Examining the relation between biodiversity and surface temperature regimes in localized coastal upwelling zones using ECOSTRESS

ECOSTRESS Science Team Meeting - December 1, 2020

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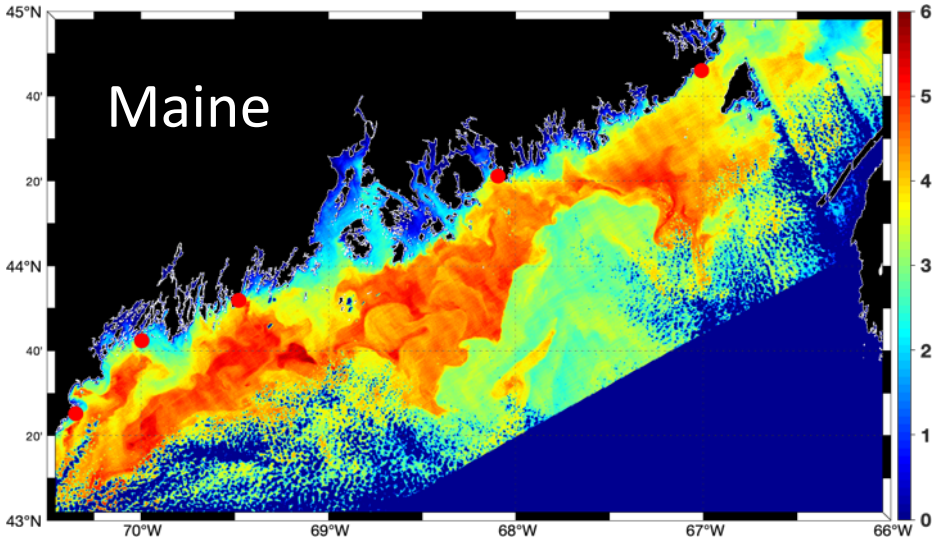
NASA JPL

Motivation to use ECOSTRESS over water

- High spatial resolution
- Non-uniform overpass times
- Ability to extract data up to and across the water-land interface



Composite of two ECOSTRESS scenes
Gulf of Maine - January 14, 2019

Processing and QC workflow

- Data obtained as GeoTIFF using AppEARS (LP-DAAC)

- Initial QC by visual inspection

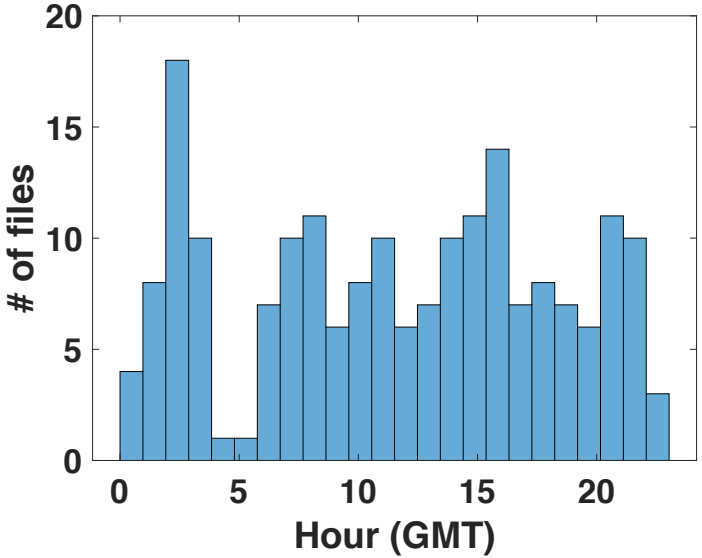
- Masks based on ECOSTRESS QC files (marginal data and clouds)

- Iterative geolocation correction applied in MATLAB using digitized coastline from Google satellite basemap

- Re-project and output corrected LST GeoTIFF

Regions of interest

Region	Raw images (2019-2020)
Channel Islands	183
Florida Keys	267
Biscayne Bay	64
Gulf of Maine	194
Fortoleza, Brazil	32
Serra, Brazil	37

