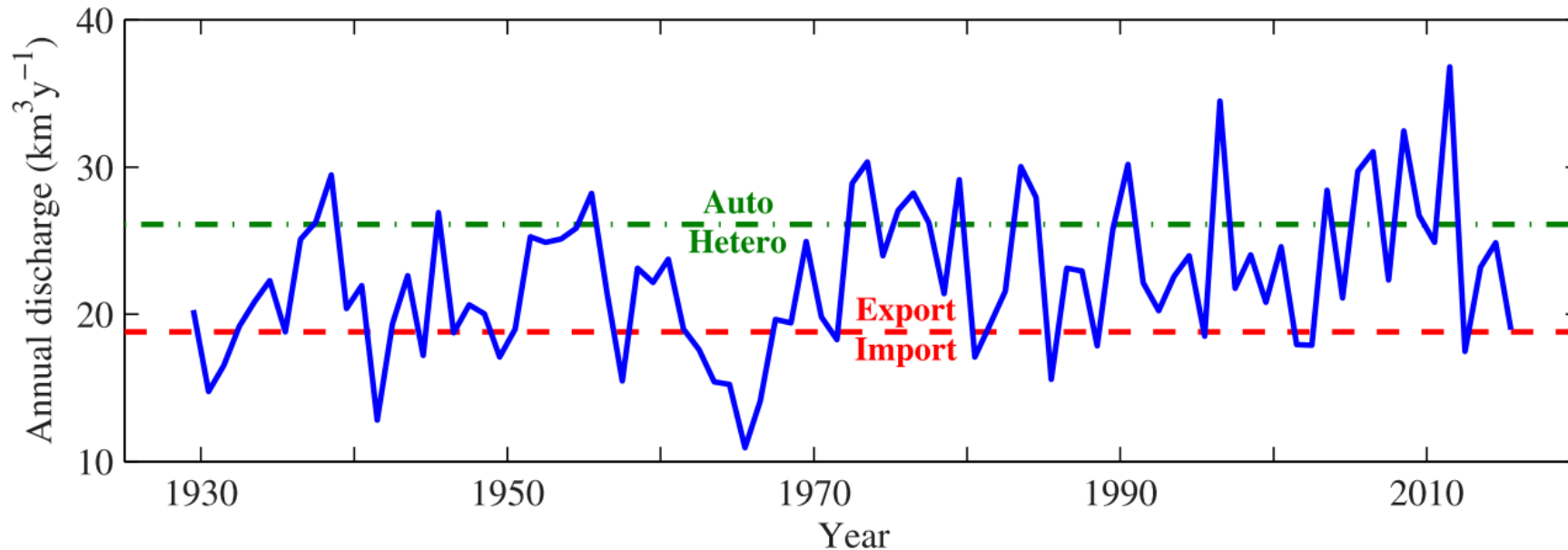
Riverine Delivery of Nitrogen to LIS

NEIWPCC
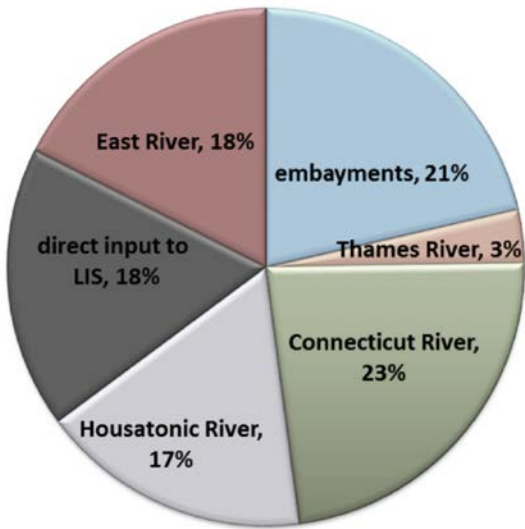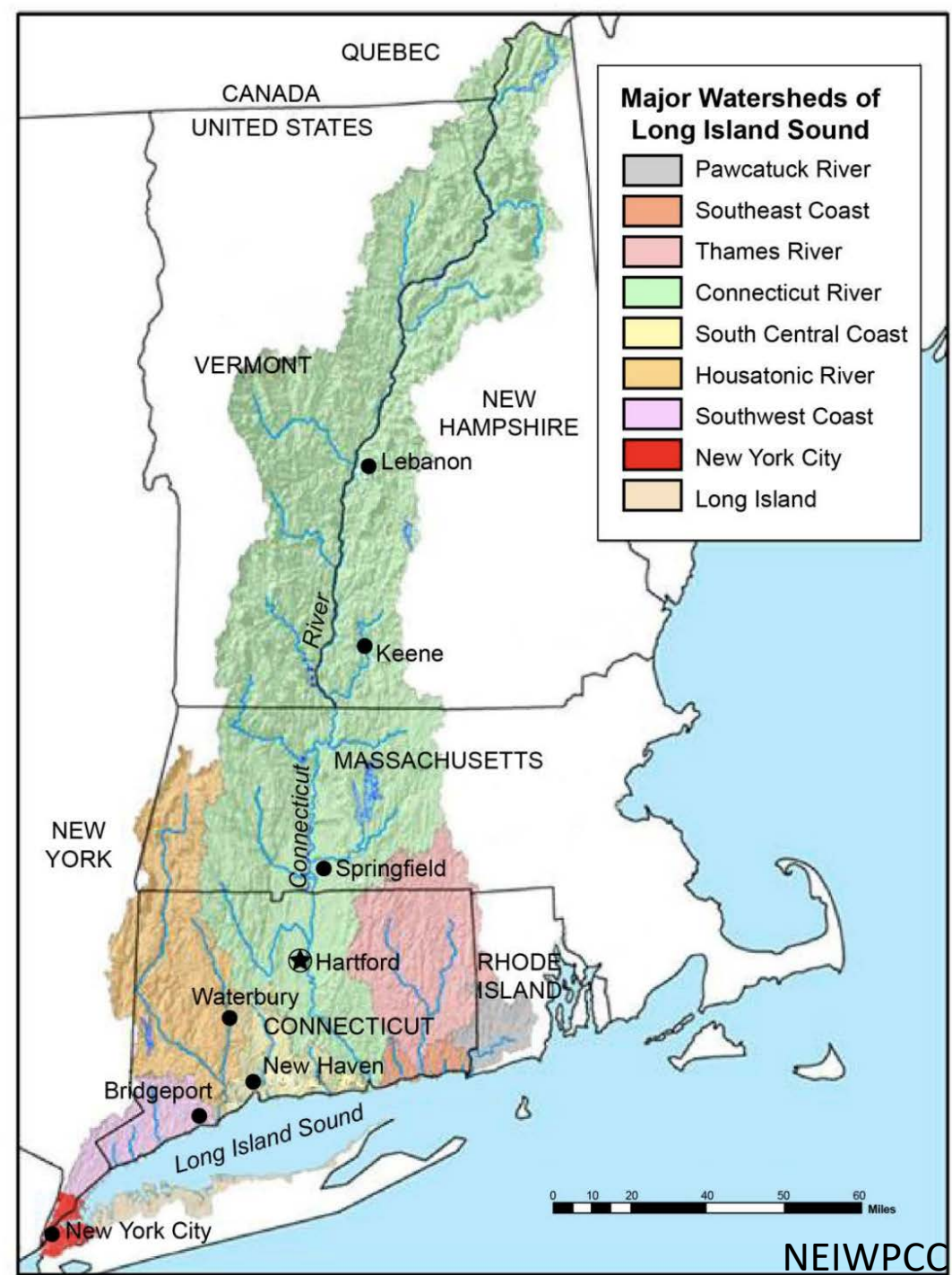
