From San Servolo to FRM Success

FICE 2025 Final Presentation - TeamGloeotrichia

July 19, 2025

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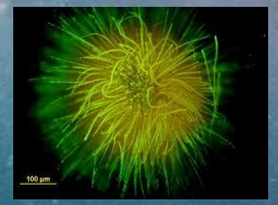


Experience during field measurements – San Servolo

What we learned about protocols and different instrument deployment

Challenges:

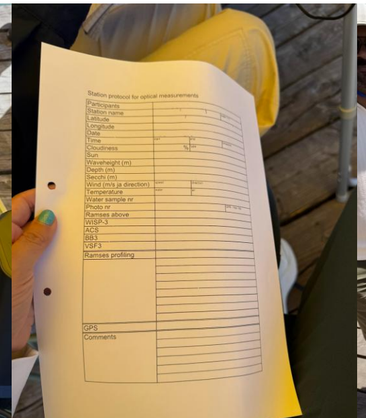
- Instrument coordination, logistics, cables
- Waves, passing boats (environmental perturbations), clouds, floating plastic
- Adjusting position in relation to the sun
- No solid black caps for two of the instruments
- Instrument was unstable on platform

Roles taken by each team member

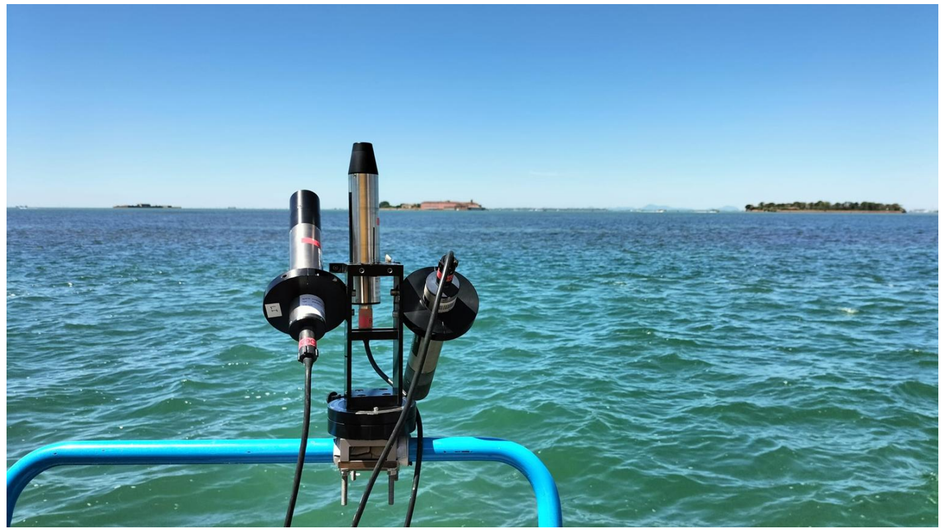
- Natalie: Metadata and data collection
- Vishnu: Environmental conditions/perturbations
- Ileana: General observation, videos
- Eduardo: Metadata collection
- Anabel: Pictures, cable management
- Anastasia: Cable connection/tool safeguarding, metadata collection







Experience during field measurements – San Servolo



What measurement protocol recommendations are harder/easier to follow in San Servolo when compared to other sites?

- Finding perfect angle from sun was challenging/Relative azimuth at 90 degree from the platform; good to have stable platform for in situ
- Precision enabled by multiple simultaneous instruments
- Easier logistically - access to jetty, no permission needed, but associated passing boats and plastic/floating sea grass
- Shadow from boats can still impact through stray light even when not in your viewing angle; boats coming, going, and staying, creating waves
- Stationary platform – harder from boat/moving platform creates more perturbations
- Improvements: not expert enough to make suggestions
- Instrument needed to be better secured

What measurement protocol recommendations are easier/harder to follow with TriOS?

- Easier to have all three instruments working together, but still requires coordination to manage three parts – not completely automated, which also has disadvantages

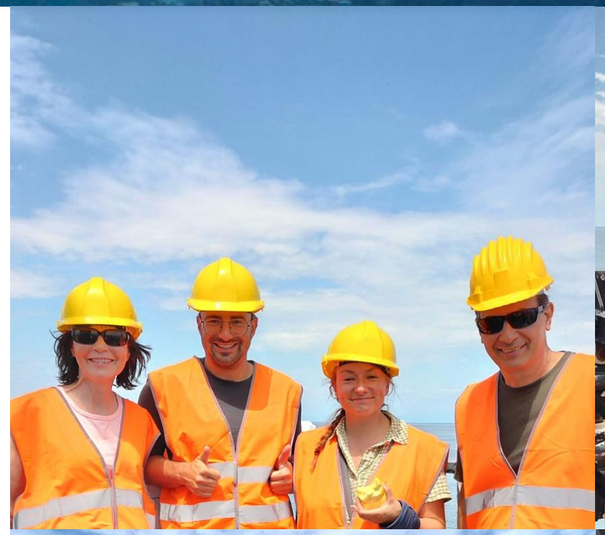
Experience during field measurements – AAOT

What you learned about protocols and different instrument deployment?

- Managing large number of instruments/data and coordination among them
- Platform effects and how that was managed using the mast
- Logistics of set up, maintaining the platform, weather dependencies; still need to know how they clean sensors and how often?

What roles did each team member take?

All observers




Experience during field measurements- AAOT

What measurement protocol recommendations are harder/easier to follow AAOT when compared to other sites?

Easier:

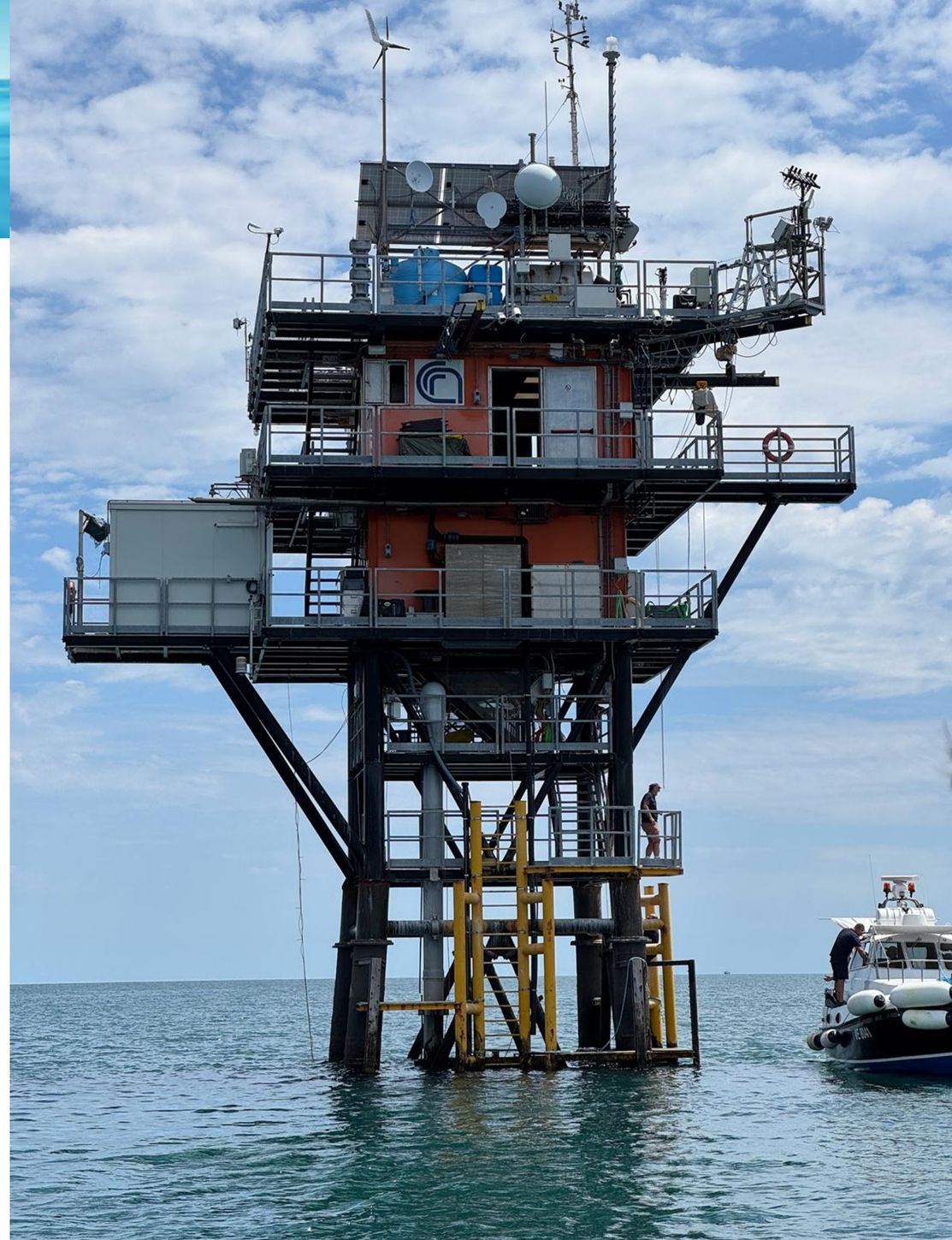
- Finding perfect angle from sun
- Stable deployments
- Having precision that comes with multiple simultaneous instruments
- Large platform/space to work and set up instruments
- Can stay overnight and do controlled, successive measurements at peak weather times
- No offshore adjacency effects

Harder:

- Coordination
- Platform maintenance
- Large and small boats in the area

Improvements?