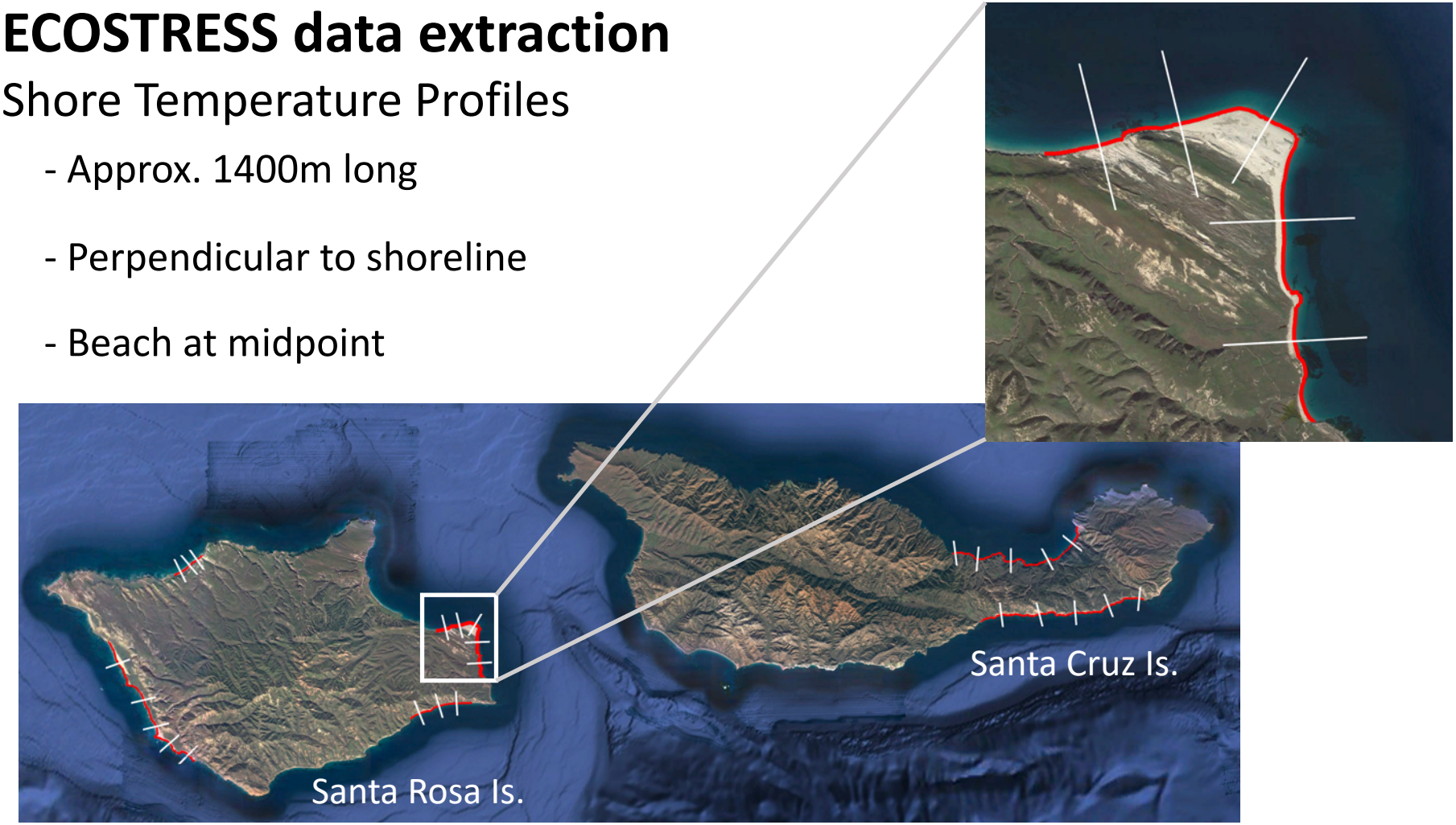


Overpass times for Gulf of Maine images (n=194)