[Save the Sound, 2017]
N loads to LIS, adjusted
for impact on Sound

1995-2016
Averages

Vlahos et al., 2020
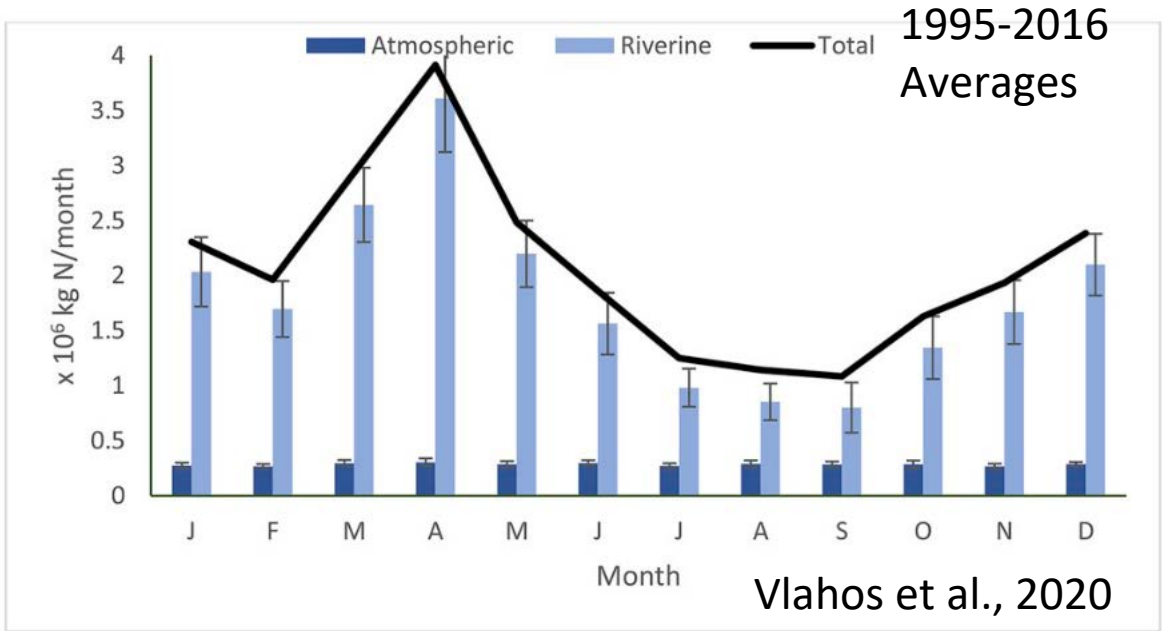
Freshwater inputs in Long Island Sound

