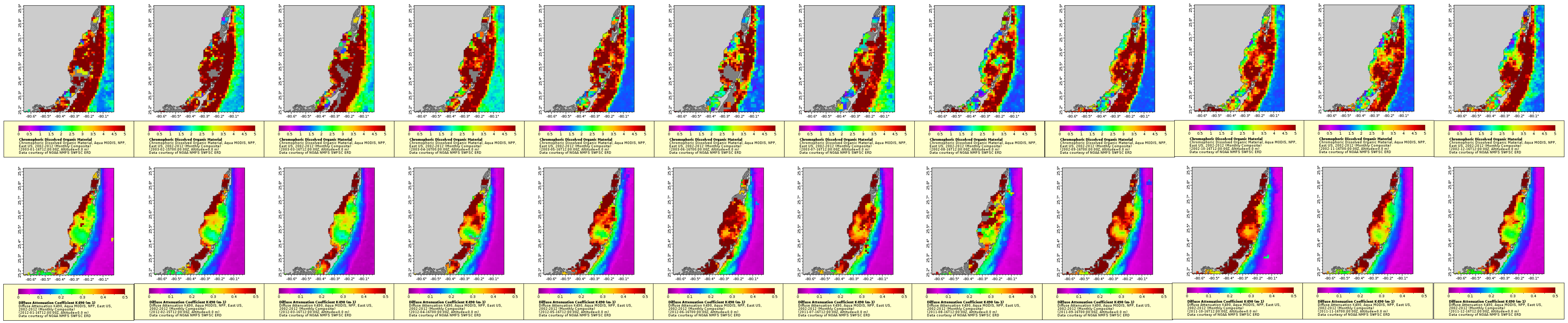
Examples of Past-Participant Slides

Long Island Sound Training Course
March 31 – April 4, 2025

Preliminary Assessment of Satellite Products for Potential Use as Water Quality Indicator for Biscayne Bay Habitat Focus Area

Tomas Vergel C. Jamir, Ph.D. - Greater Atlantic Regional Fisheries Office, National Marine Fisheries Service



JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

Introduction:

Bounded by a large urban area, extensive farmlands, and the Florida Everglades, Biscayne Bay is a shallow estuary beset with serious conservation issues ranging from declining water quality to diversion of freshwater inflow and physical damage to biological habitat. In response, NOAA established the Biscayne Bay Habitat Focus Area (BB HFA) project to: (1) understand major sources of nutrients contributing to phytoplankton blooms and (2) improve freshwater inflows to restore nearshore estuarine habitat, among others. This presentation is a preliminary qualitative assessment of available satellite data products that may be applicable for this purpose.

Materials and Methods:

Monthly Level 3 satellite images of water clarity were assessed qualitatively for their ability to identify seasonal patterns in primary productivity and water quality within the BB HFA. For this analysis, the mean monthly composite data of (1) *Chromophoric Dissolved Organic Material* (CDOM) from January to December, 2002 and 2003 [upper set of figures] and (2) *Diffuse Attenuation Coefficient* (K490) from January to December, 2012 [lower set of figures] were evaluated. Both were derived from Aqua MODIS, NPP, East US, data courtesy of NOAA NMFS SWFSC ERD.

Results and Discussion:

Southeastern Florida generally experience warm, dry conditions throughout the year punctuated by afternoon showers and thunderstorms during summer and occasional hurricanes during fall. The Miami River empties its freshwater load in the northwest section of the Bay. Freshwater from the Everglades is controlled by major canals located to the west and in the shallow southern section of the Bay.

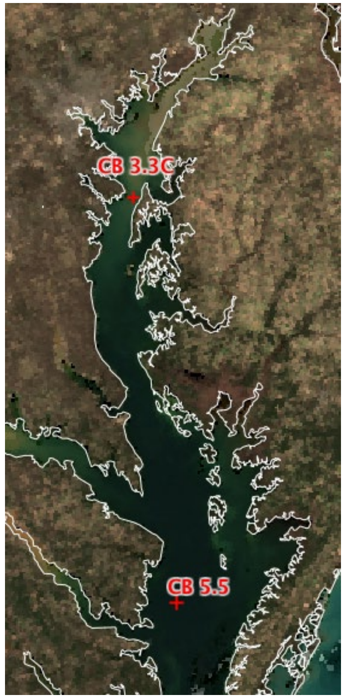
The pixel sizes and image resolution of both CDOM and K490 images were small enough to allow for visual identification of patterns and seasonal changes in the spatial distribution of water quality indicators within the Bay. For example, freshwater with low dissolved organic load coming out of the southern canals and the mouth of the Miami River during the rainy season were clearly discernable from the CDOM images. The images also show how the low volume discharge of less dense freshwater floats and hugs the coast as it meets the salty, more dense waters of Biscayne Bay

On the other hand, the K490 images seems better at delineating the oligotrophic oceanic waters from the relatively more productive Bay waters. The seasonal changes in the overall pattern of primary productivity of the Bay can also be discerned visually from the K490 images.

Chesapeake Bay water clarity

By: Grace Kim, NASA Goddard

For NOAA East Coast Satellite Data Training Course Project, May 2019



Q: How does the satellite data compare with in situ measurements of the diffuse light attenuation coefficient for PAR (k_{PAR})?

