Orion Glass Electrode pH Validation in Estuarine Waters & Citizen Science Success

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Overall Project Approach and Motivation

SOCAN
Southeast Ocean and Coastal Acidification Network

- SOCAN's mission to broaden knowledge and engage different stakeholders
  - Expand research into new regions
  - Contribute to K-12, higher education, and informal education
- Use existing pH, nutrient, and O_2 time series since 2008 to determine baseline for acidification around Myrtle Beach, SC
- Validation/Internal consistency of NBS time series
- Explore citizen science for acidification monitoring

Why is validation important?

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- pH_T methods can be expensive and limited
- pH_{NBS} methods are already widely used
- Validation can expand the utility of existing time series: NEP, NERRs, Municipalities (storm water control, nutrient runoff/eutrophication

- Infographic/image

Existing Time Series Since 2008

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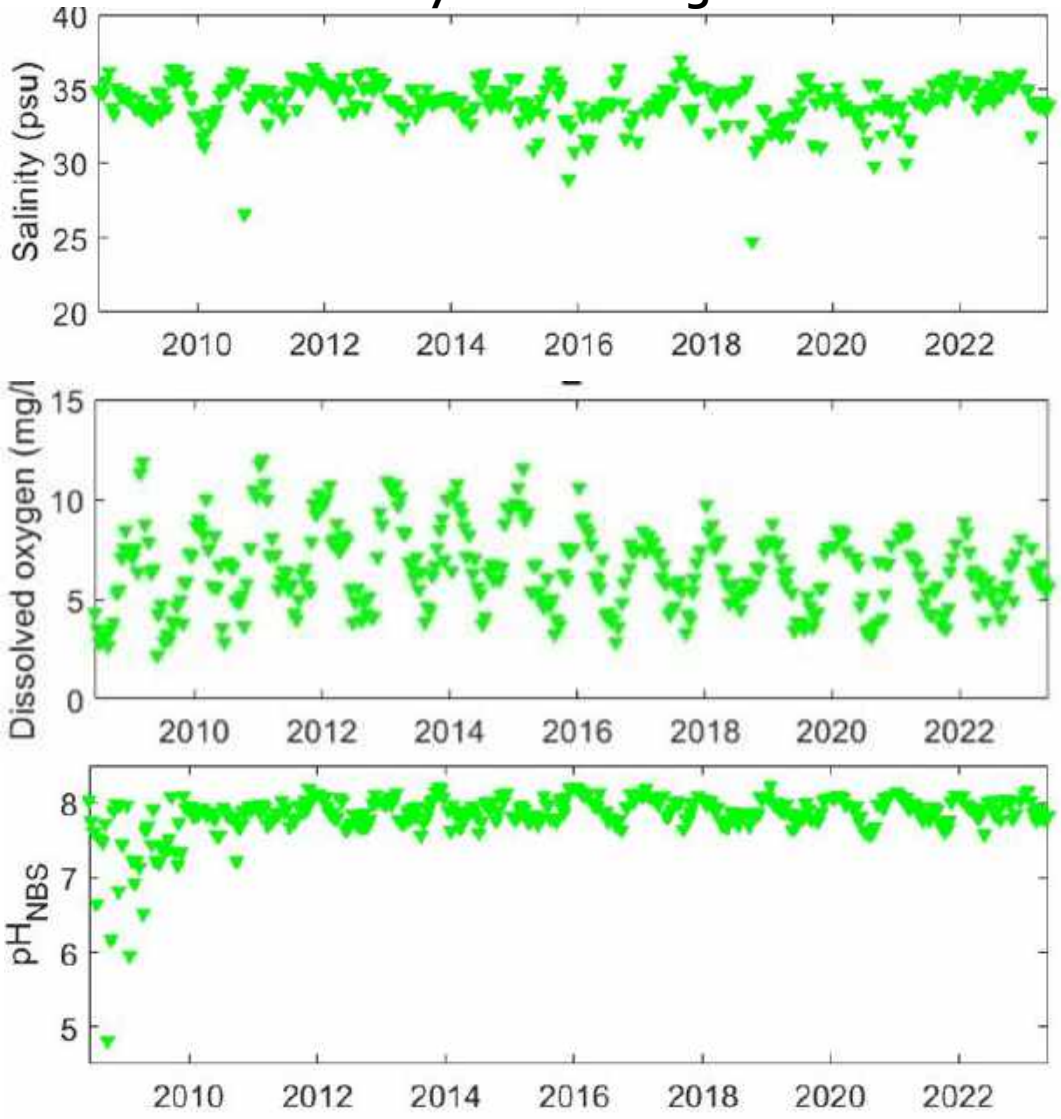
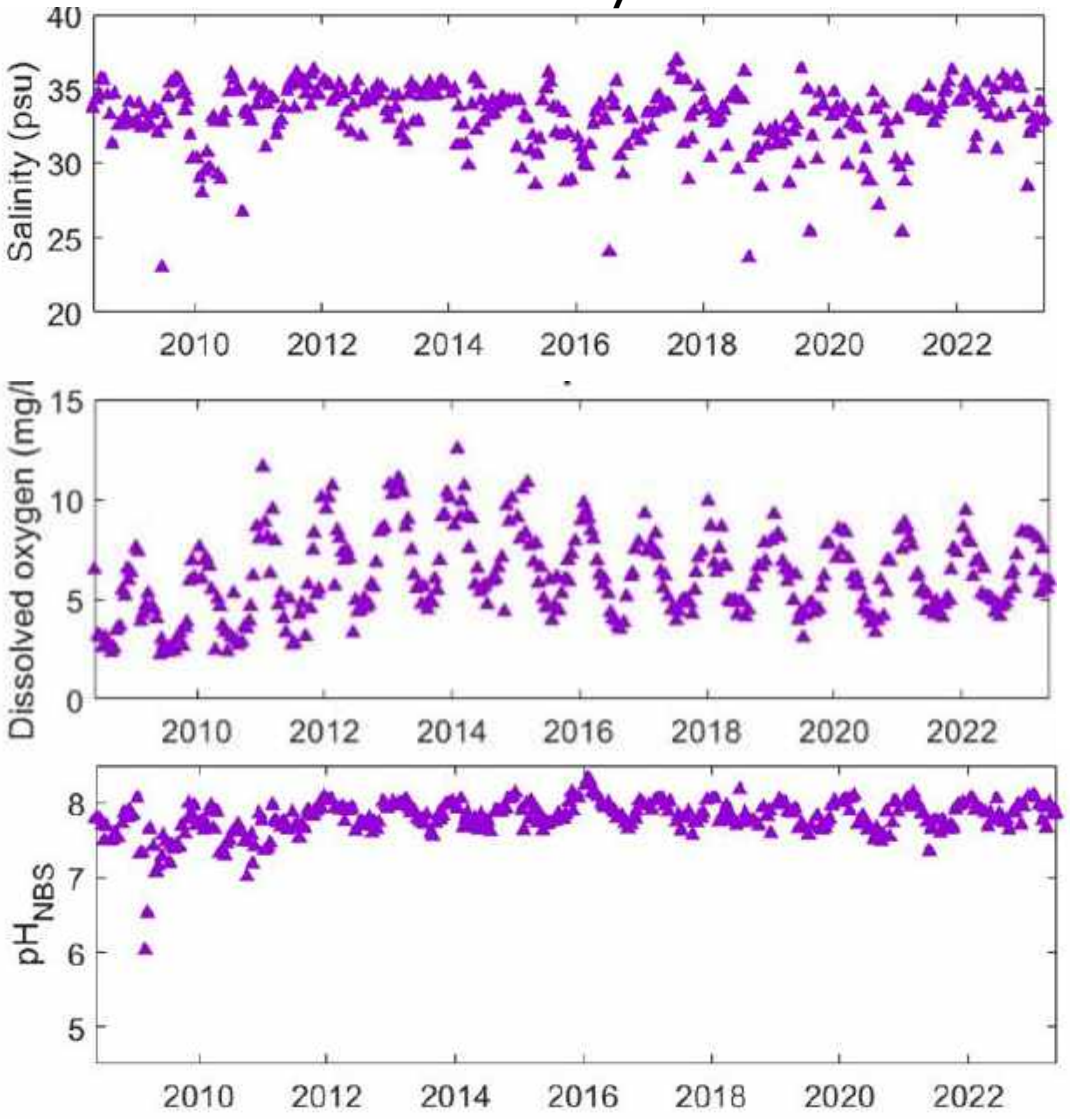
Oyster Landing



Rum Gully Creek



Volunteer Water Quality Monitoring Program

SCCAN Southeast Ocean and Coastal Acidification Network

Lead PI: Victoria Green
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Funding Partners for Rum Gully Creek & Oyster Landing