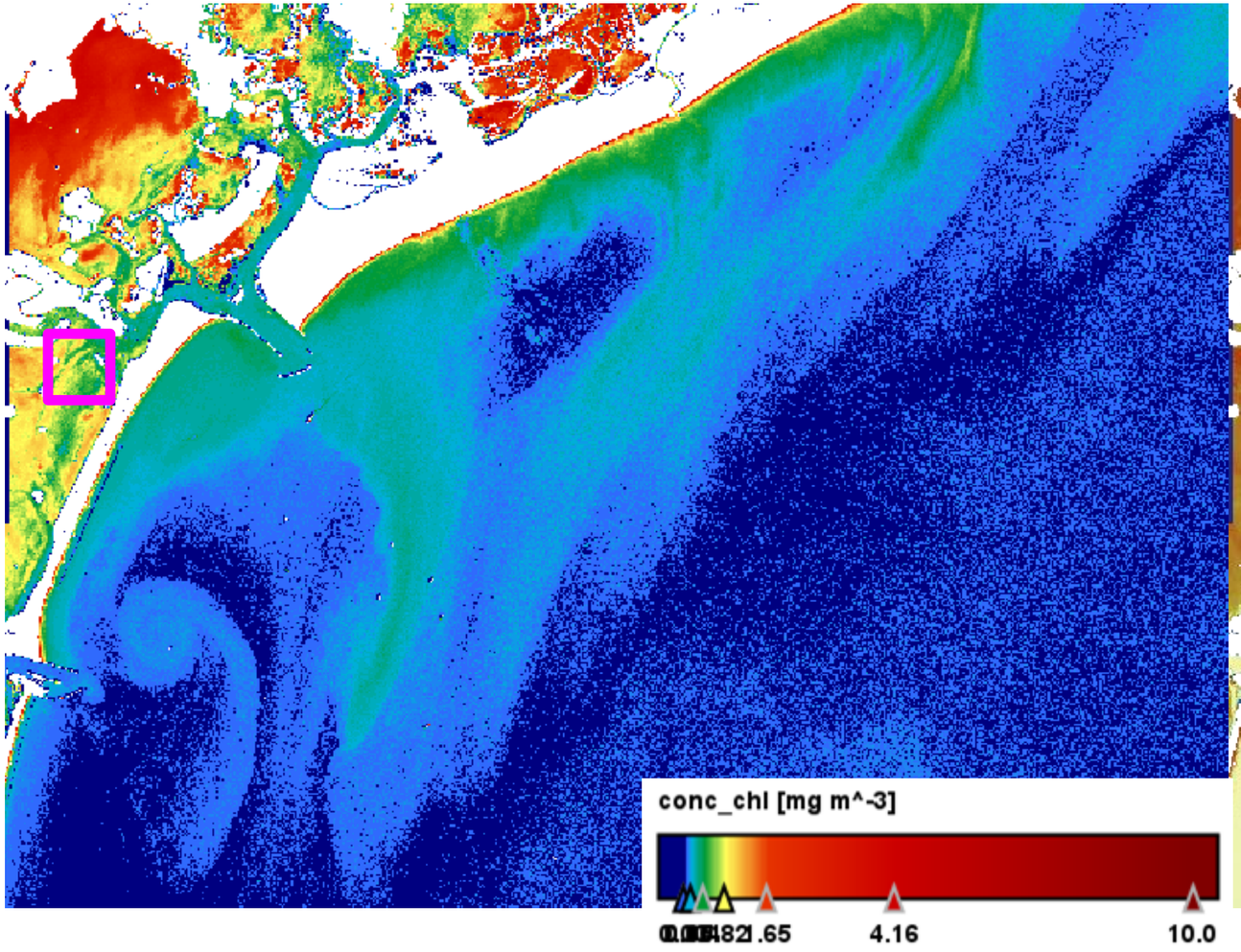
Not expert enough to make suggestions yet



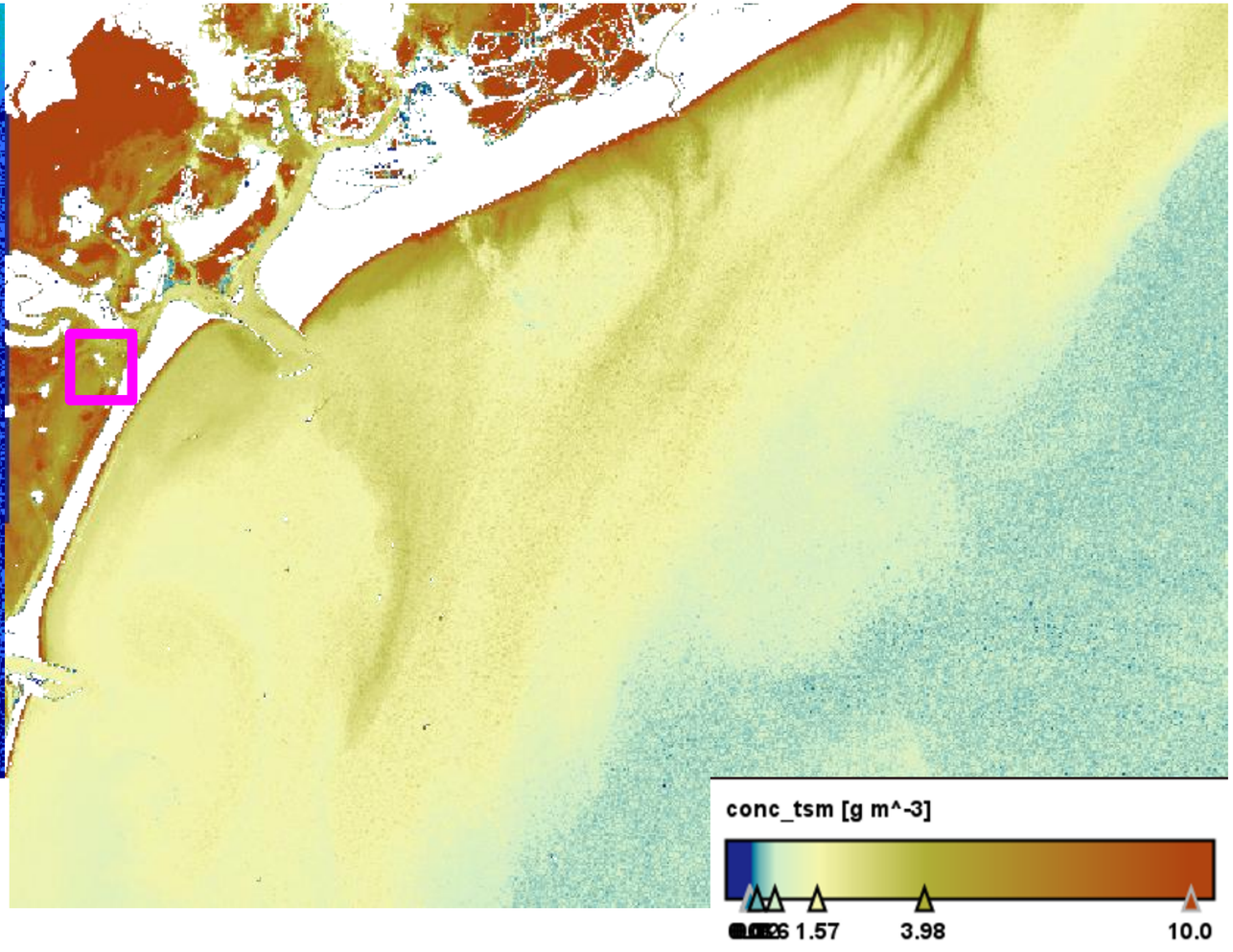
SAN SERVOLO
in situ TriOS measurements
July 8, 2025


San Servolo
Sentinel-2/MSI eRGB 2025/07/08

Sentinel-2/MSI L1 2025/07/08 10:00



chl-a concentration [0, 10 mg/l]
C2RCC algorithm

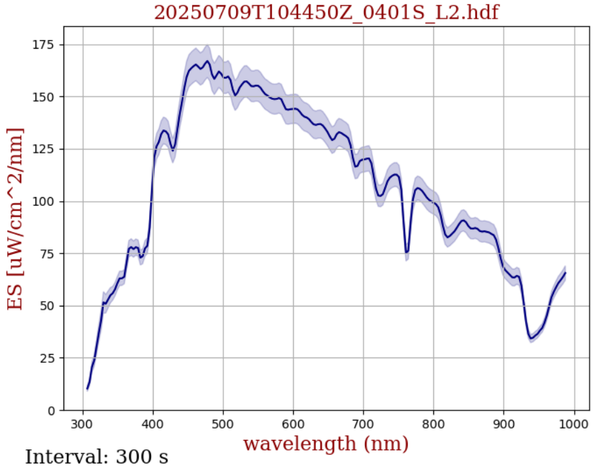


TSM concentration [0, 10 mg/l]
C2RCC algorithm

Running HyperCP

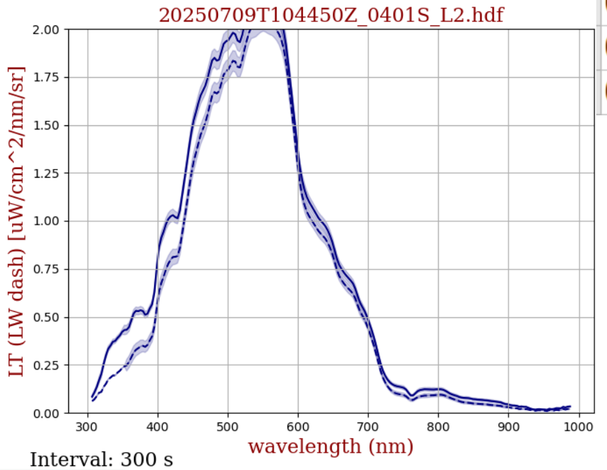
- Certain 6S files .exe files would not run
- “L1aqc processing failed. Nothing to output”; click ok, keeps running, but one output failed – discovered pitch and roll was checked
- Forgot to check caps on dark - Carefully check what is ticked for on/off before you run
- Need more familiarity with the parameters for running per application
- Hard to follow some of the procedure/steps – could be broken down into smaller steps
- HyperCP has good support and online material
  GitHub - nasa/HyperCP
- Still unfamiliar with interpreting the plots