Data Sources:
- NOAA East Coast Coastwatch (satellite k_{490}, NOAA algorithm, monthly composite, 1km)
- Chesapeake Bay Program monitoring data (in situ k_{PAR})

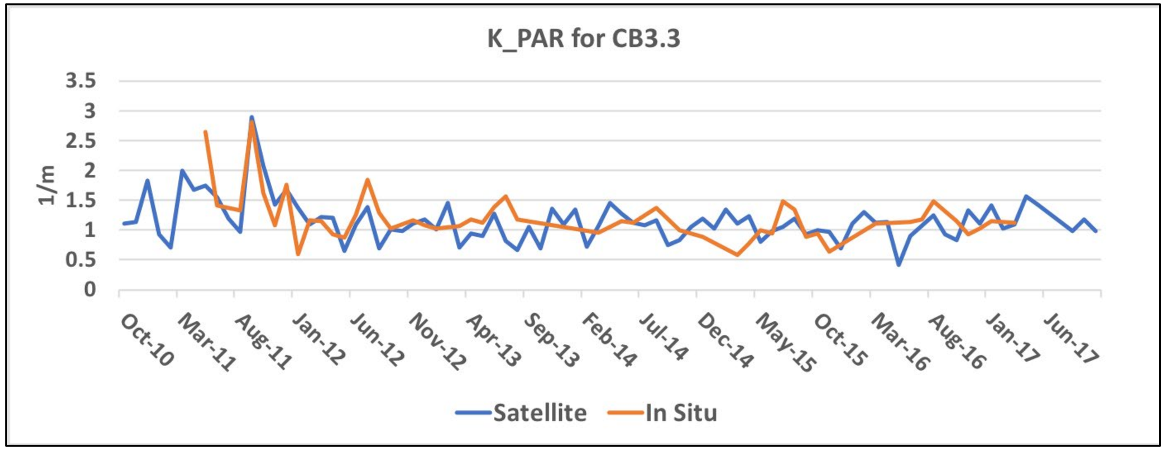
Times: Oct 2010 to Oct 2017

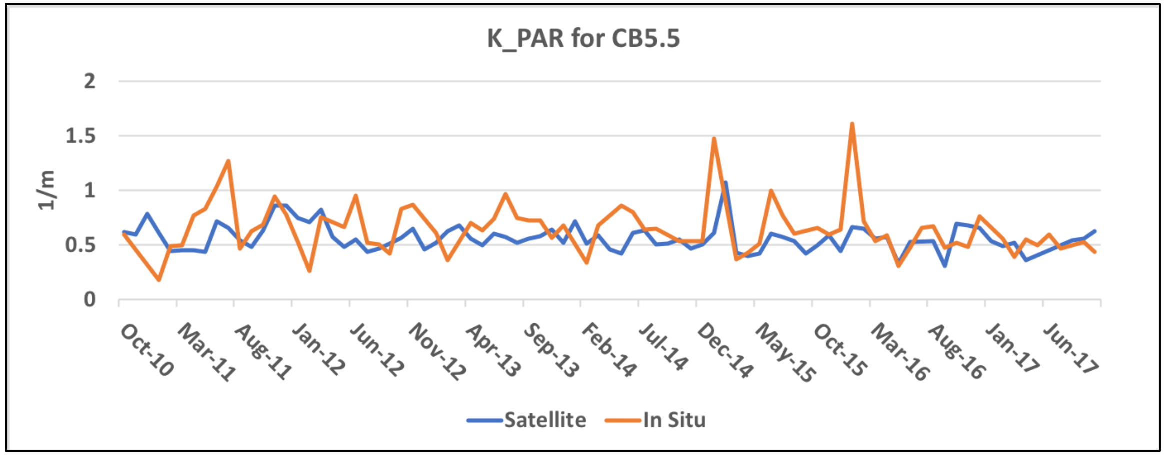
Locations: Stations CB 3.3 and 5.5

Method: Convert k_{490} to k_{PAR} to match in situ measurement using equation 17 of Wang et al 2009, JGR:

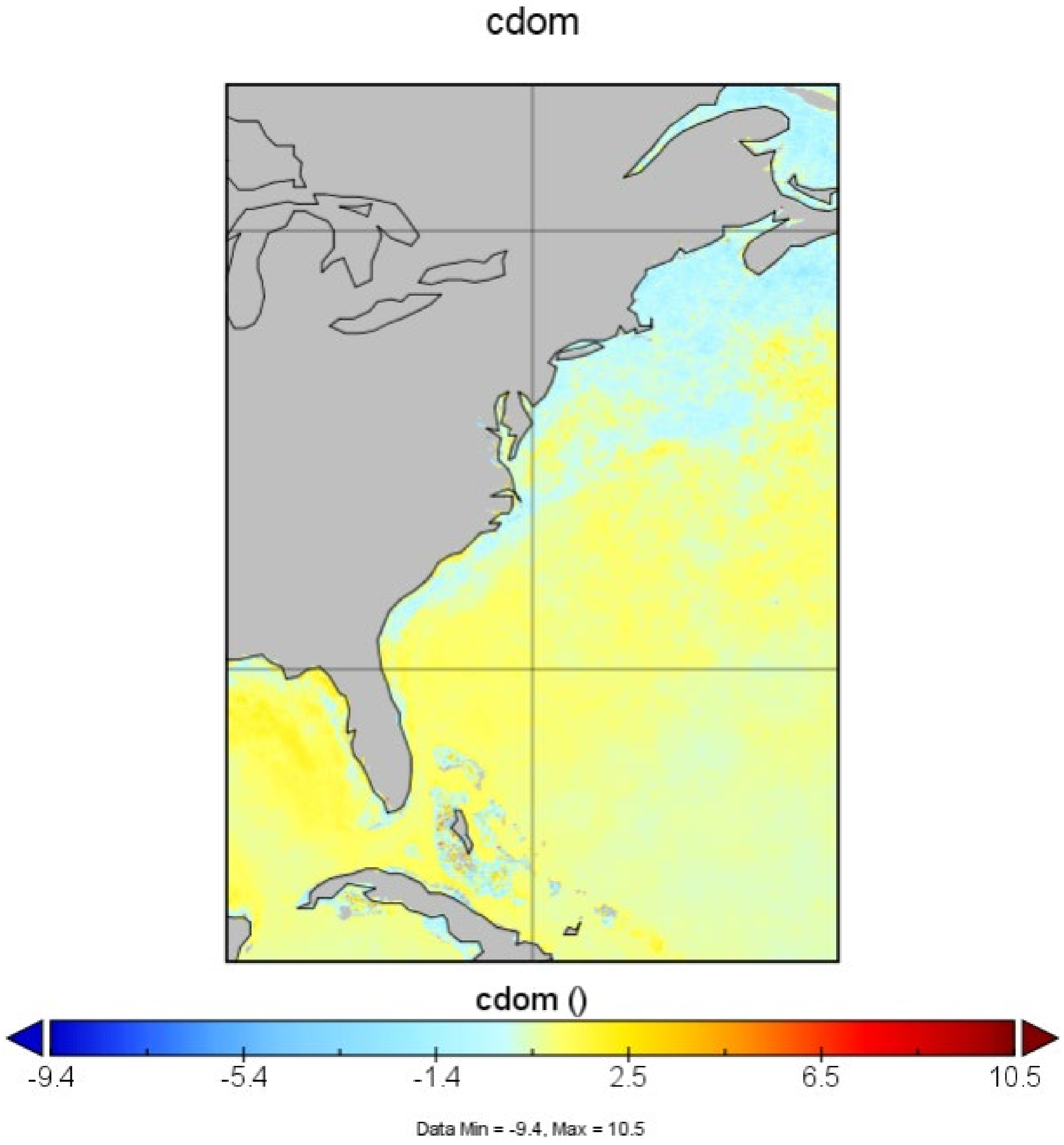
$$K_d(\mathrm{PAR}) = 0.8045\, K_d(490)^{0.917},$$