ECOSTRESS data extraction

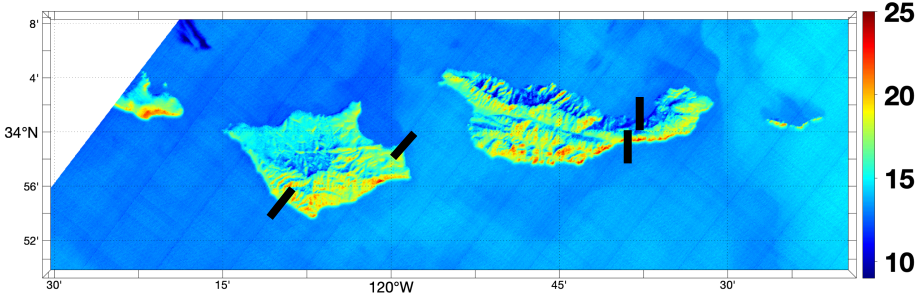
Shore Temperature Profiles

- Approx. 1400m long
- Perpendicular to shoreline
- Beach at midpoint



Channel Islands STP

LST(DegC)



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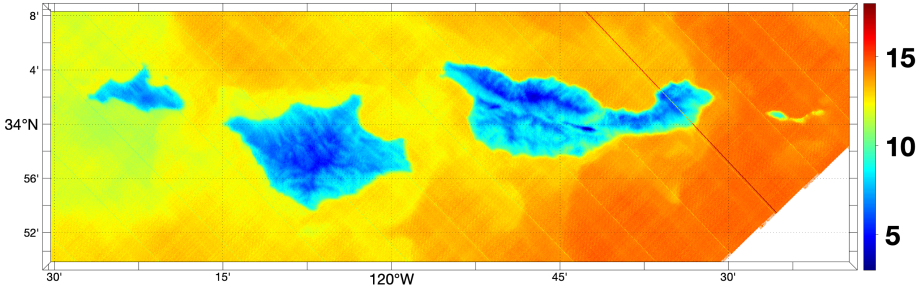

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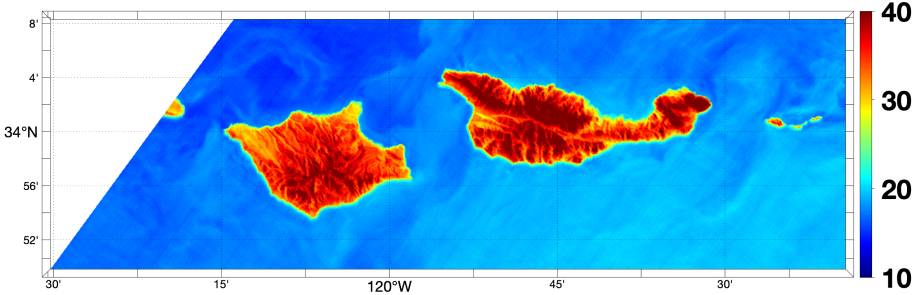