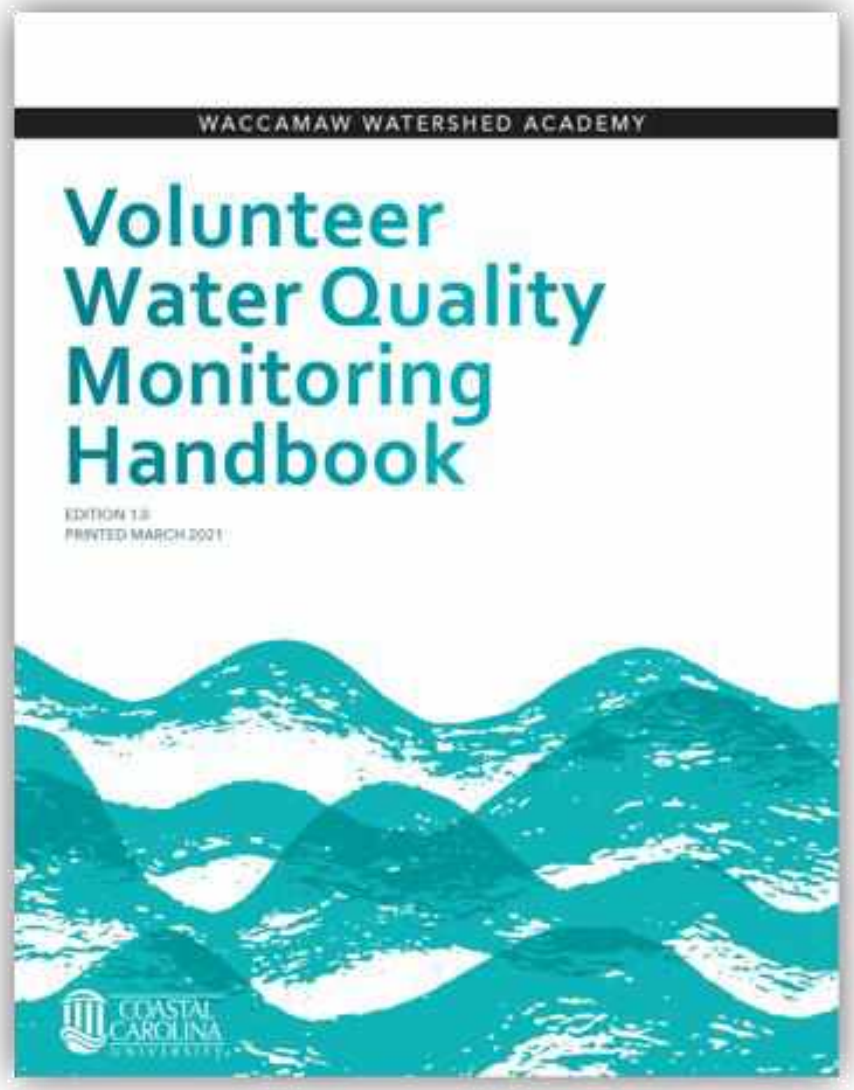
Horry County South Carolina
Committed to Excellence

Georgetown County, SC

Volunteer citizen scientists conduct water monitoring year-round in their local watersheds. Volunteers collect in-situ data (temperature, dissolved oxygen, salinity, total dissolved solids, conductivity, pH and nutrients via test strips) and grab samples of *E. coli*, and turbidity.

Volunteer teams are trained to prepare and use portable lab equipment to analyze the samples they collect. Volunteers upload data online where it is quickly review and relayed to local stormwater managers.