Results: HyperCP San Servolo data Cast 1



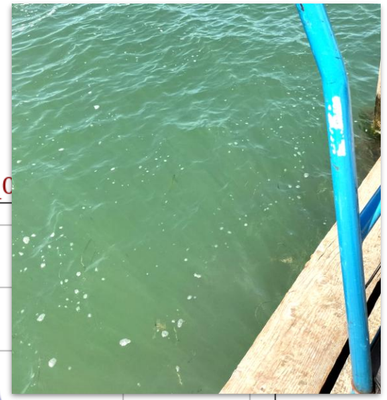
Interval: 300 s

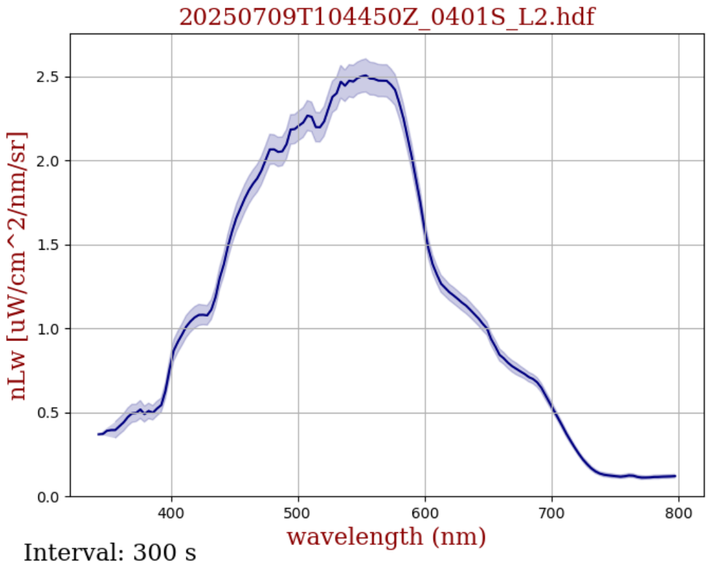
Interval: 300 s



Interval: 300 s

0401S	10:44
0402S	10:49
0403S	10:51





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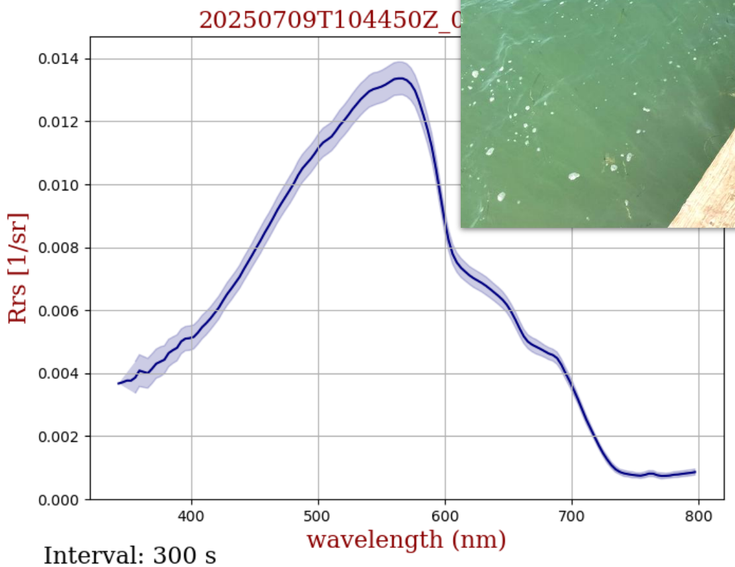


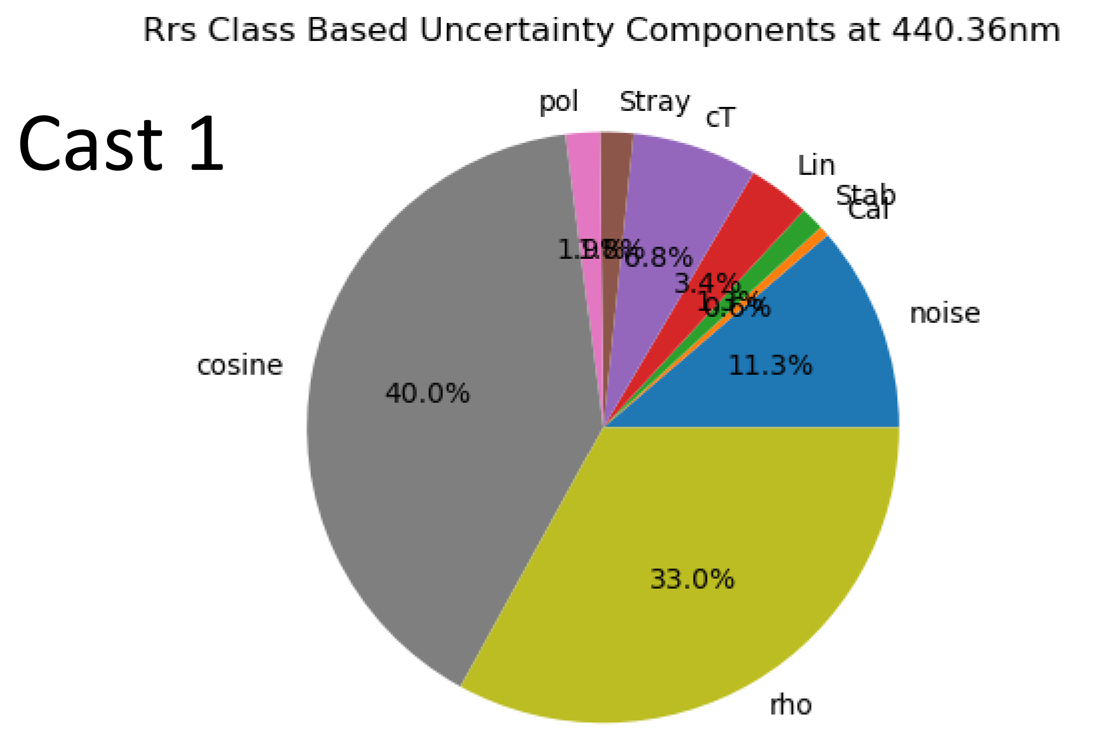
Interval: 300 s

UTC: 10:44-10:55;
Local:12:44-12:55
Observation
Sun: Clear sky day
Comments:
Boat passing (3), small waves presence of foam and floating vegetation

San Servolo data: What proportion of the Rrs(440) uncertainty at Stn 04 is driven by the angular response of irradiance?