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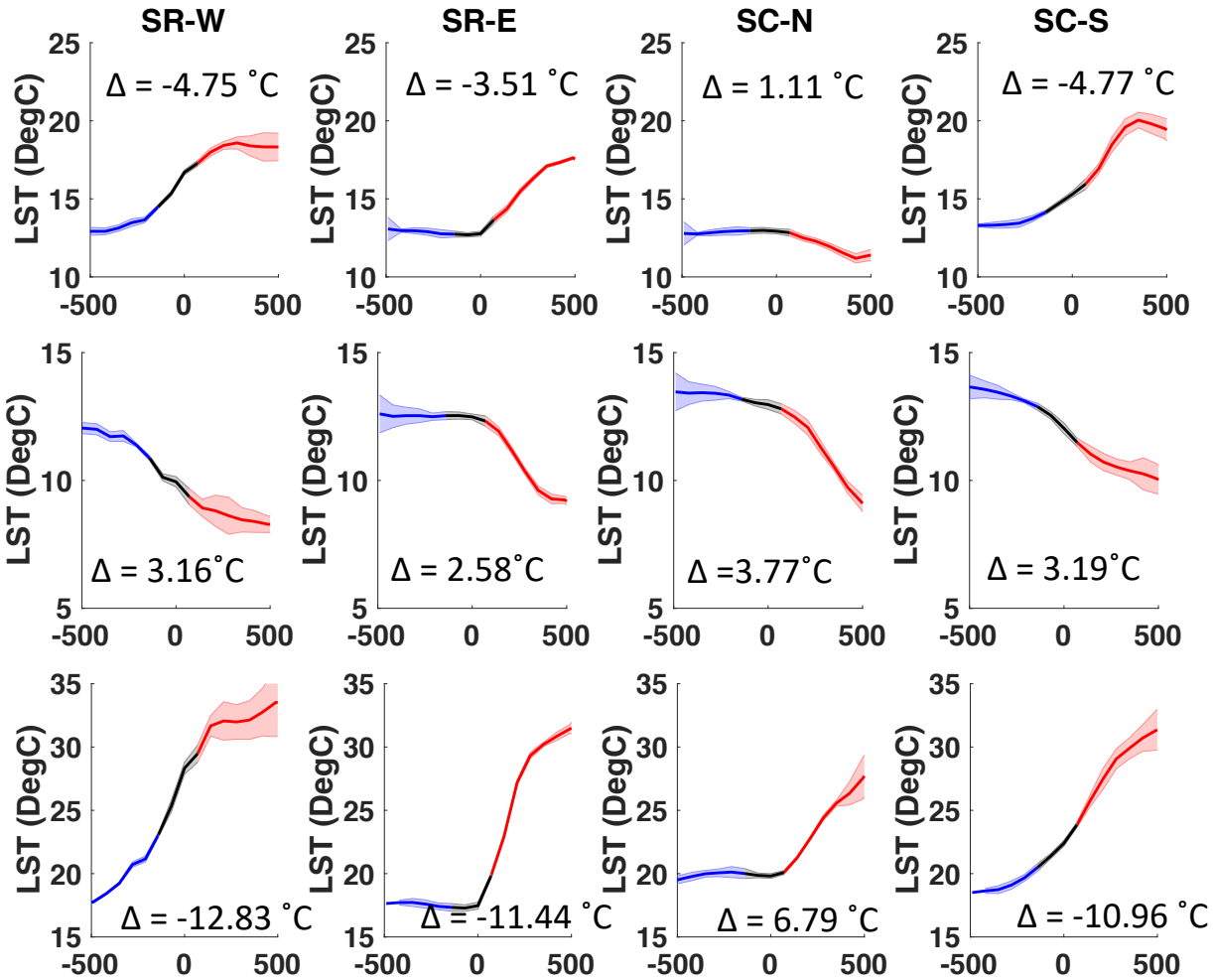
Comparison of STP – Channel Islands

Δ = Water LST – Land LST



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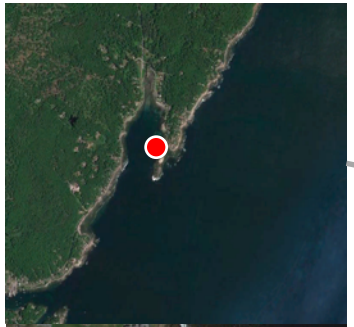
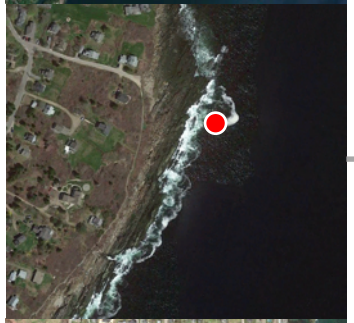
ECOSTRESS on rocky shores in Gulf of Maine