A: Satellite seems to generally get similar values as in situ k_{PAR}. Some of the discrepancy likely comes from the differences in sampling/observation times and image compositing. Both satellite and in situ data show higher values (lower water clarity) in the upper Bay station (3.3C) compared to the middle/lower Bay (5.5).





Change in CDOM concentration between 2003 and 2012



Chris Jenkins,
URI/GSO
Undergrad,
2018

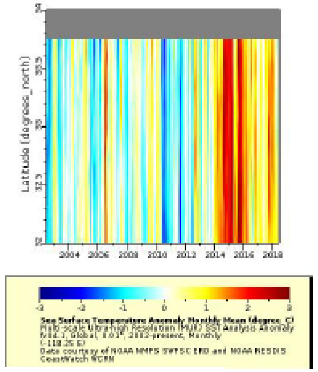
Using data from the Aqua MODIS satellite project found on ERDDAP, we found a slight decline in CDOM concentration around the Caribbean, along the jet stream, and along the northeast shelf. CDOM stayed constant or slightly increased in the open ocean and in the Gulf of Mexico. The decline in these areas suggest reduced levels of organic runoff from the islands. Potential increase in CDOM concentration in the open ocean has no obvious explanation and is worth further exploration.

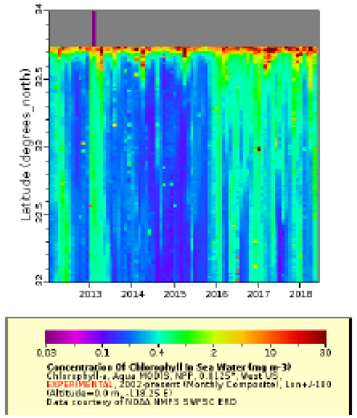
Comparing Environmental Change at Two Blue Mussel Offshore Aquaculture Farms