0401S	10:44
0402S	10:49
0403S	10:51

pie_Rrs_Trios_20250709104450_440.36.png



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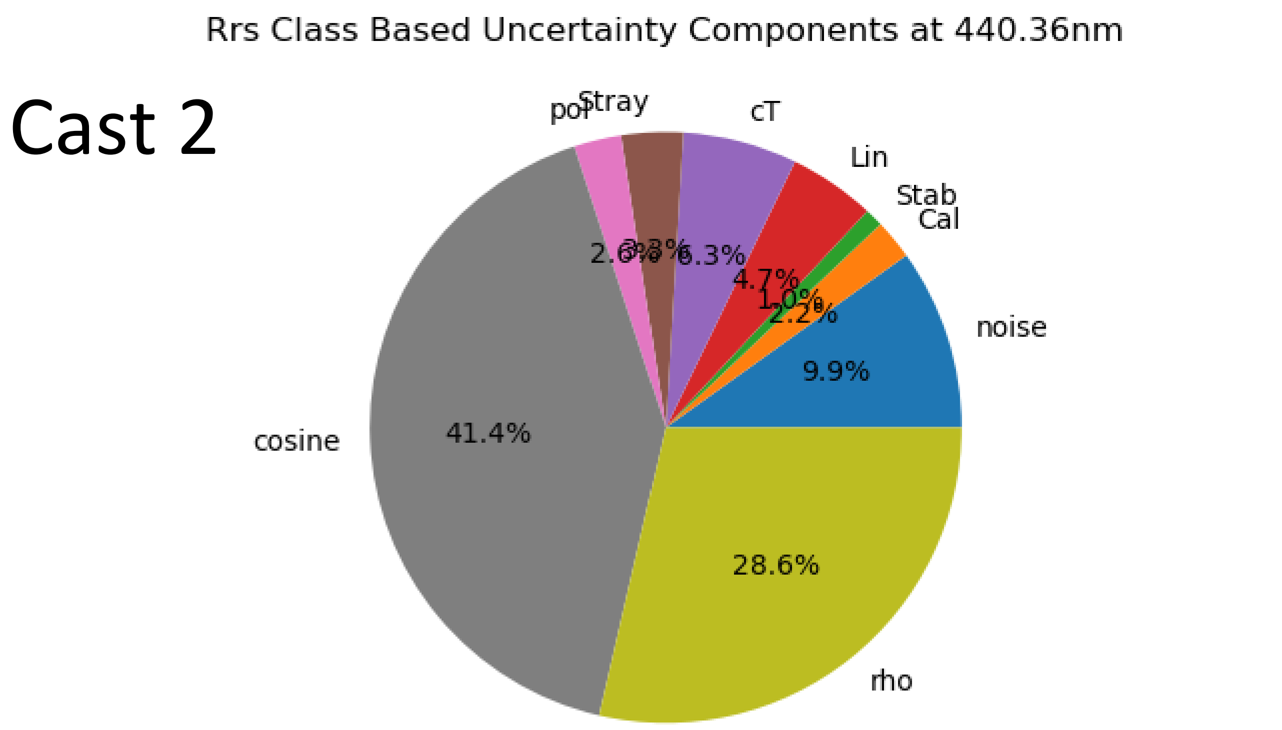