Comparison with in situ temperature observations

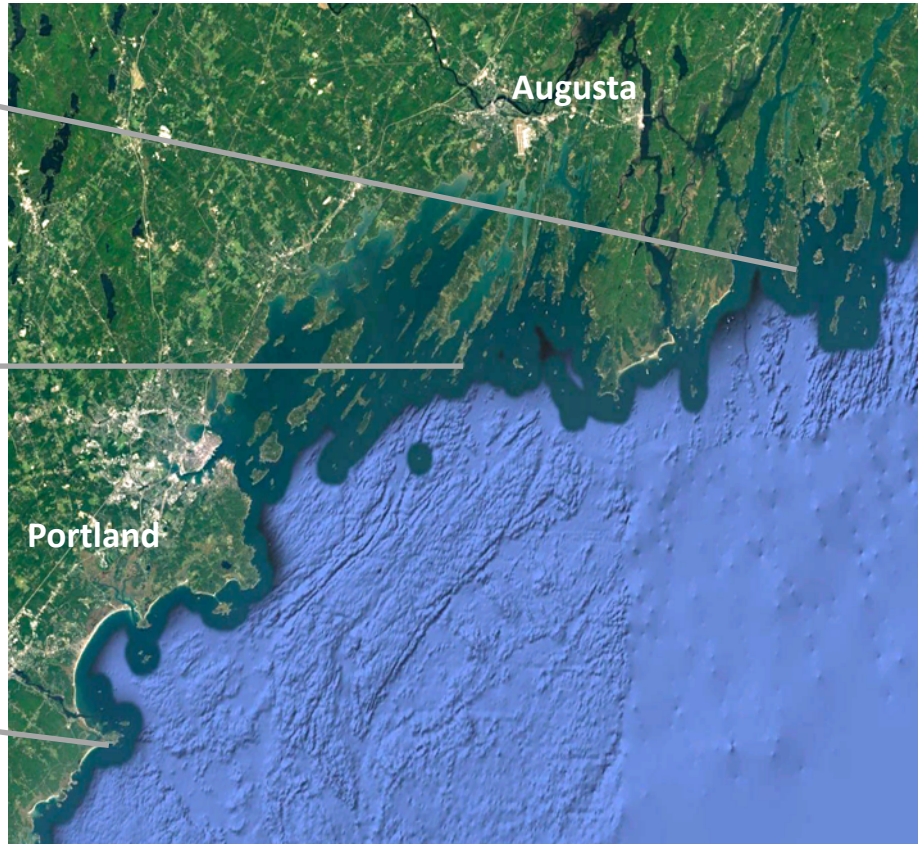
Chamberlain



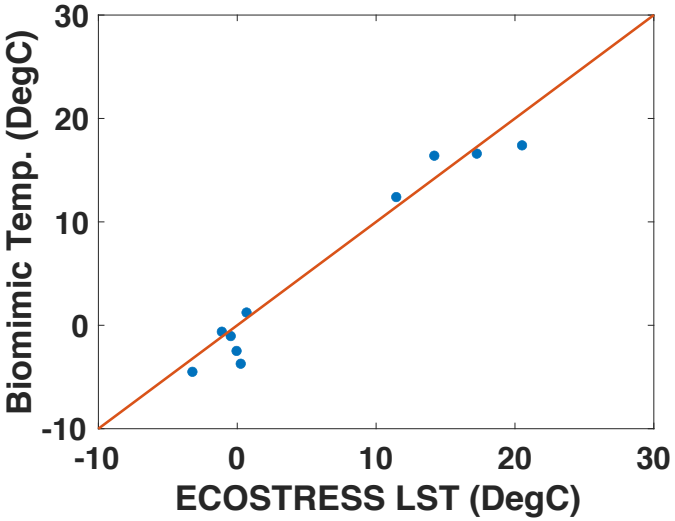
Bailey Island

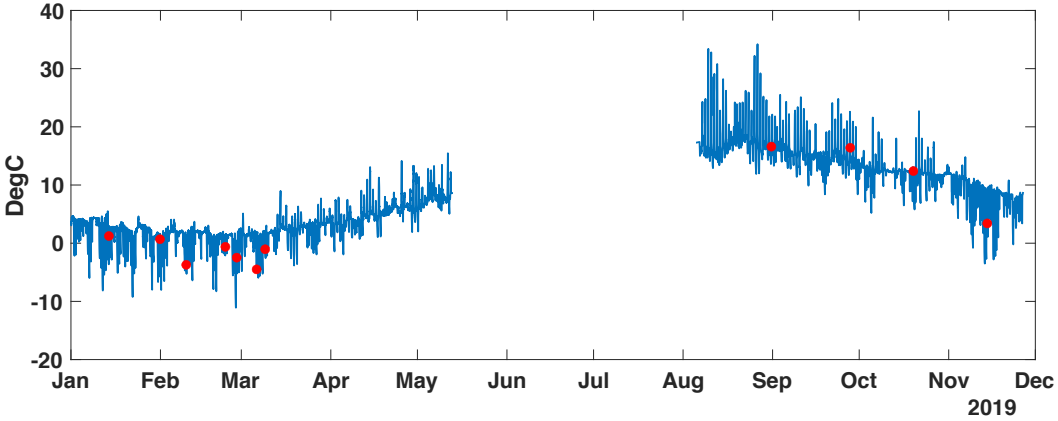


Biddeford



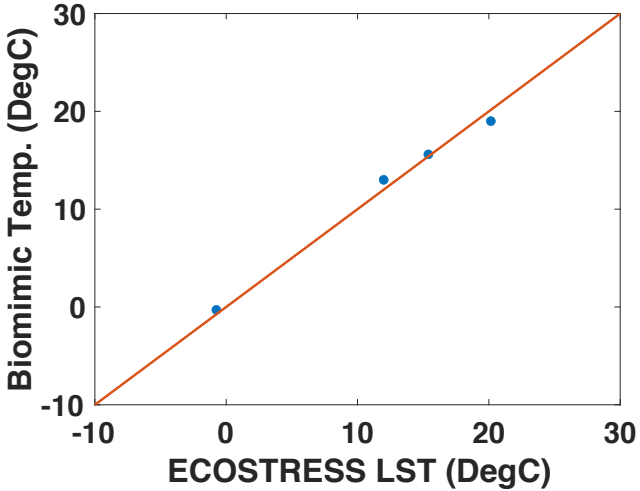