Waccamaw Watershed Academy

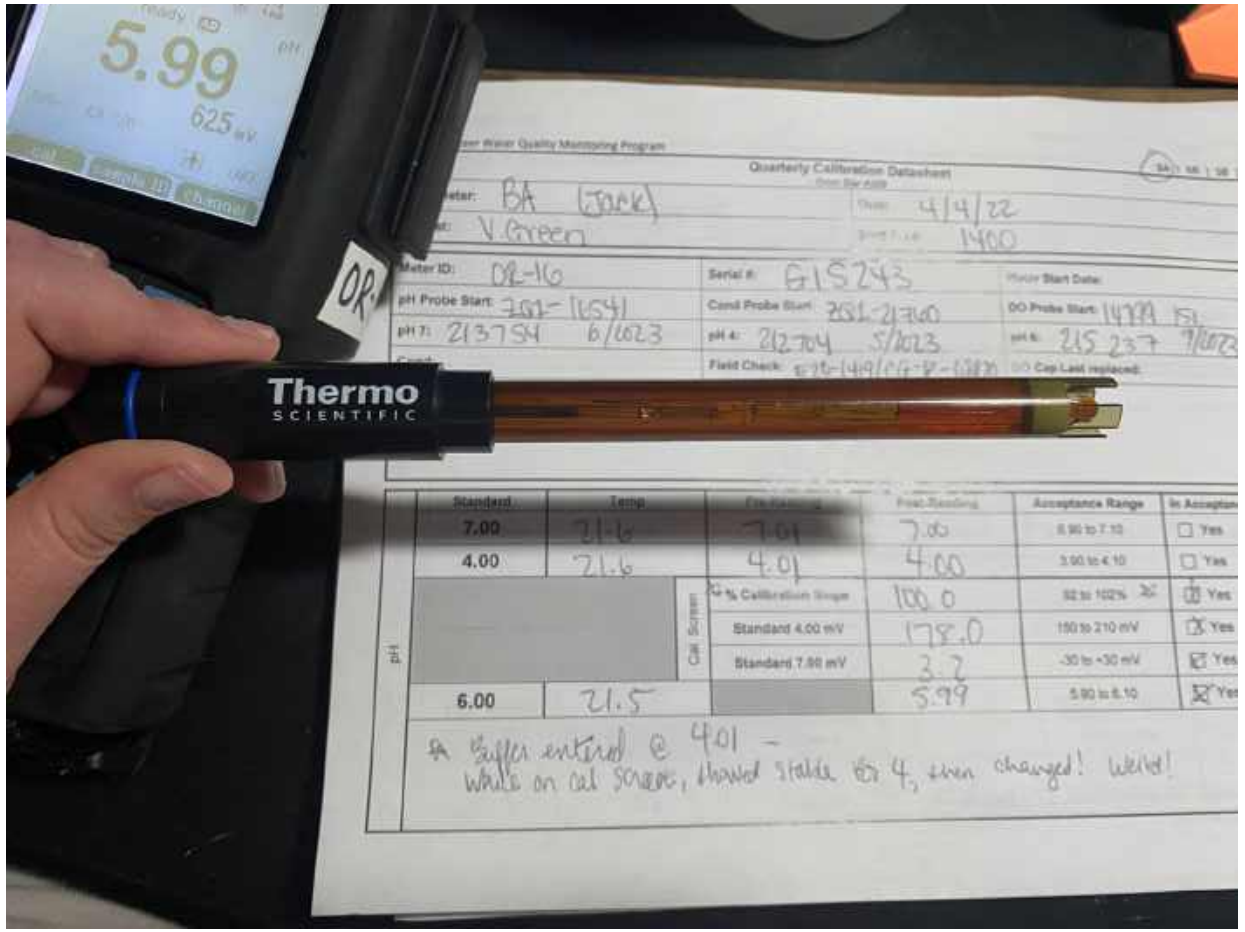


Technical Tip: Refilling Solutions

A Conversation with Dr Susan Libes

Methods

- Orion A329 Star Multimeter with an Orion Ross Ultra Low Maintenance pH/ATC Triode– temperature correction by probe
- pH is two-point calibration with buffers (4, 7; check on 6)
- pH water sample is collected in a 1-gallon insulated jug cooler
- DIC/TA Water samples collected, poisoned and driven to Mote
- pH_T calculated from DIC &TA using CO2SYS