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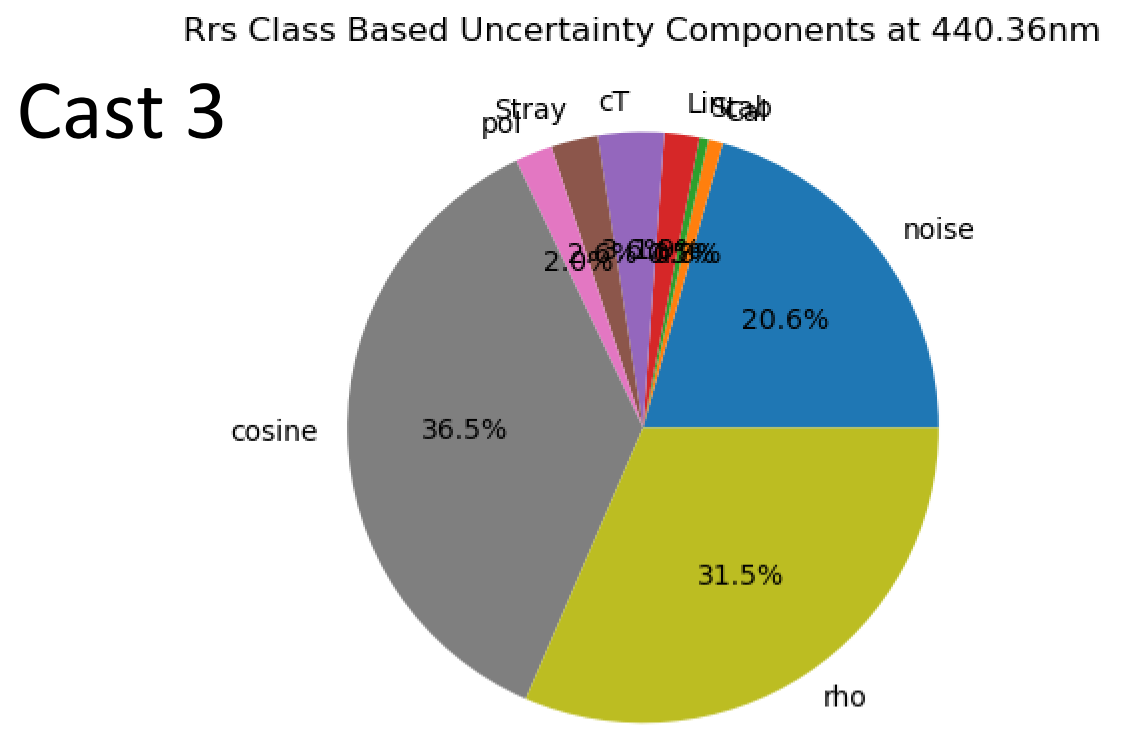
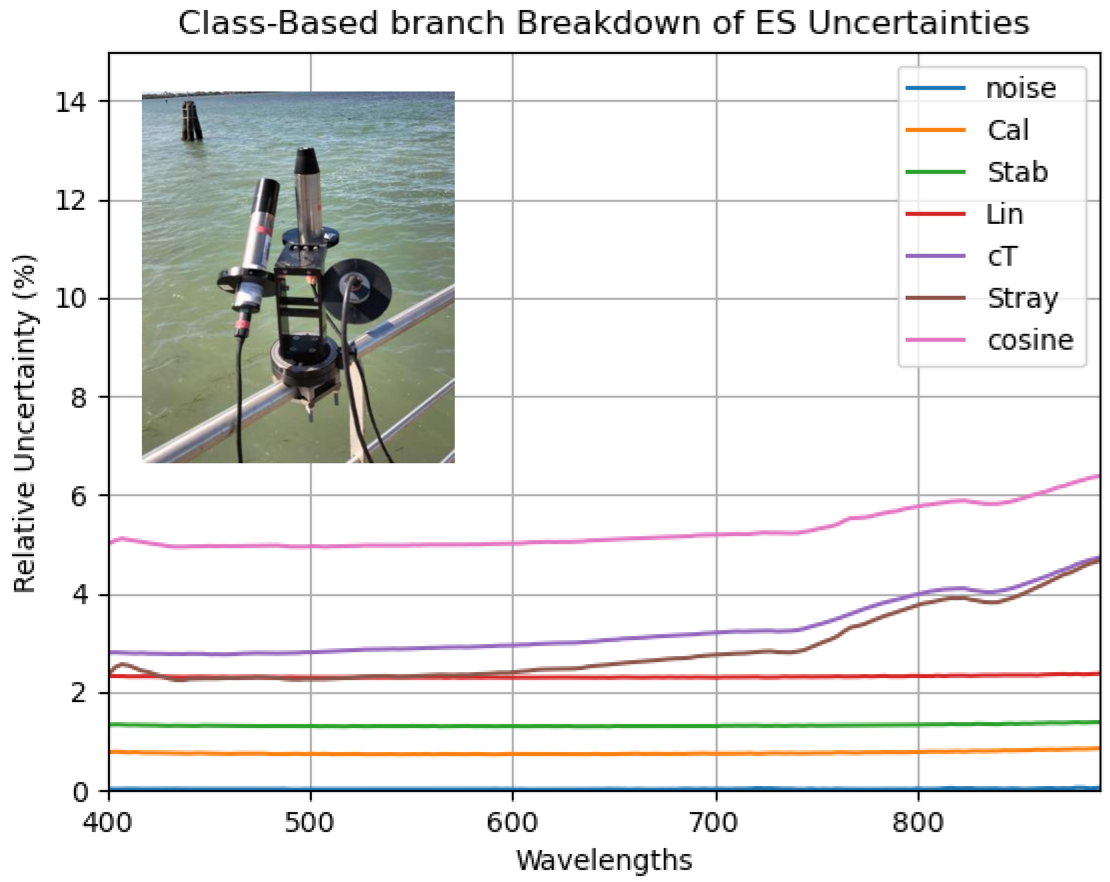
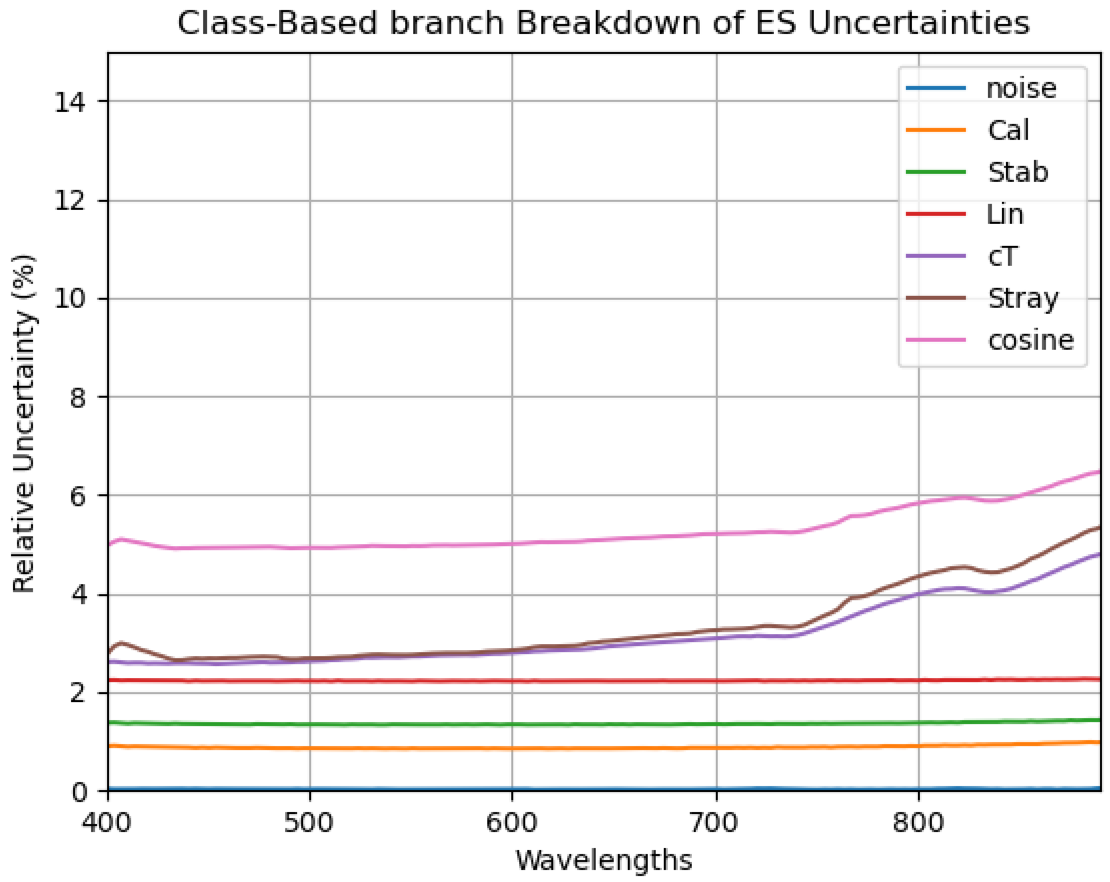
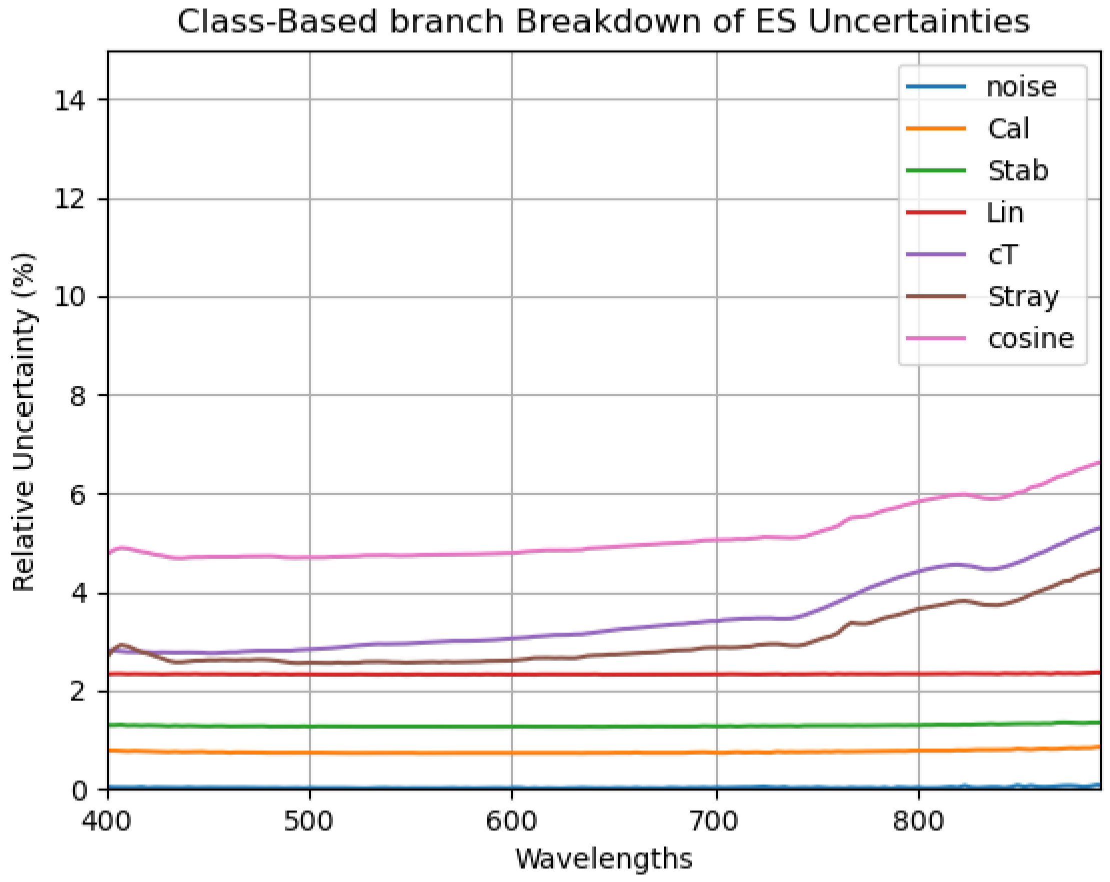
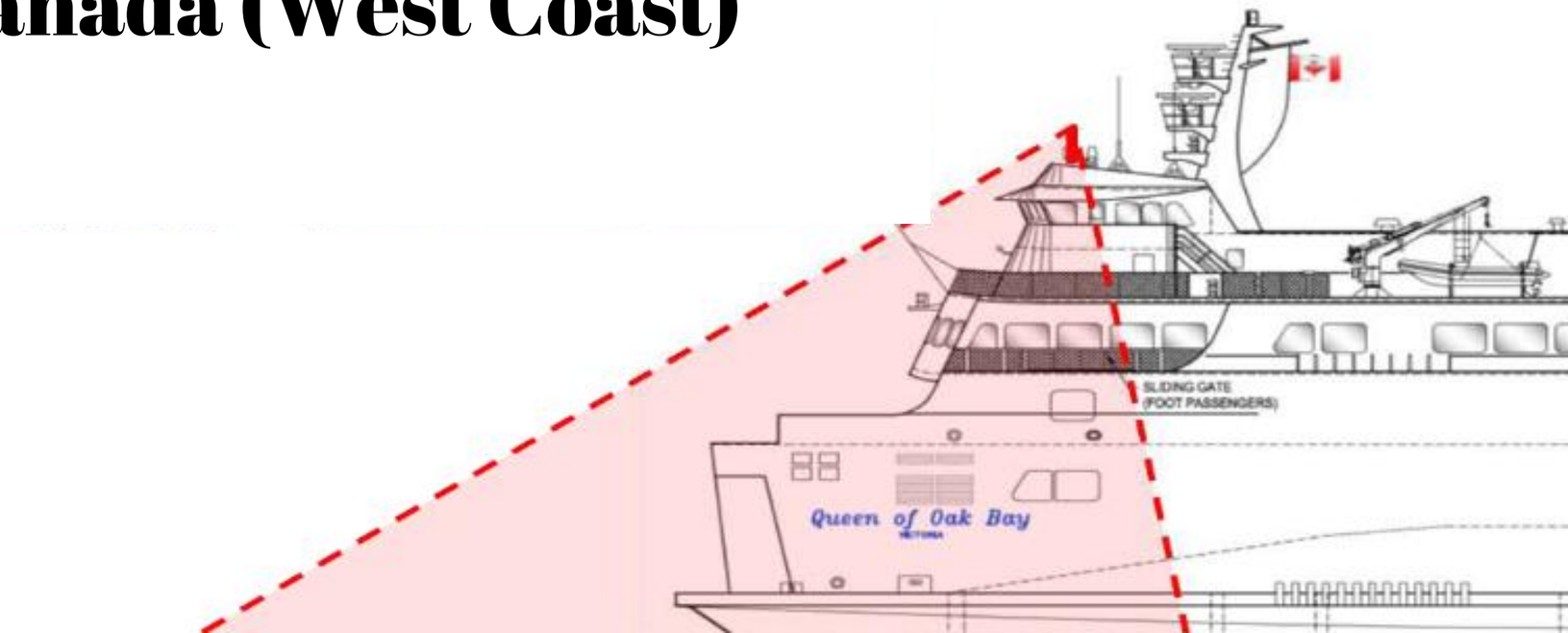






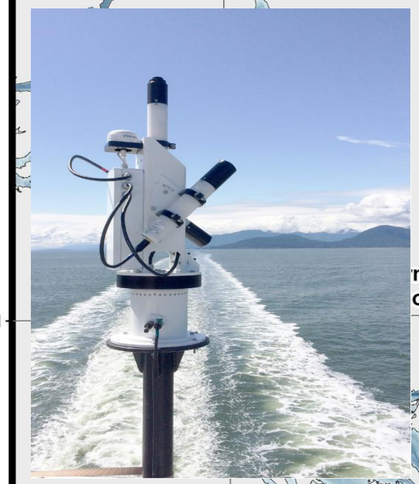


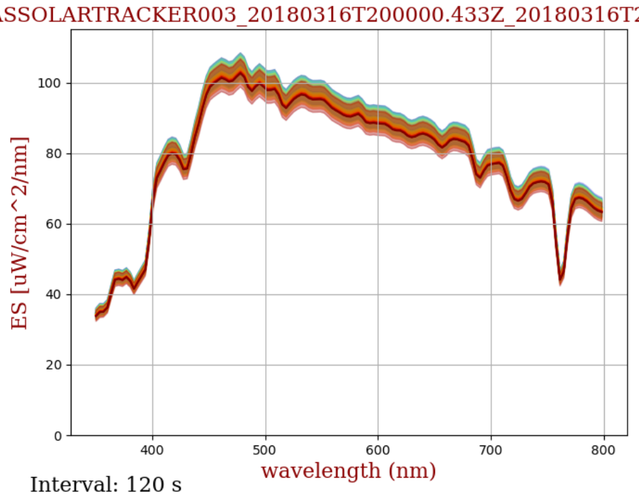
CASE STUDY 1:
Canada (West Coast)