Hourly in situ temperature observations (2019)
Rocky shore at Chamberlain, ME
Mid tidal zone, exposed location

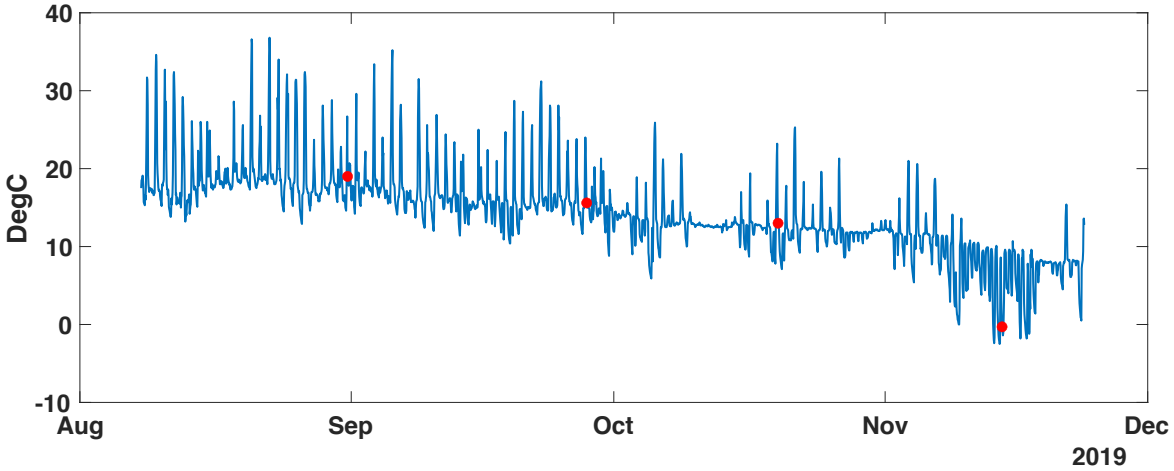




Biomimic data courtesy of Brian Helmuth Lab – Northeastern Univ.