Volunteers collecting samples and making field measurements

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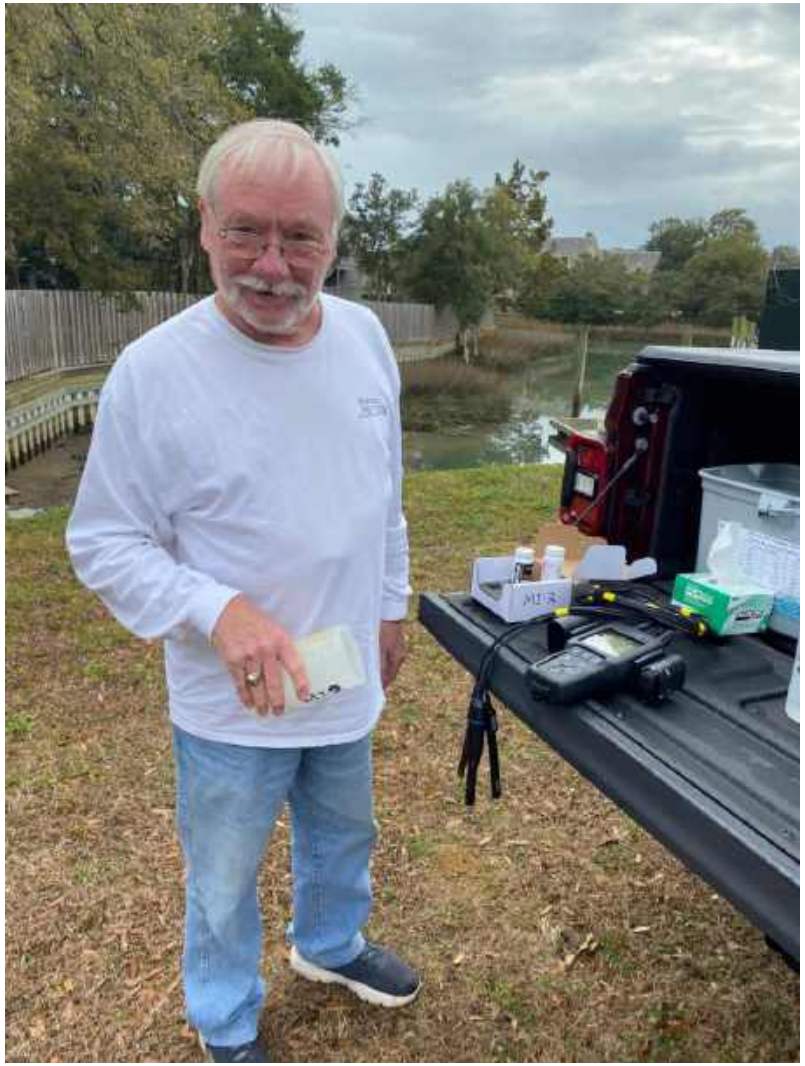