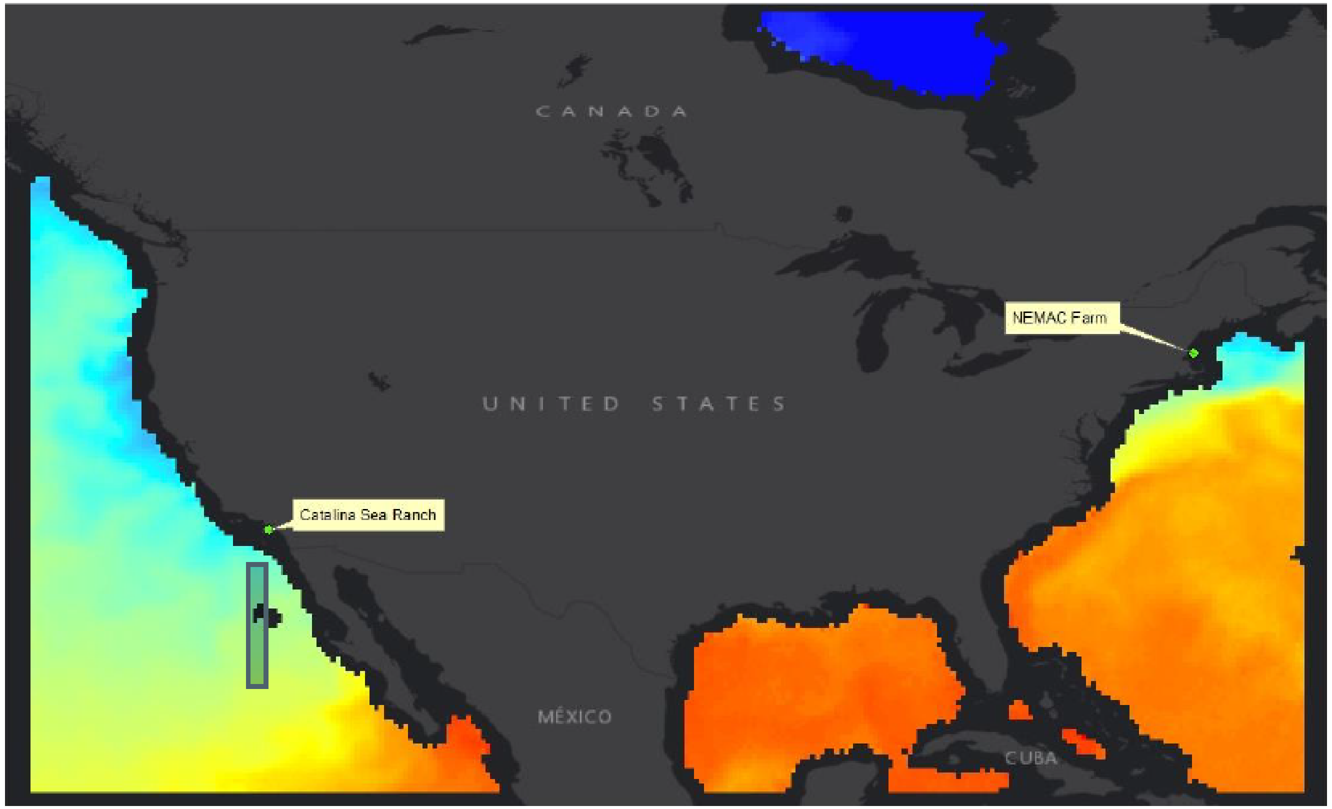
SST 2002 – 2018
Chlorophyll 2012 – 2018

Darien Mizuta
Postdoctoral Research Associate
NEFSC – Milford Lab

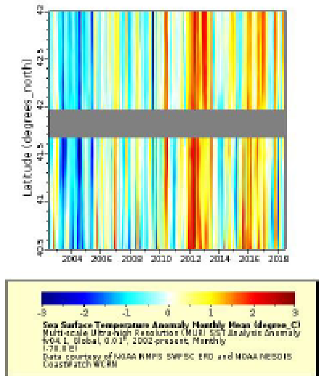
>> Farming success depend much on environmental characteristics of the area, matching species ecology need. <<

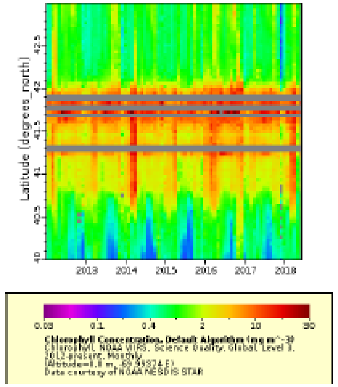






Offshore Mussel Farms
West Coast x East Coast





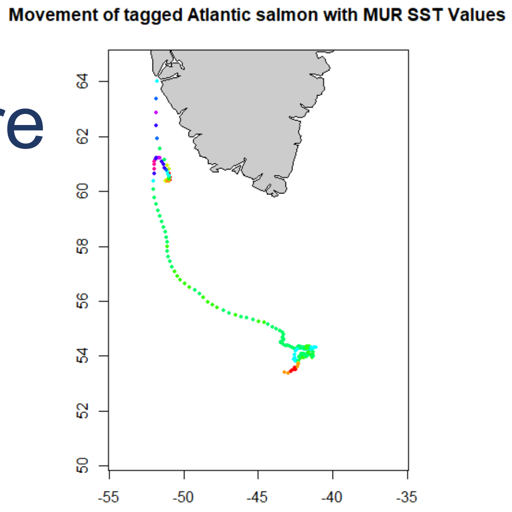
Recent trends shows that the farm in the East Coast seems to be more suitable for farming*, with more stable temperatures and more available food.

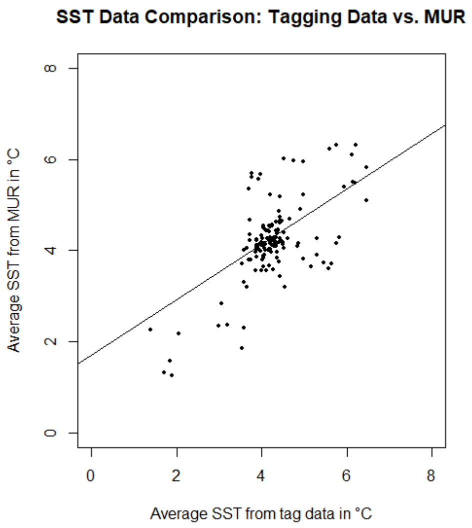
* Based solely on this data AND assuming surface measurements reflect similar trends in deeper water column.

Movement of adult Atlantic salmon in the Labrador Sea and Sea Surface Temperature

Jess Strzempko, NOAA NEFSC & Clark University
undergrad 2020, 2018 East Coast URI class

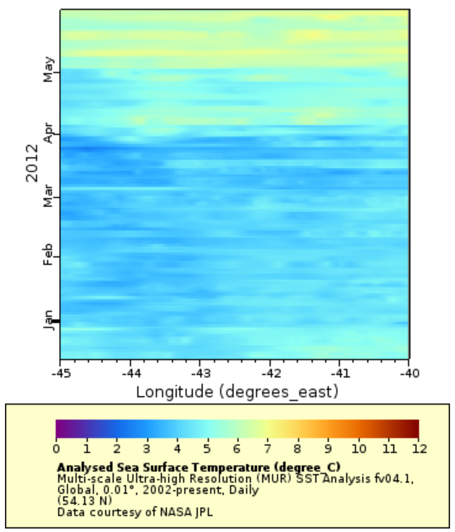
- September 2011-April 2012 tagging data from an individual salmon that left the coast of Greenland and traveled south through the Labrador Sea before maintaining a tight pattern of movement January-April between 53-55 ºN and 41-44 ºW
- Created Hovmöller diagrams of absolute SST and SST anomaly at average latitude for January-April, 54.14 ºN, to look for indication of a possible warm core ring to explain the concentrated movement, no such pattern found
- Map showing NASA JPL MUR SST data for daily tagged locations and scatterplot with linear regression comparing these values to those recorded by the tags display a considerable amount of variance
- ve accuracy in the

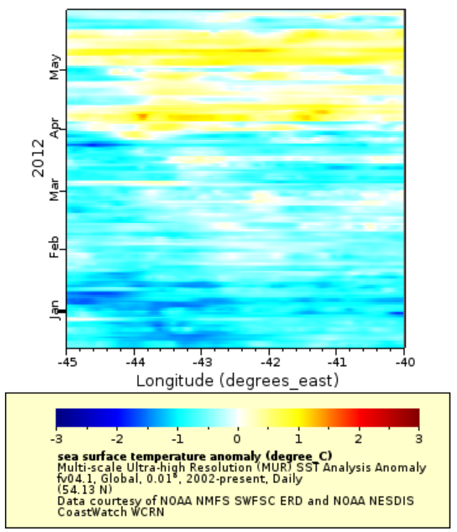




Comparison of satellite and tag SST data

(Linear Regression: y = 0.6101x + 1.6944, R^2 = .4468)