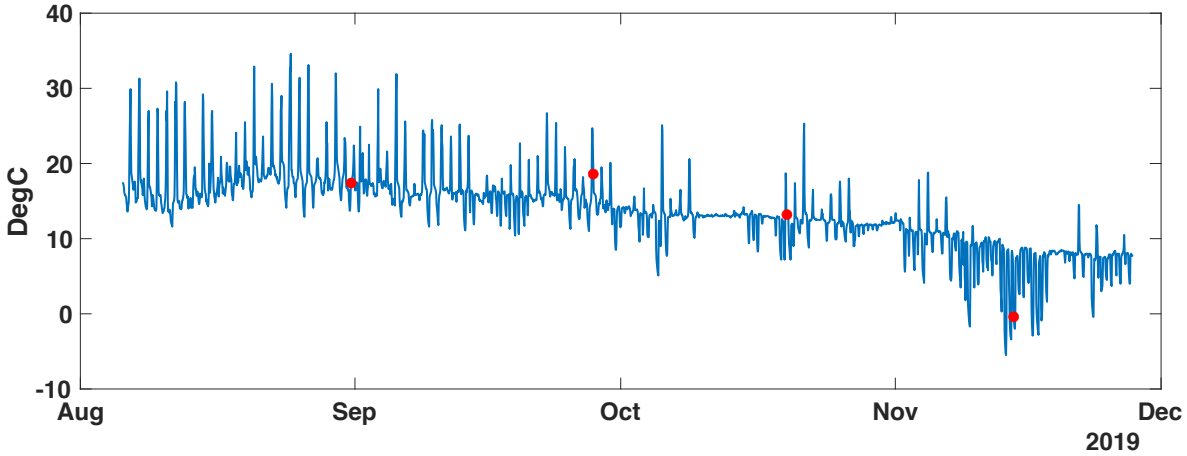
ECOSTRESS comparison to hourly in situ temperature observations (2019)
Rocky shore at Bailey Island, ME
Mid tidal zone, exposed location

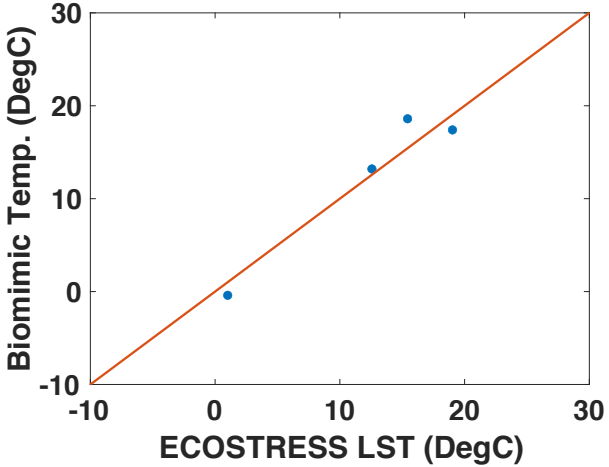




Data courtesy of Brian Helmuth Lab – Northeastern Univ.

ECOSTRESS and in situ temperature observations (2019)
Rocky shore at Biddeford, ME
Mid tidal zone, exposed location



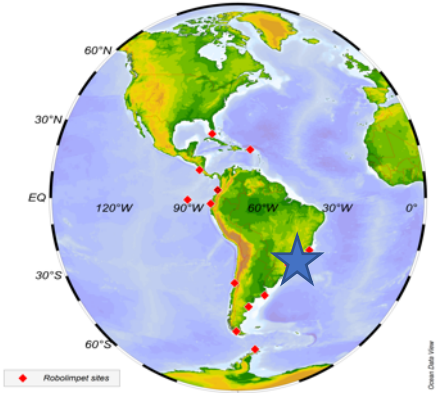


Data courtesy of Brian Helmuth Lab – Northeastern Univ.

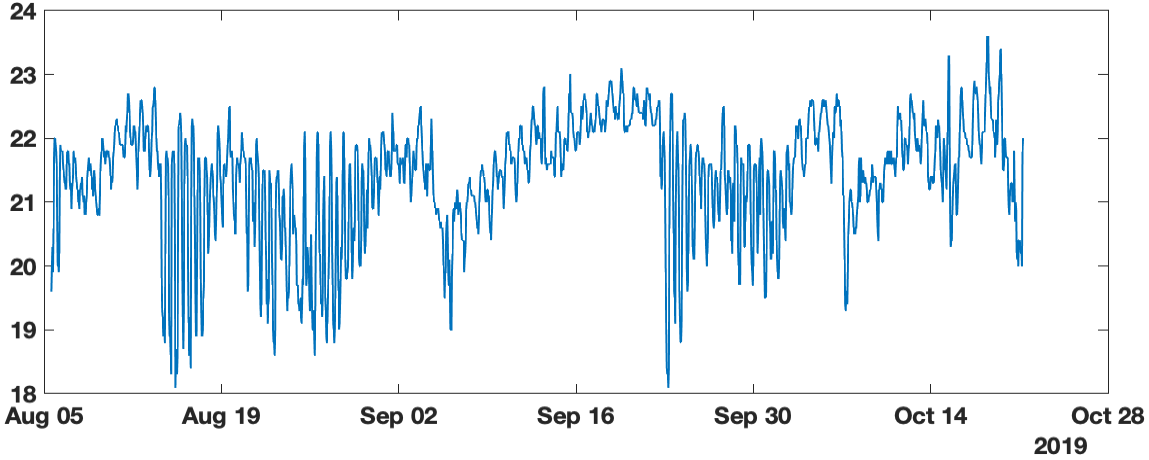
Next steps:

Continue validation of ECOSTRESS at L-W interface with in situ data:

- Robolimpets from MBON Pole-to-Pole
- Robo mussels from Helmuth lab (N. Gulf of Maine, US West Coast)



Fortoleza, Brazil shaded robolimpet



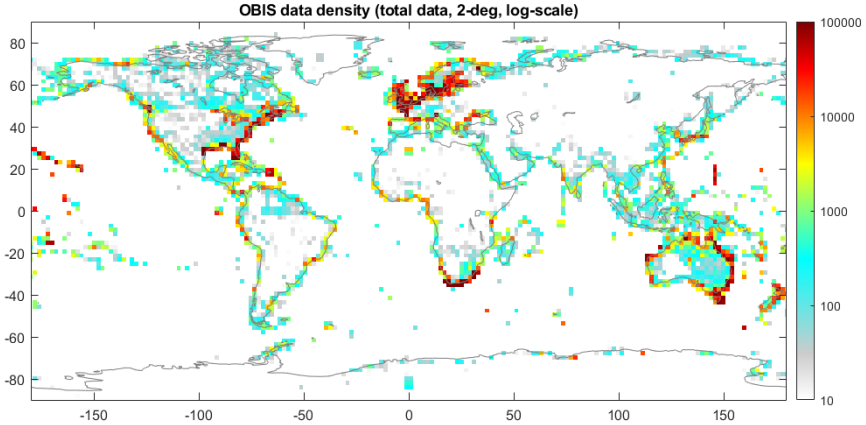
MBON

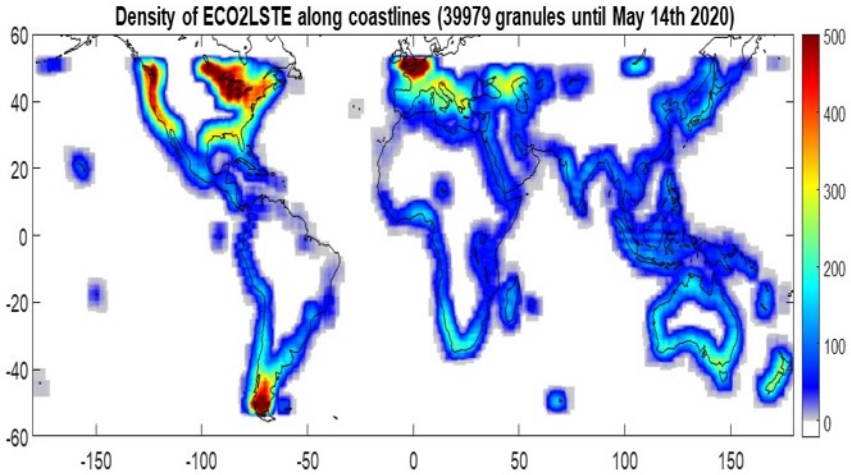
Marine Biodiversity Observation Network

How can we use ECOSTRESS to help make sense of patterns in biodiversity?

- Biodiversity records from Ocean Biodiversity Information System (OBIS)
- MBON Pole to Pole rocky shore surveys (quadrats)

OBIS data records





ECOSTRESS LST granules

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  MBON Pole to Pole colleagues, Brian Helmuth Lab (NEU)

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