Estuarine Sites

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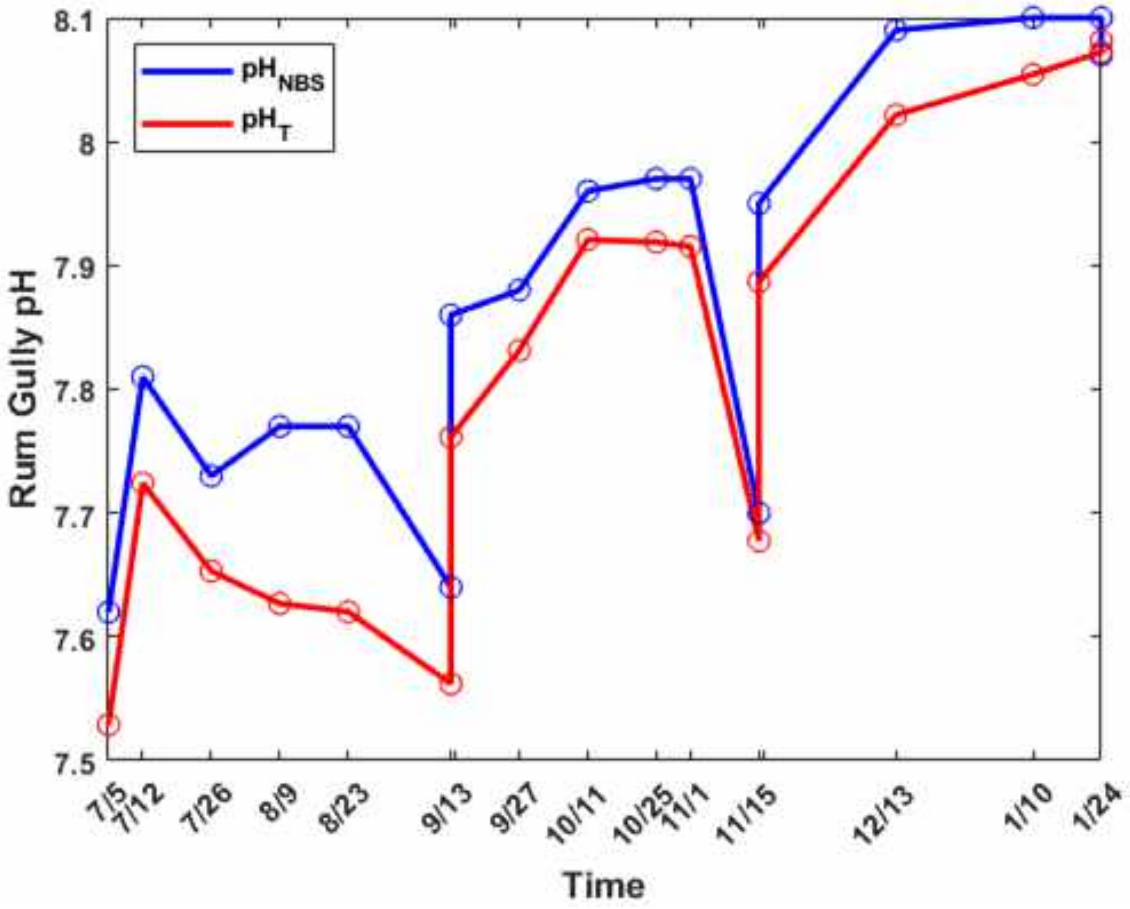