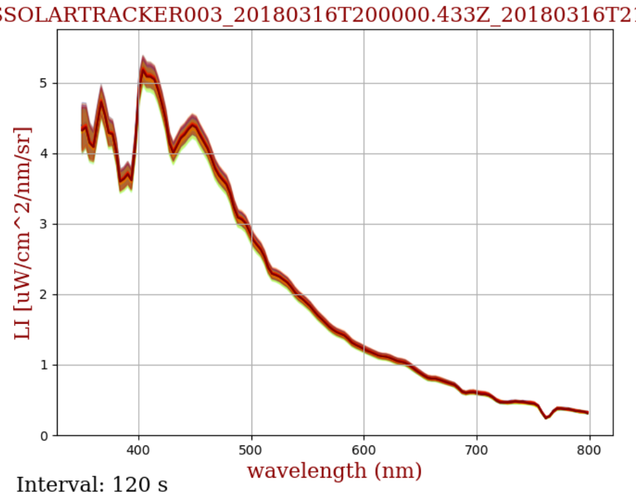


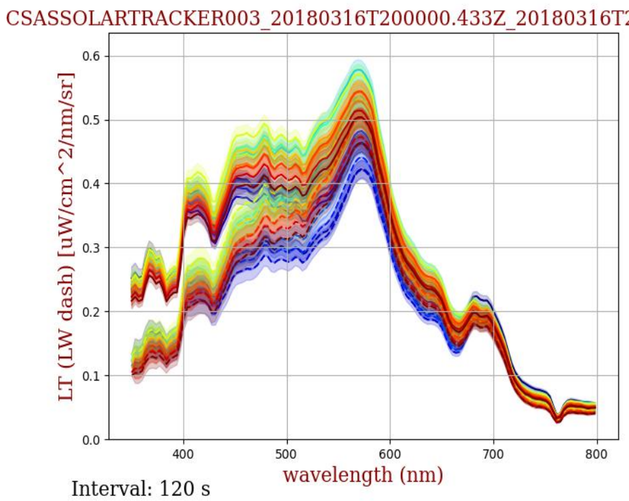
HyperSAS Solar Tracker

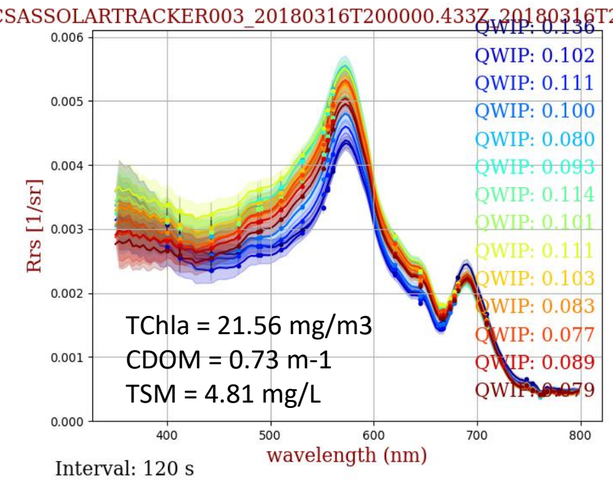
Above-water Radiometry Data with HyperCP





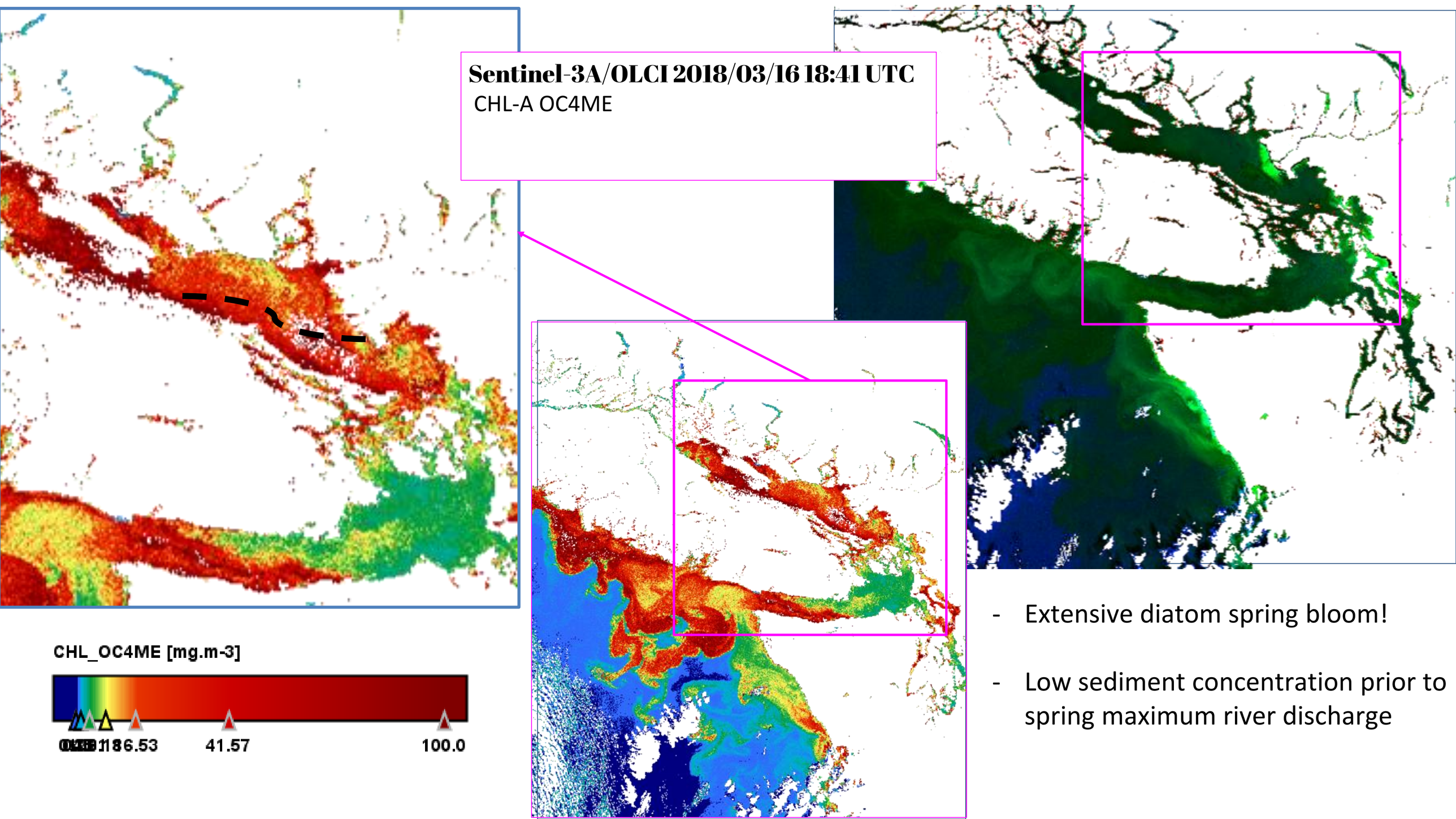






- ❏ Derived Rrs revealed a strong diatom bloom, confirmed by CHEMTAX data.
- ❏ HPLC data showed high TChla in the western transects; low CDOM absorption and TSM concentrations.

- ❏ Binning interval: 120 sec
- ❏ Glint correction: Mobley, 1999
- ❏ NIR residual correction: Ruddick
- ❏ BRDF correction: Pitarch



- Extensive diatom spring bloom!
- Low sediment concentration prior to spring maximum river discharge

CASE STUDY 2:
Brazil

Running ThoMaS

- SeaBASS format configuration: requires specific naming conventions
- Anaconda licensing issues; forced a conda-forge for repository downloads to stop automatically routing to Anaconda (must find and remove Anaconda)
- The GUI interface is easier to use than prompt command especially for beginner users. Does it limit ThoMaS functionality?
- ThoMaS has good support and online material (https://gitlab.eumetsat.int/eumetlab/oceans/ocean-science-studies/ThoMaS)

ThoMaS Result (Ilha Grande Bay, Brazil)

Preliminary processing (before ThoMaS)

