Advancing Coastal Intelligence in the US Caribbean: Surface Currents

PI Hugh Roarty
71 Dudley Rd. New Brunswick, NJ 08901
hroarty@marine.rutgers.edu

Performance Period: June 1, 2019 – December 1, 2019

LONG-TERM GOALS

Rutgers University Center for Ocean Observing Leadership (RUCOOL) is a global leader in High-Frequency radar (HFR) network implementation and management. Through this proposal, RUCOOL looks to assist CariCOOS in the expansion and operation of their HFR network. The US Coast Guard has identified the ocean surface current data from the five existing HFR stations as an important resource for their search and rescue activities. The real-time surface current information improves the decision-making capabilities during critical lifesaving search and rescue missions.

The HFR network is part of the observational sensor subsystem for CariCOOS. The other subsystem for CariCOOS is a modeling and forecast component. The subsystem is comprised of wave, storm surge, wind and ocean circulation models. The ocean circulation model is based upon the Regional Ocean Modeling System (ROMS). The goal of this proposal is to compare the surface current measurements of the HF radar network with the output of the circulation model and test the capability of the other models to assimilate the measured ocean surface current data.

MILESTONES / OBJECTIVES

No.	Deliverable	Delivery Date	Status
1	Color code the virtual drifters based upon the AFAI concentration from the USF satellite product.	January 30, 2020	On Schedule
2	Develop a validation page that shows the comparison between the HFR surface trajectories and the ocean model trajectories.	February 28, 2020	On Schedule
3	Hold midterm project meeting in Puerto Rico	February 15, 2020	On Schedule
4	Evaluate the RTOFS model for surface trajectory skill. If the FVCOM model output is available, evaluate that as well.	May 15, 2020	On Schedule
5	Attend CARICOOS General Assembly	April 2020	On Schedule