Vlahos & Whitney, 2017

- Inter-annual variability in freshwater discharge into Long Island Sound affects Long Island Sound metabolism, carbon and nitrogen cycling
- However, seasonal variability has been shown to be more pronounced than inter-annual variability (Gay & O'Donnell, 2009; Vlahos et al., 2020); National Climate Assessment predicts wetter winters and springs in Northeast, U.S.

Massive freshwater fluxes from the Connecticut River into the Sound after Hurricane Irene (Sept. 2011, Landsat 5 satellite imagery; NASA).

DOC *(mg/L)*

1.9   2.1   2.3   2.5   2.7
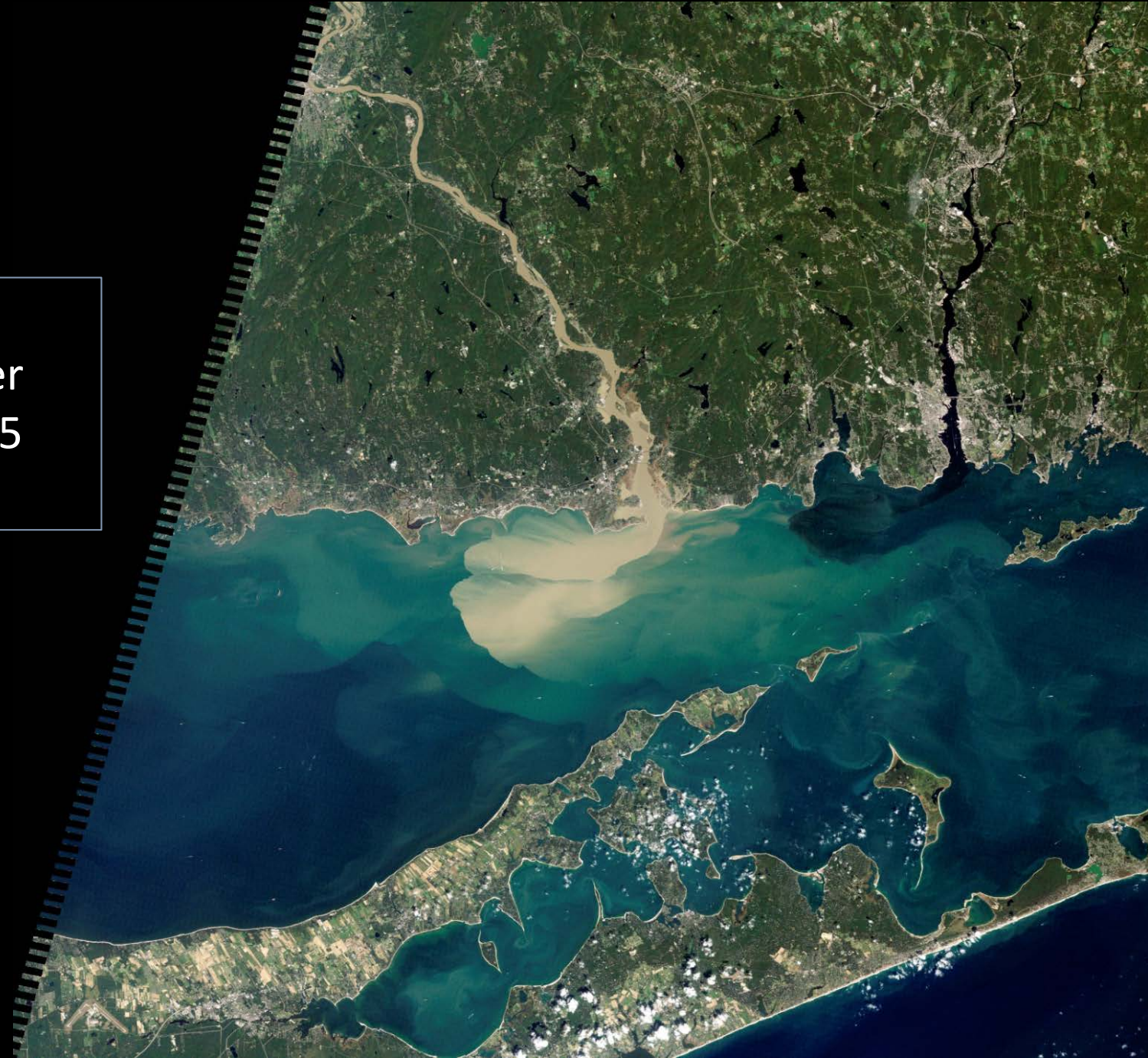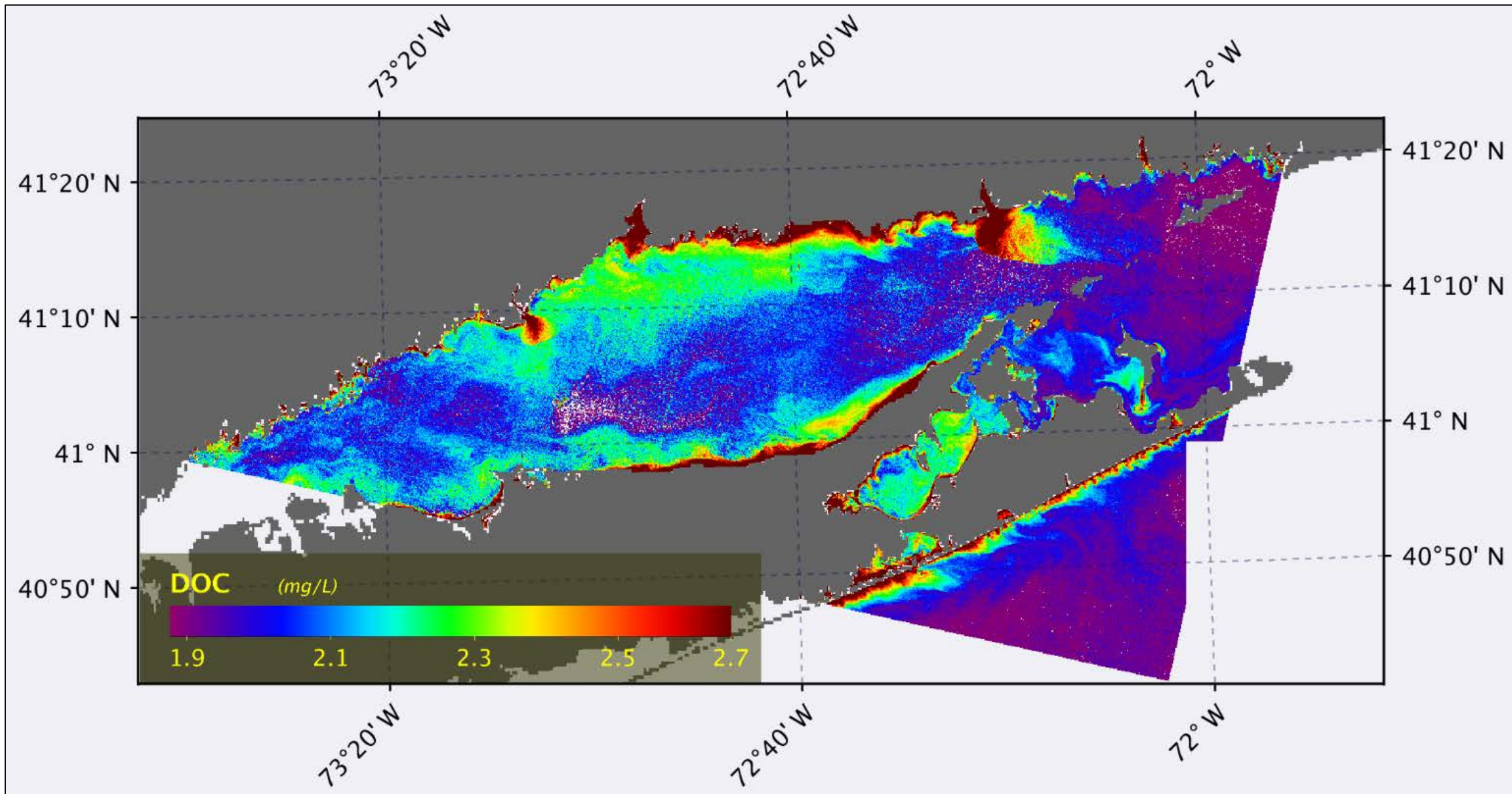
Student Skill Development