FieldSpec® HandHeld 2™ Spectroradiometer
User Manual

Only 2 days of data
27-apr-2022
28-apr-2022

3 Sentinel-3A,3B images

- S3A_OL_2_WFR___20220427T124940_20220427T125240_20220429T002101_0179_084_323_3240_MAR_O_NT_003.SEN3
- S3B_OL_2_WFR___20220427T121314_20220427T121614_20220429T011905_0179_065_180_3420_MAR_O_NT_003.SEN3
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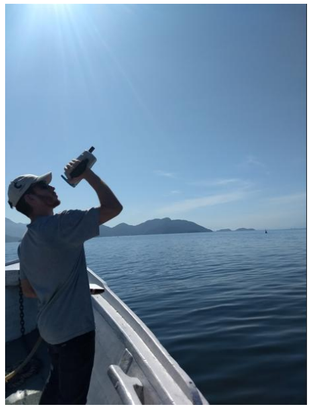
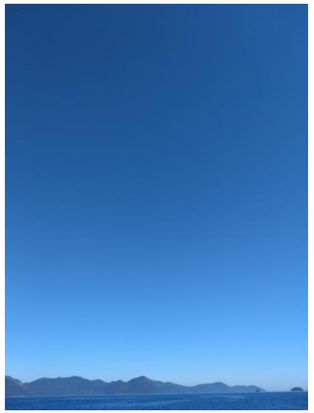
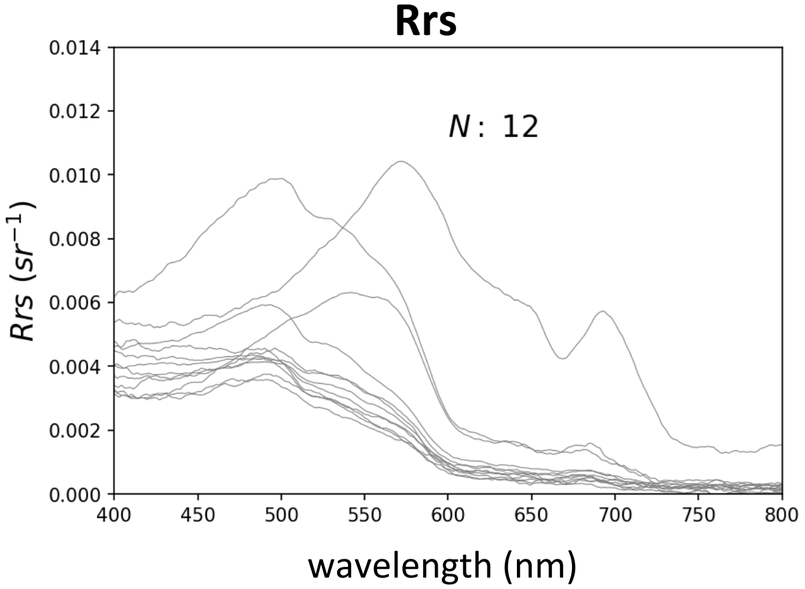
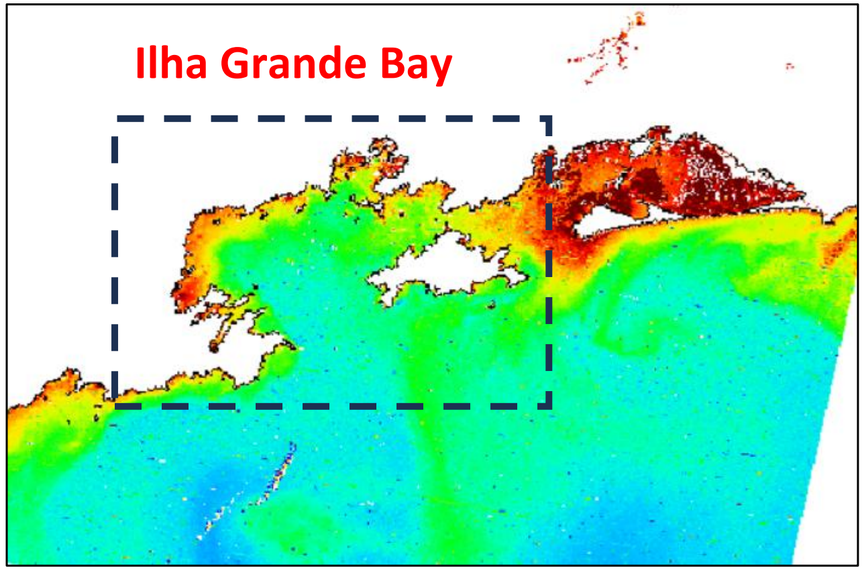
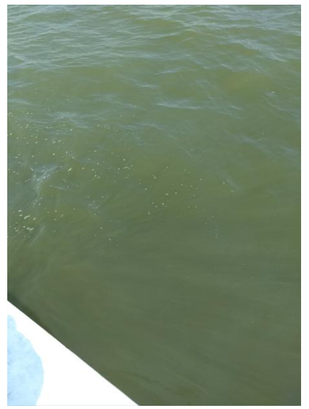


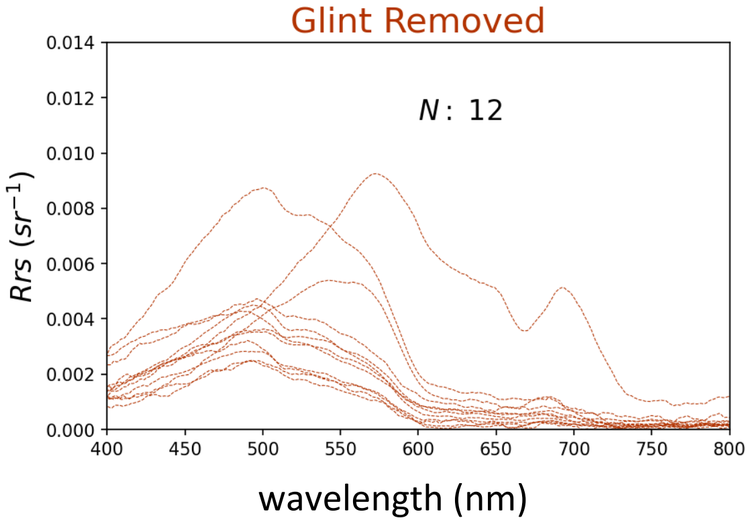






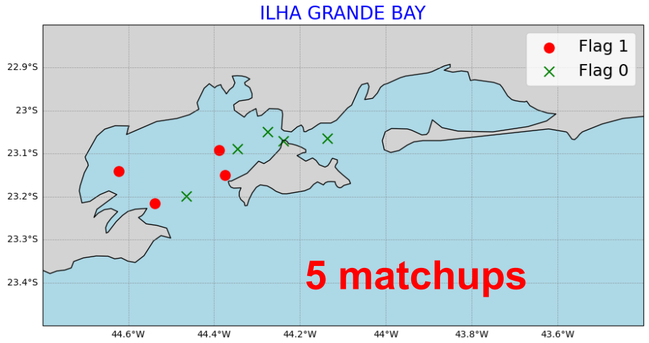


ThoMaS Result



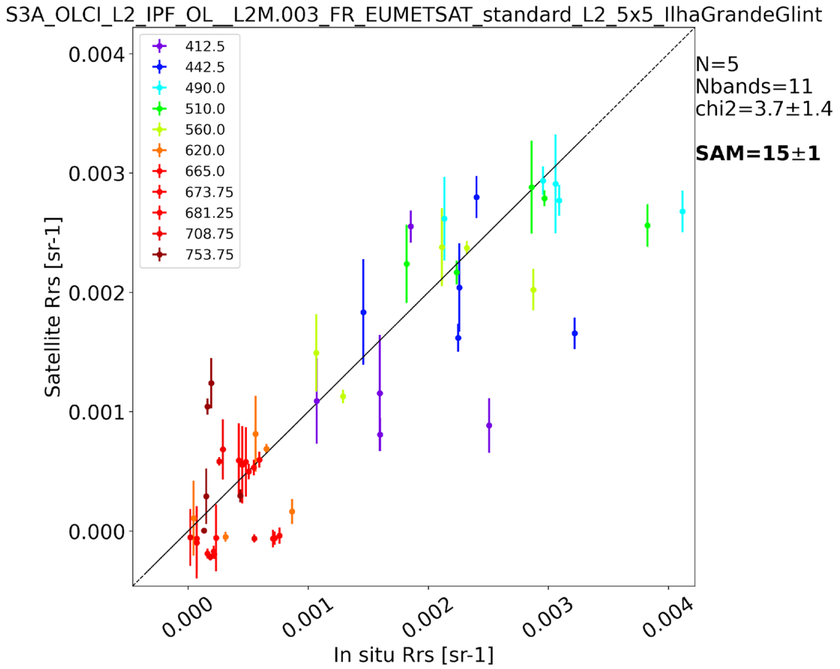
ThoMaS Parameters:

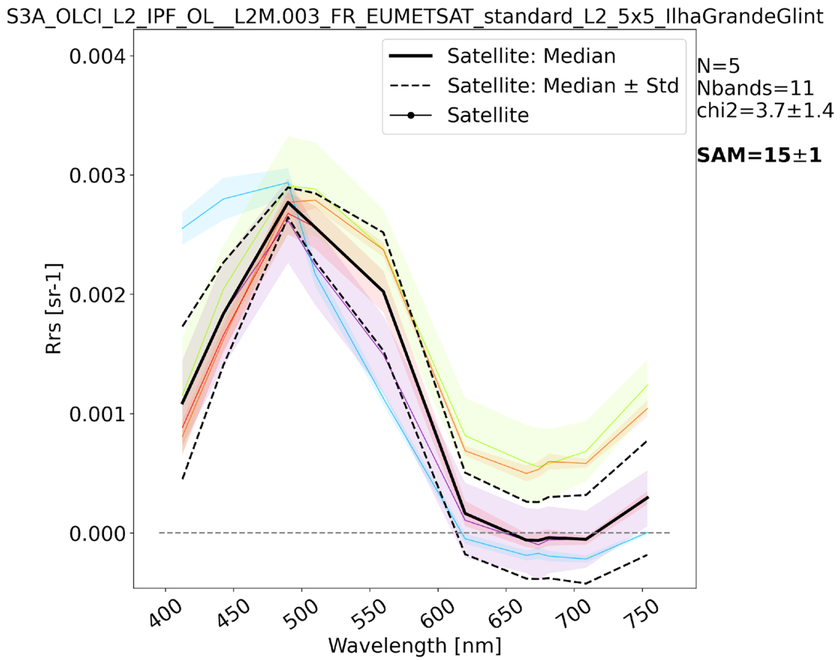
- Insitu and satélite BRDF : **M02**
- satellite_platforms: **S3A, S3B**
- satellite_levels: **L2**
- satellite_resolutions: **FR**
- minifiles_winSize: **5**
- EDB_winSizes: **5**
- insitu_satellite_time_tolerance_seconds **= 6 hours**
- MDB_time-interpolation: **insitu2satellite**_NN
- MDB_stats_MonteCarlo: **100**