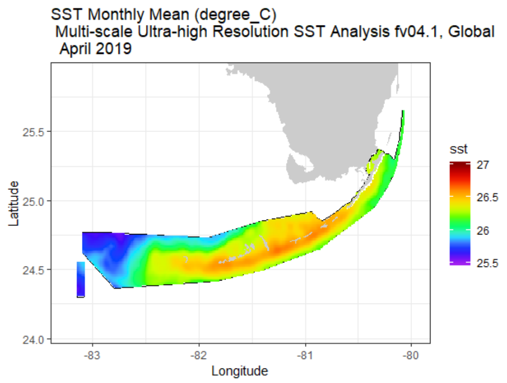
Hovmöller diagrams

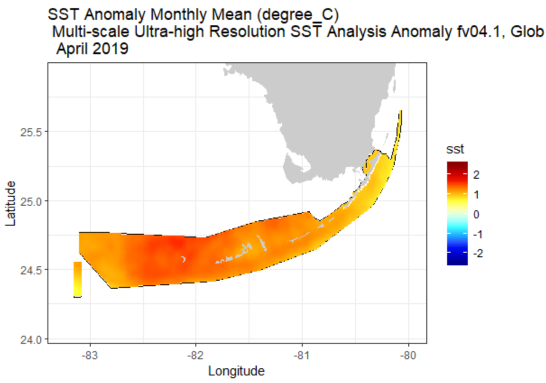
NOAA FISHERIES
Northeast Fisheries Science Center

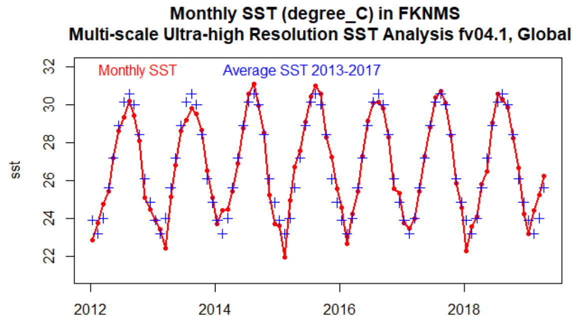
Explore SST and Chlorophyll monitoring over the Florida Key National Marine Sanctuary

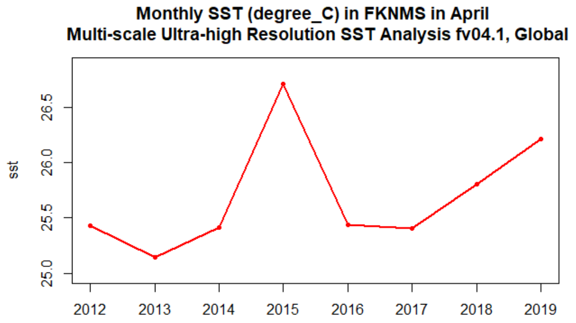
Qinqing Shi (NOAA/NOS/ONMS) qinqing.shi@noaa.gov

- The objective is to explore the usage of satellite data to monitoring the key oceanic parameters including the sea surface temperature and chlorophyll over the Florida Key National Marine Sanctuary (FKNMS).
- R was used to retrieve and analyze near real time data and anomalies from the Coast Watch ERDDAP at the monthly scale.
- The monthly SST as shown in right figures revealed that SST was high in the center and lower in the west of FKNMS in April, 2019, with more than one degree positive anomalies in the center west. The April SST over FKNMS was high in 2015 and 2019.
- The monthly chlorophyll results as shown in the bottom indicated that the chlorophyll was high in the center and north of FKNMS in April, 2019. Several positive anomaly hotspots were also identified, and the average April chlorophyll of FKNMS reached the highest value over the recent 8 years.
- It demonstrated how to utilize satellite data to monitor oceanic variables over FKNMS, which could enhance the management, engagement, policy planning, and geospatial representations for the national marine sanctuaries.

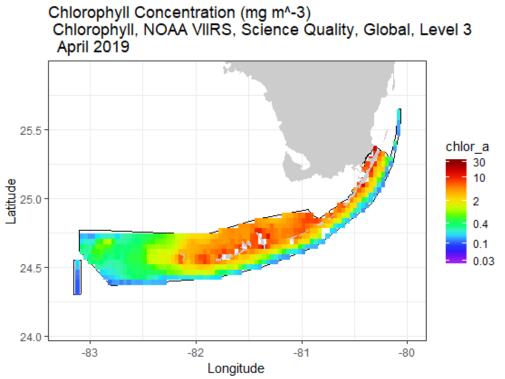


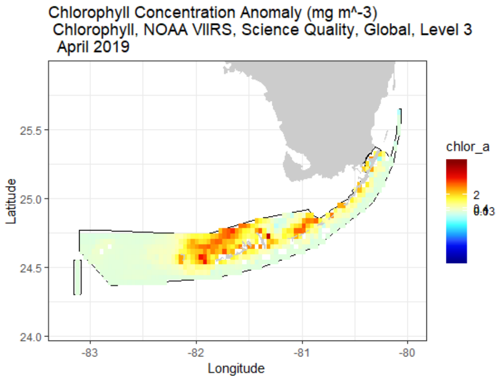


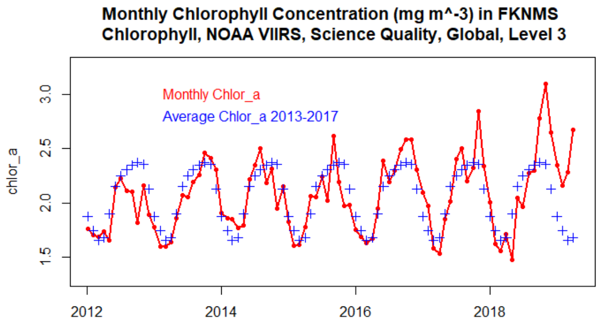


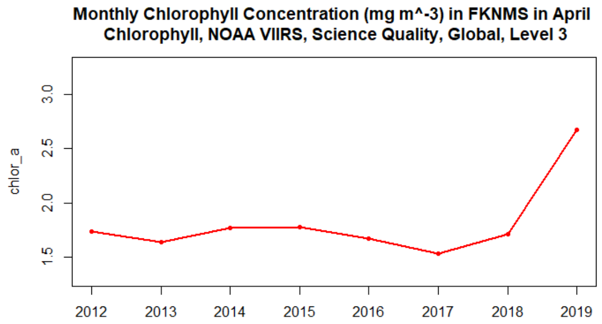


SST data provided by NOAA ERD and CoastWatch West Coast Regional Node. The sensors include AMSR-E, AVHRR, MODIS, SSM/I, VIIRS, in-situ