- Learning background in water quality and biogeochemistry

- Experience downloading and analyzing large datasets

- Introduction to programming

- Making plots and figures that clearly convey results

- Exposure to satellite data

- Discussing scientific results and how this can apply to water management in Long Island Sound
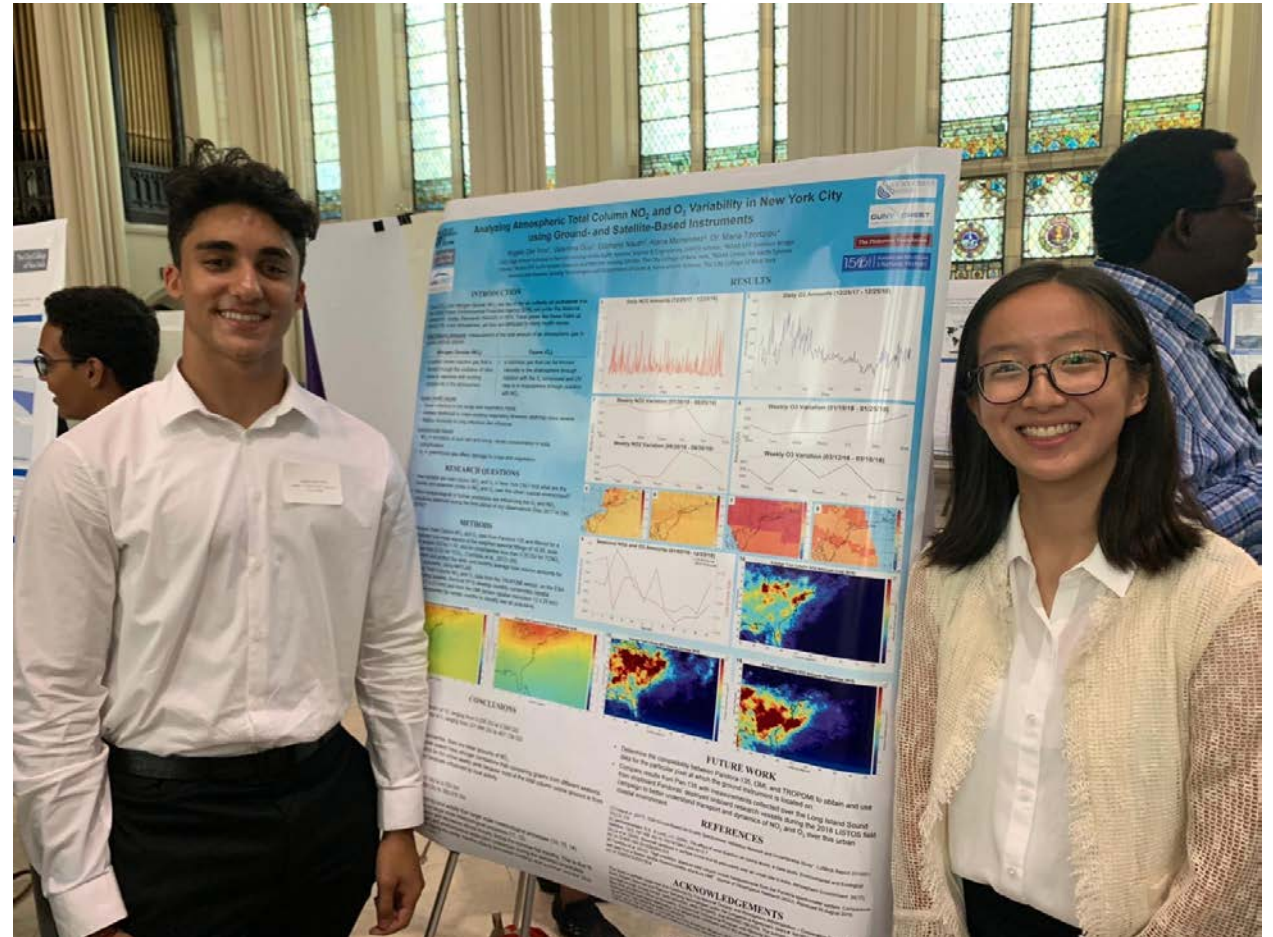
HIRES students Angelo Del Toro and Valentina Guo, 2019