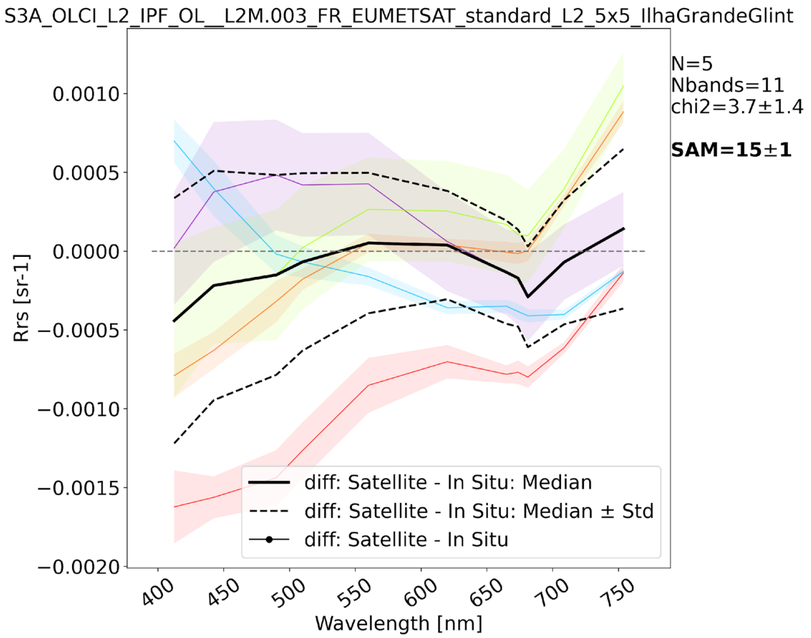


Ilha Grande Bay

- **Almost Case I water (clean water)**
- **No river discharge**
- **No big city around**





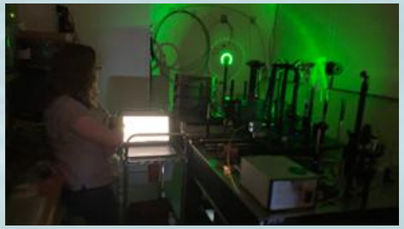


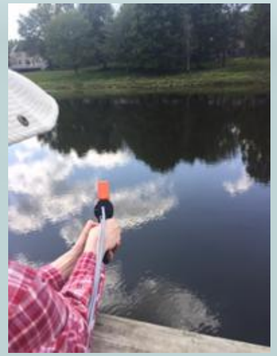
Achieving FRM quality over future measurements

space-limited

primary challenges to acquire our own in situ measurement:

- Sensors not fully characterized with no uncertainty calculations; limited funding for sensor purchase or characterization/calibration updates
- Not always an option to have a stable platform, away from perturbations, or for automated instrumentation; always cloudy in specific locations,
- Limited power source/supply in offshore set-up (Photovoltaic system)
- Presence of poles and other relatively high structures which may disturb/contaminate the irradiance measurements.
- Potential fouling of radiometer (Bird feces, sea spray, salt residues, spider web, dust)
- Collaborators do not always follow protocols for spectral data or in situ data collections (grab samples)
- Tower owner does not inform PI if they add their instruments close to radiometer set-up





Photos courtesy of Natalie Hall, USGS, not for redistribution

Do you think your in-situ acquisitions are conforming to FRM principles

- Varies from no to somewhat

Achieving FRM quality over future measurements

What are the elements of your acquisition protocol/specific procedures in the field?

- Some are not following any in freshwater studies
- Others following some protocols such as geometry, but no glint correction

What are the quality control/assurance steps you normally take?

- Lacking in general
- To reassess look at IOCCG guidelines and define a strong protocol for your specific application, including QA/QC steps

Achieving FRM quality over future measurements

Is there any specific procedure that you follow specific to your measurement conditions and that should be accounted for in the current documentation?

Establishment of minimum uncertainties for freshwater/estuarine non-stationary and stationary platform deployment

How can the OC community help to further FRM standards?

Collaborative studies with experts in FRM to provide guidance

Are you planning to HyperCP and ThoMas to process your in data?

HyperCP - Vishnu once deployment set-up is adjusted, Anastasia

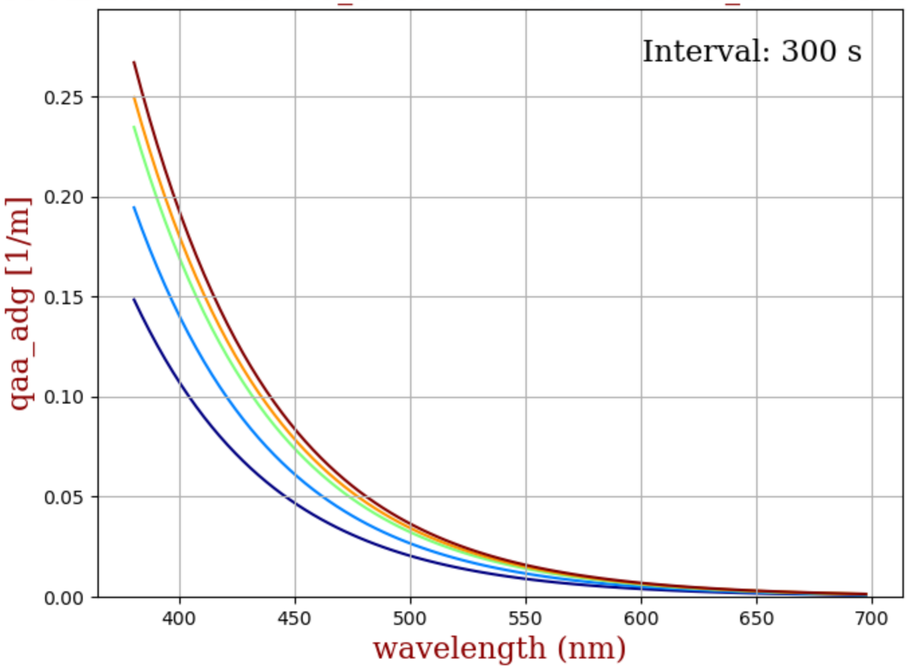
ThoMaS – Natalie, Eduardo, Anabel, Vishnu, Anastasia, Ileana

Processing steps to tweak/enhancement?

Still too unfamiliar with both applications

Thank you!

CSASSOLARTRACKER003_20180316T200000.433Z_20180316T21495



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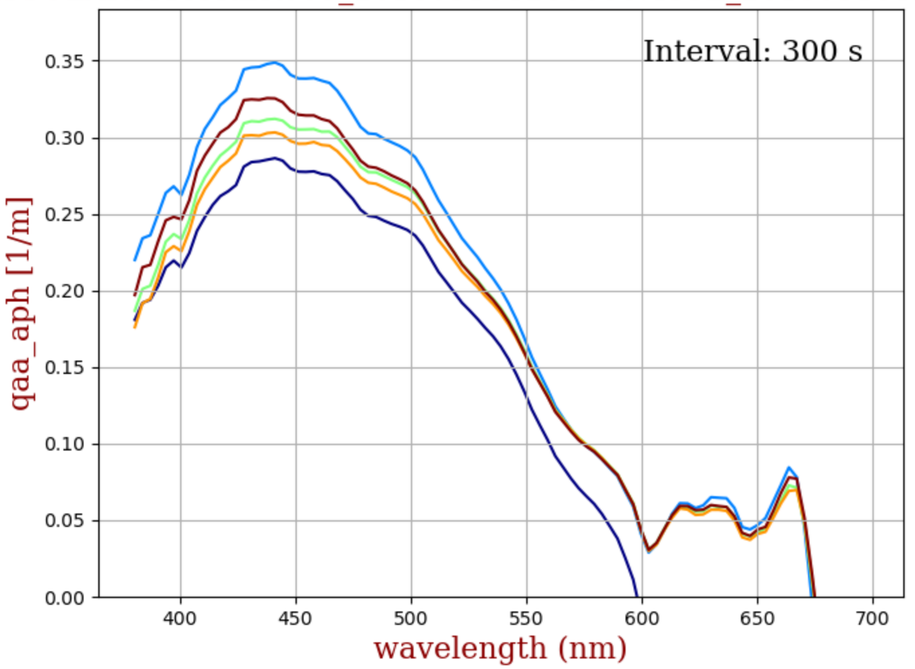

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