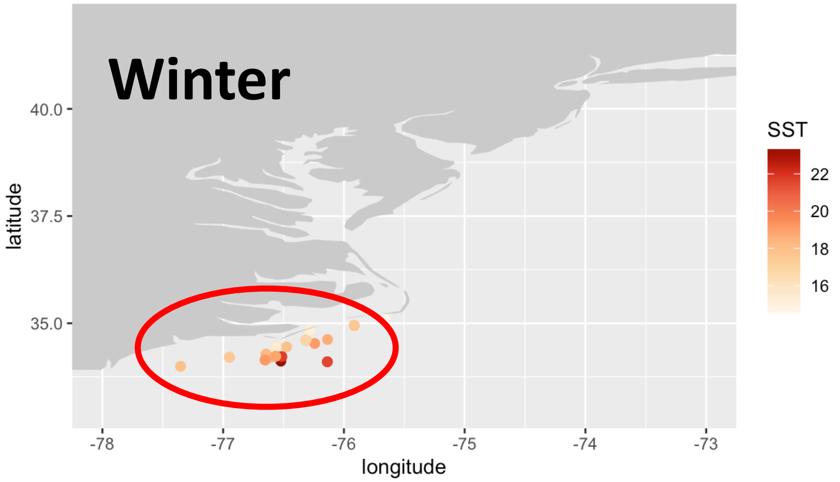
Chlorophyll data provided by NOAA's Center for Satellite Applications & Research (STAR) and the CoastWatch program and distributed by NOAA/NMFS/SWFSC/ERD.

Matching Tagged Fish Movements to Environmental Parameters from Satellite

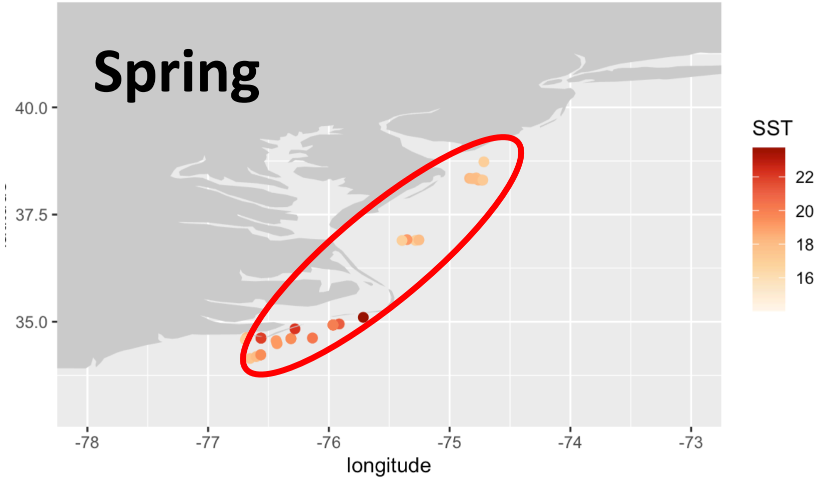
Seasonal Shifts in East Coast Dusky Sharks in Response to Water Temperature

Class Group Project: Roxann Cormier – Univ of Massachusetts
Matthew Larsen – Univ of Central Florida

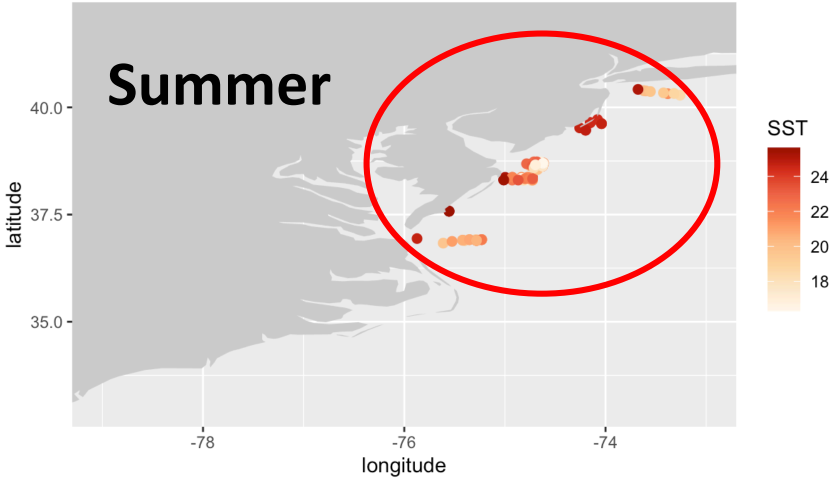
Mean SST all dusky shark tag locations in Winter (n=6)