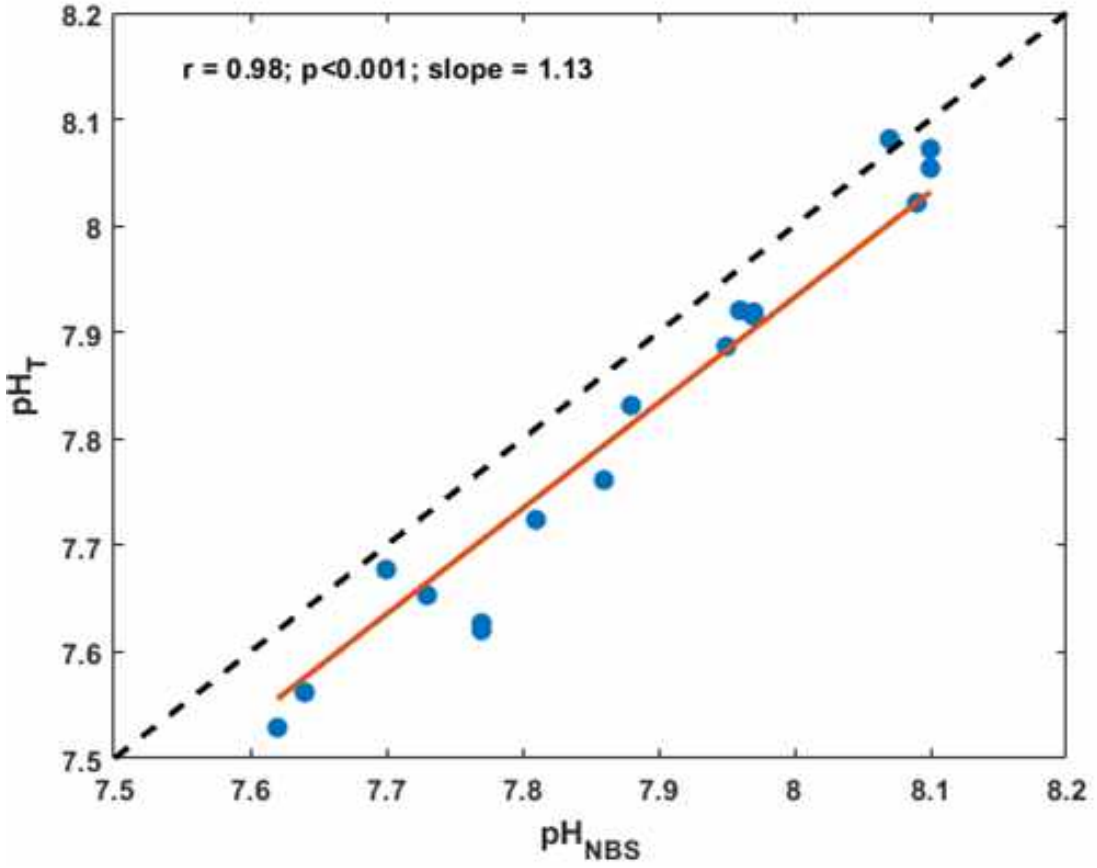
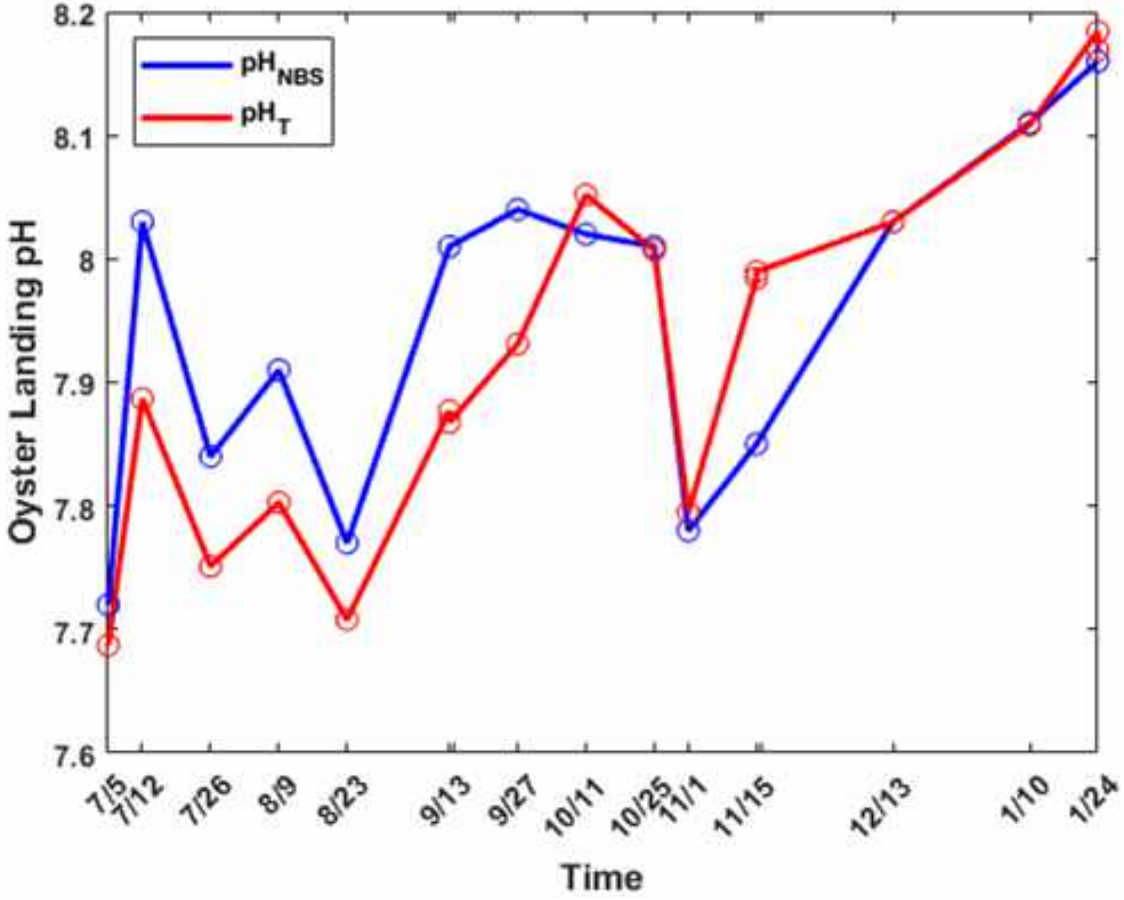
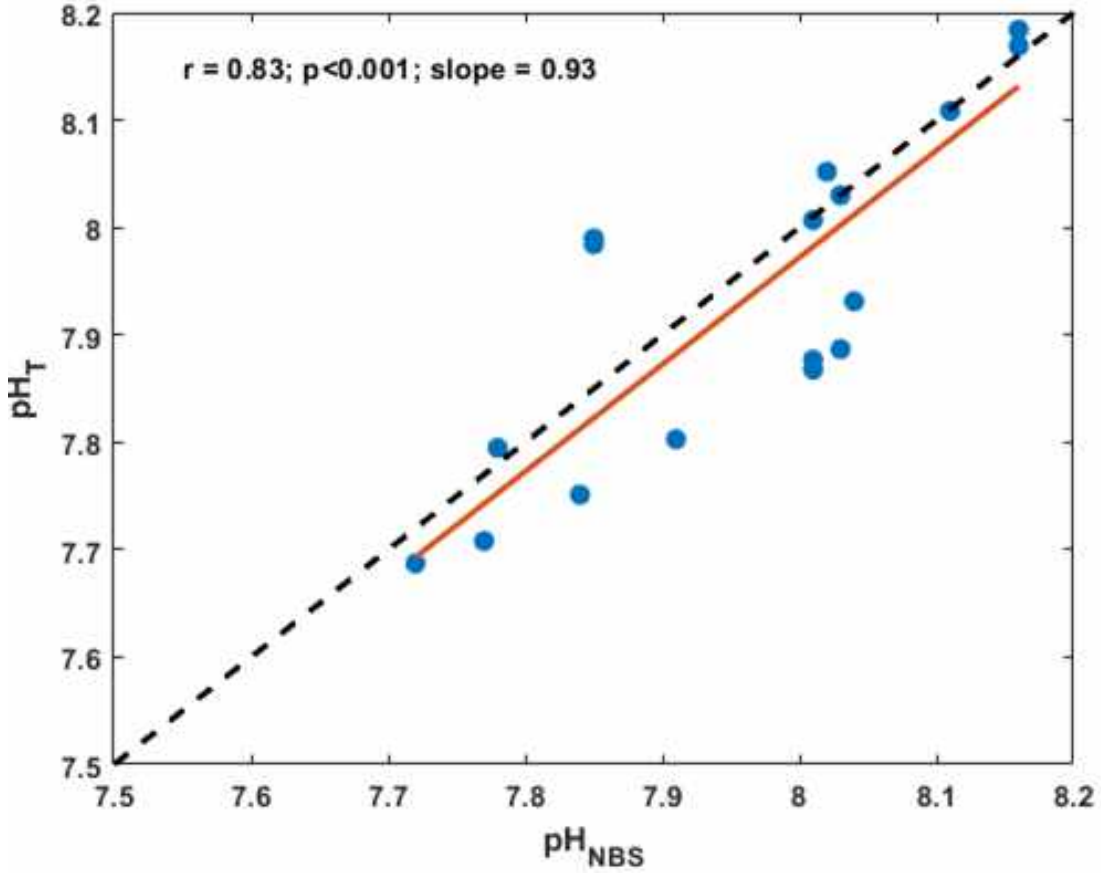
Rum Gully Creek