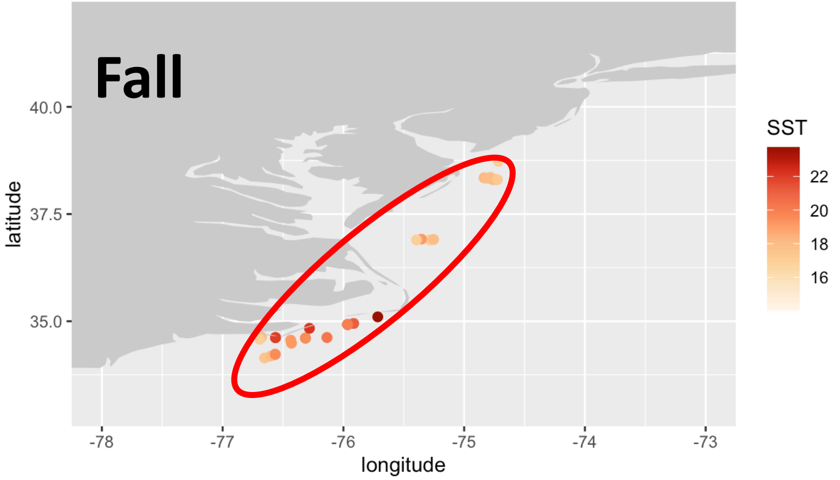
Mean SST all dusky shark tag locations in spring (n=9)



Mean SST all dusky shark tag locations in summer (n=14)

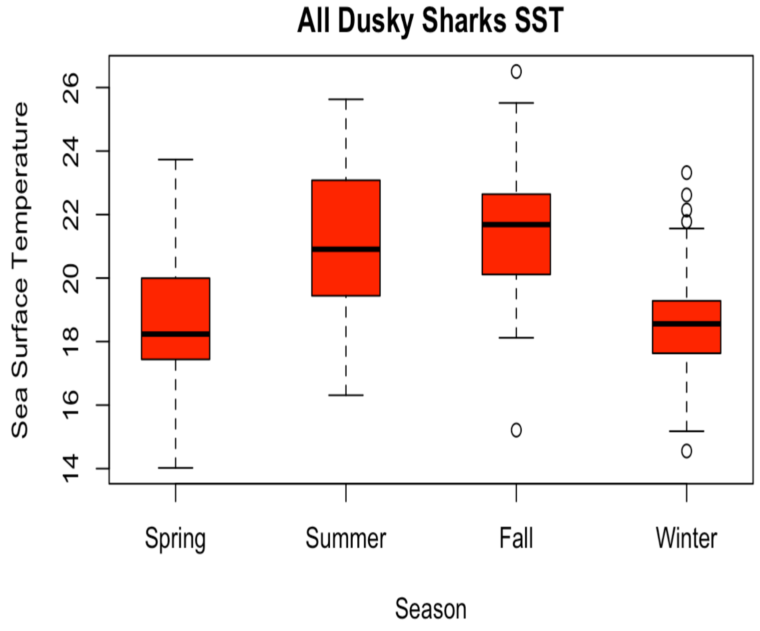


Mean SST all dusky shark tag locations in Fall (n=20)



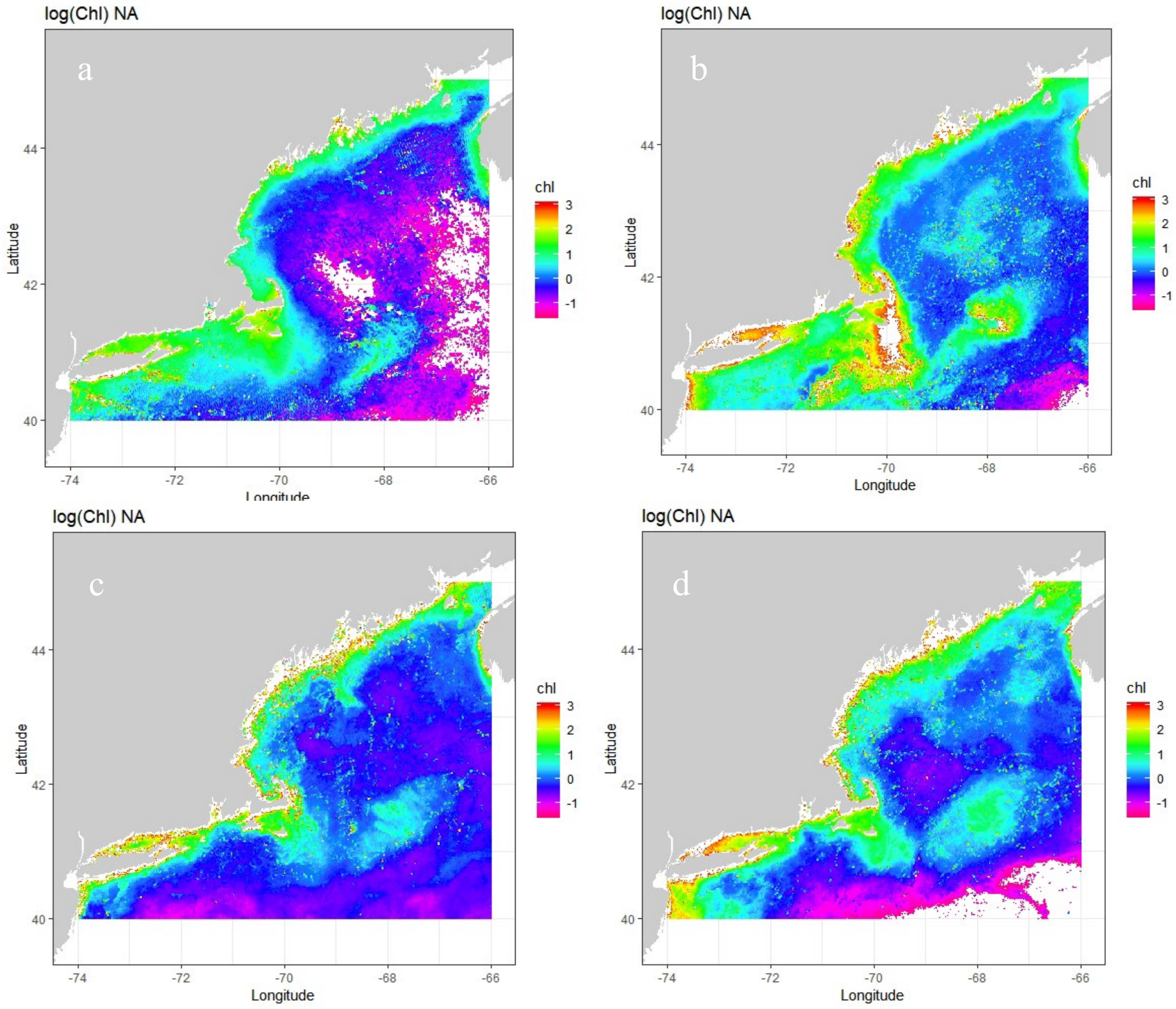
Average Temperature by Season for all 20 Dusky Sharks

2017-2018, U.S. East Coast



Data Credit
Fish Tag Data: Smithsonian/SERC
Satellite SST: NOAA/STAR/CoralReefWatch

Chlorophyll concentrations in 2011



- Chlorophyll concentration (mg/m^3) in the North Atlantic throughout the seasons of 2011. a) 1/16/2011, b) 3/16/2011, c) 6/16/2011, and d) 9/16/2011.
- Aqua MODIS monthly composite satellite data set ID: erdMEchlamday.
- Maps created in R

Jessica Carney, URI/GSO student, 2018 class

Sea Surface Temperature Change in North Atlantic Right Whale Southern Critical Habitat (1982-2012)

Coast Watch Satellite Data Course August 2018

R Code: https://github.com/lettrichm/CoastWatchSatelliteCourse

Matthew Lettrich
Office of Science and Technology
Assessment and Monitoring Division
Protected Species Science Branch

How has the sea surface temperature changed from 1982-2012 where North Atlantic right whales winter in their southern critical habitat?

Methods:

Acquire satellite data
Clip to boundary of southern critical habitat
Calculate summary statistics month-by-month

Results:

Winter temperatures (when right whales are in the southern critical habitat) appear to have become colder during the 30 year time period while summer temperatures have risen. Confirmation from in-situ data series is necessary, as satellite coverage in this area during the winter months is sparse due to cloud cover. Dec, Jan, Feb, and Mar coverage is particularly poor.

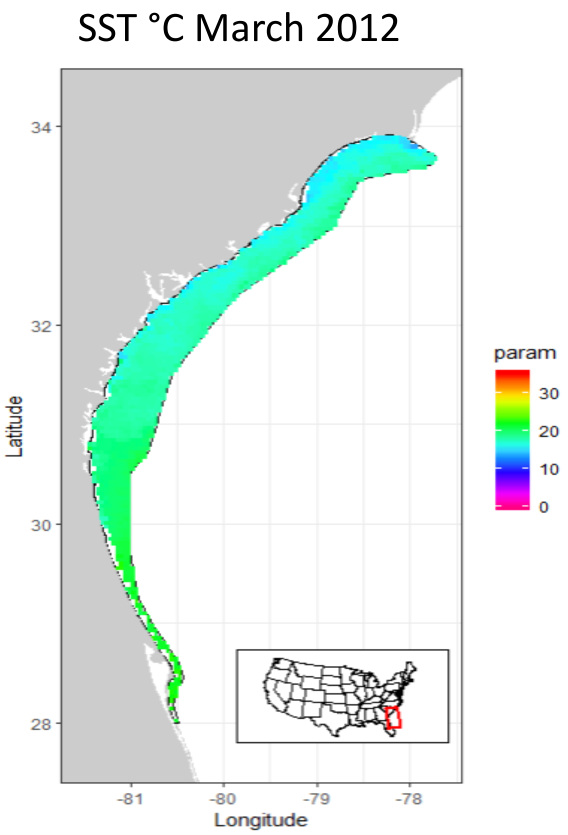


Fig. 1. March 2012 sea surface temperature in the southern North Atlantic Right Whale Critical Habitat area.

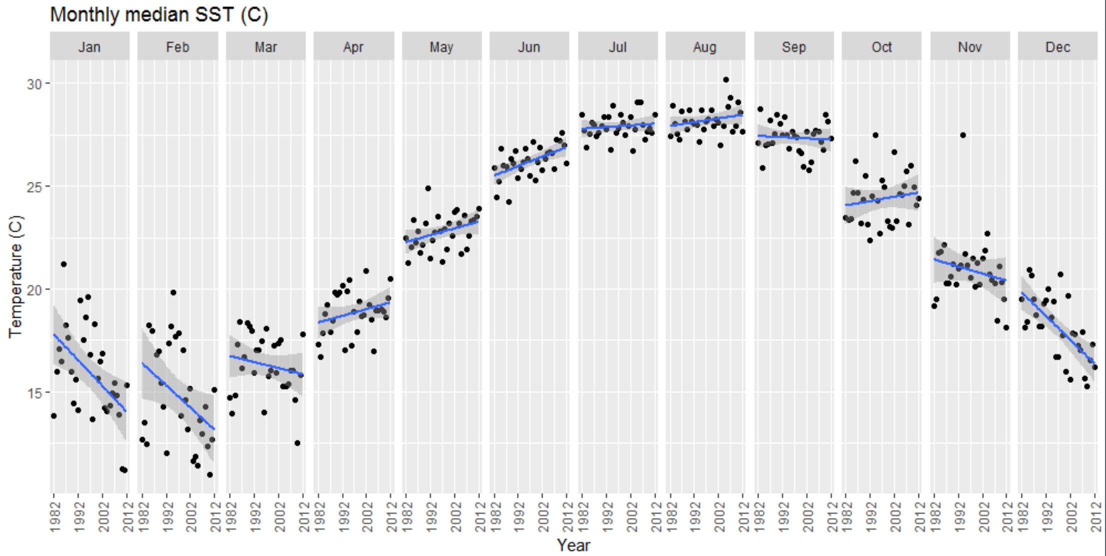


Fig. 2. Trend in year over year monthly sea surface temperature in the southern North Atlantic Right Whale Critical Habitat area.

Data Sources:

Casey et al. 2010; NOAA Fisheries Service 2016
"These data were provided by GHRSST and the US National Oceanographic Data Center. This project was supported in part by a grant from the NOAA Climate Data Record (CDR) Program for satellites"