Oyster Landing





The Results in Context

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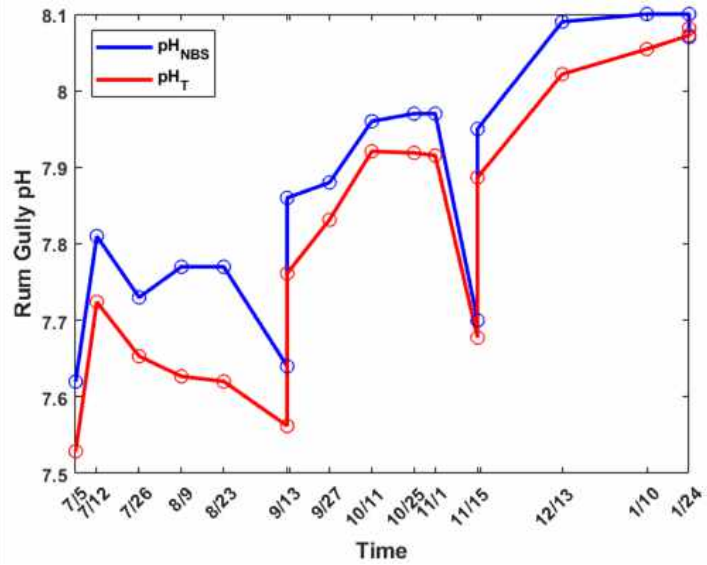

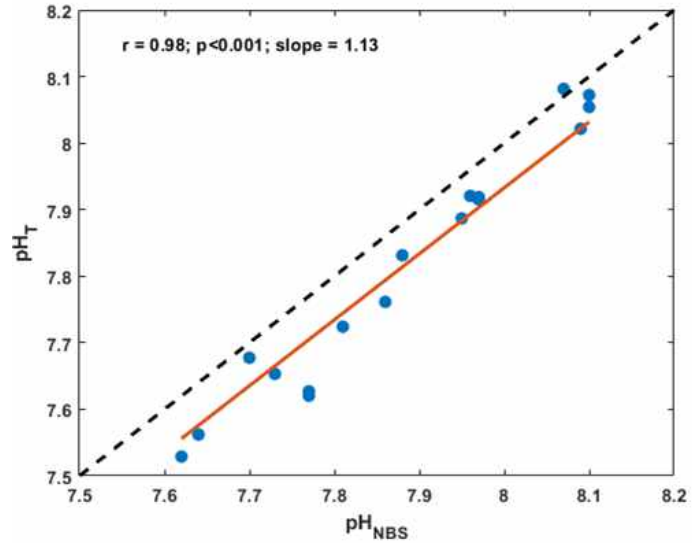

Orion precision 0.01 and relative accuracy to 0.03 for buffers in lab and field tests

Median residual (difference) is 0.063 and 0.067

Median daily variability is NEEDED to compare to sensor and lab results

YSI EXO Sonde post-calibration 0.1 and field tested 0.2 (CCU/EQL/WWSA)

Conclusions & Next Steps

- Orion pH_{NBS} measurements collected by Citizen Scientists are high quality measurements at these sites
- Use calculated TA (from TA-S relationship) and pH_{NBS} to determine carbonate chemistry
- Continue working with the VWQM program to collect pH_{NBS} and expand acidification monitoring in Georgetown and Horry Counties

South Carolina Coastal Acidification Project Homepage
www.socan.secoora.org/coastal-carolina

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