WORK COMPLETED

1. A new webpage was developed to chronicle the project [here](). The old webpage that has the previous analysis from Year 1 and 2 is still available [here]().
2. The Sargassum tracking tool runs once a day and the most recent trajectory forecasts are available [here](). Figure 1 provides a screenshot of what the interface looks like. The archive dating back to June 13, 2019 is available [here]().
3. We developed ERDDAP Slide Sorter pages of the AFAI 3-day product for the regions around [Puerto Rico]() and the [Virgin Islands](). The AFAI concentration around Puerto Rico is given [here]().
4. Hugh Roarty attended the OCEANS meeting in Seattle and presented the paper on implementing the Sargassum tracker for Puerto Rico. A copy of the presentation is available [here]().
5. The HFR network performed well during this progress period. The radial data availability over the progress period is provided in Figure 2. The coverage maps for the 13 MHz stations are shown in Figure 3 and the coverage for the 5 MHz stations is shown in Figure 4. The coverage for the five stations look good with two exceptions.
    a. As noted in the previous progress report, the one troubling aspect of this plot is the radial vector count for the CDDO station. There is a daily drop in coverage due to an outside interference problem. The problem has been identified as a nearby light. Colin Evans is working with the property owner to remedy the situation.
    b. As noted in the previous progress report, the uneven spatial coverage at PYFC for the measured radials should also be addressed soon.
6. The totals vector maps are typically created on a 2 km and 6 km grid. The monthly average vector plots from the 6 km grid are shown in Figure 5.
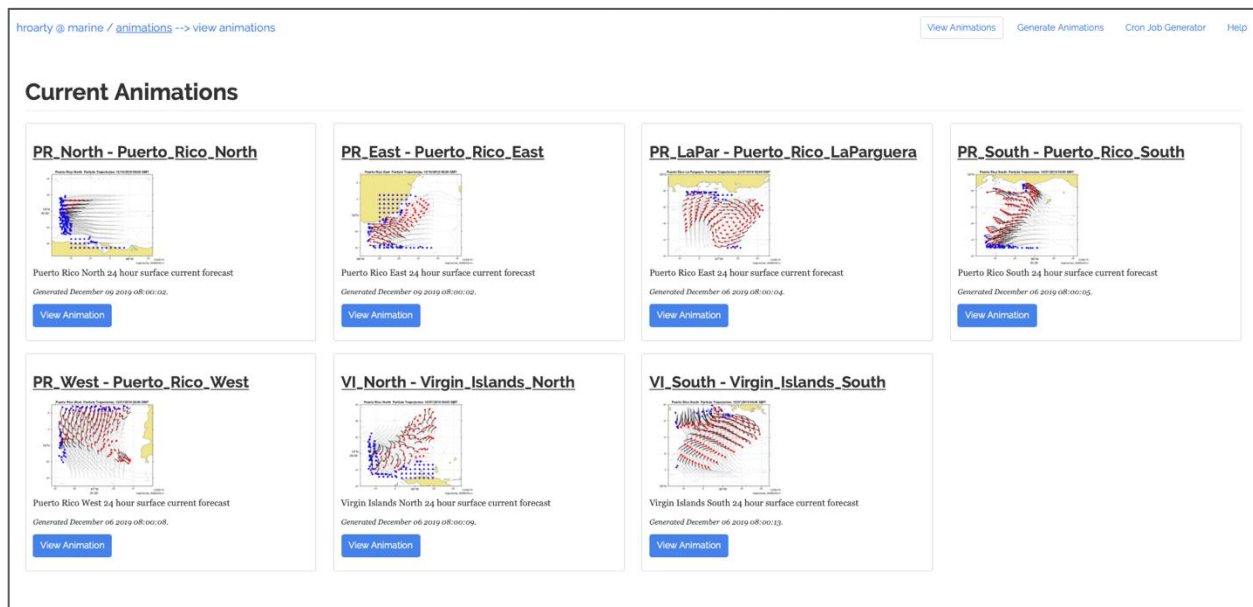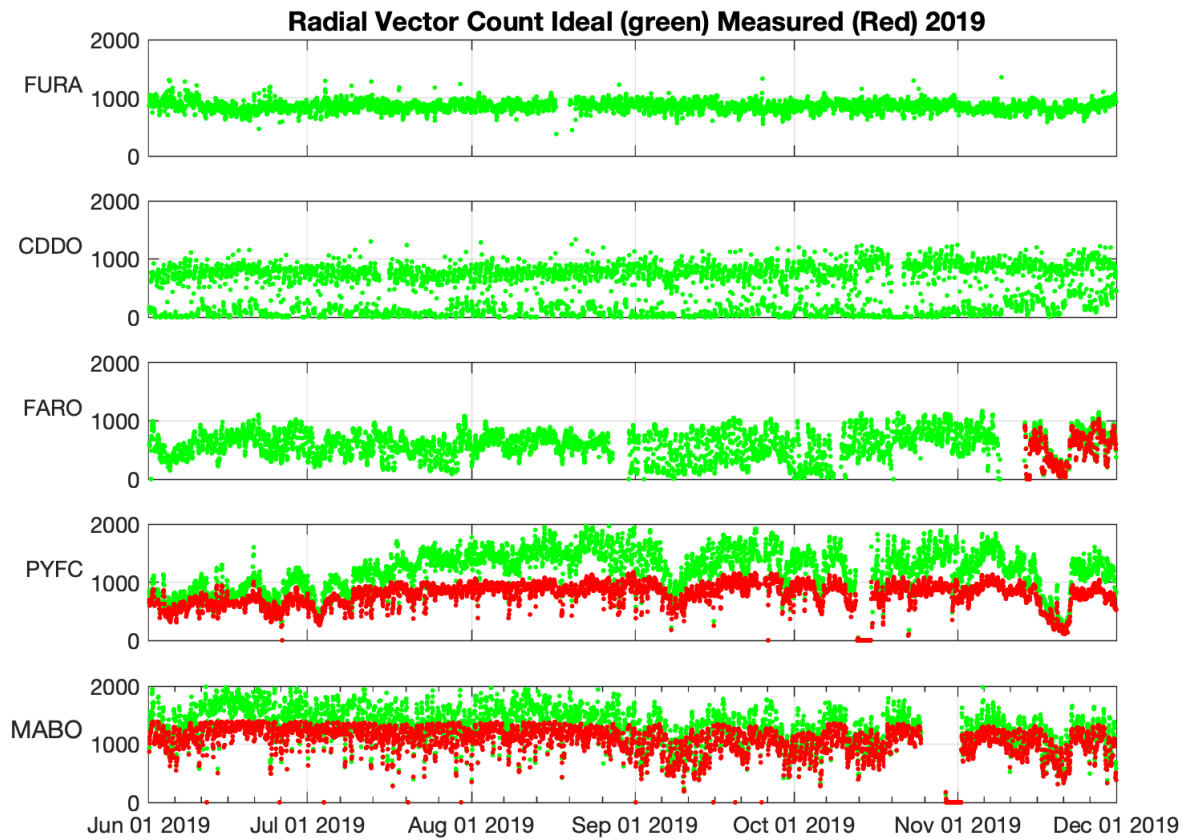
MAJOR OUTCOMES

Figure 1: Screen grab of the Sargassum Tracker available at this [link]().

Radial Vector Count Ideal (green) Measured (Red) 2019

*Figure 2: Ideal (*green*) and measured (*red*) radial data availability of the 5 HF radar stations in Puerto Rico on the Rutgers servers for* June 1, 2019 to December 1, 2019.

Radial Coverage JUN 1-NOV 30, 2019

Station FURA
Ideal radial type

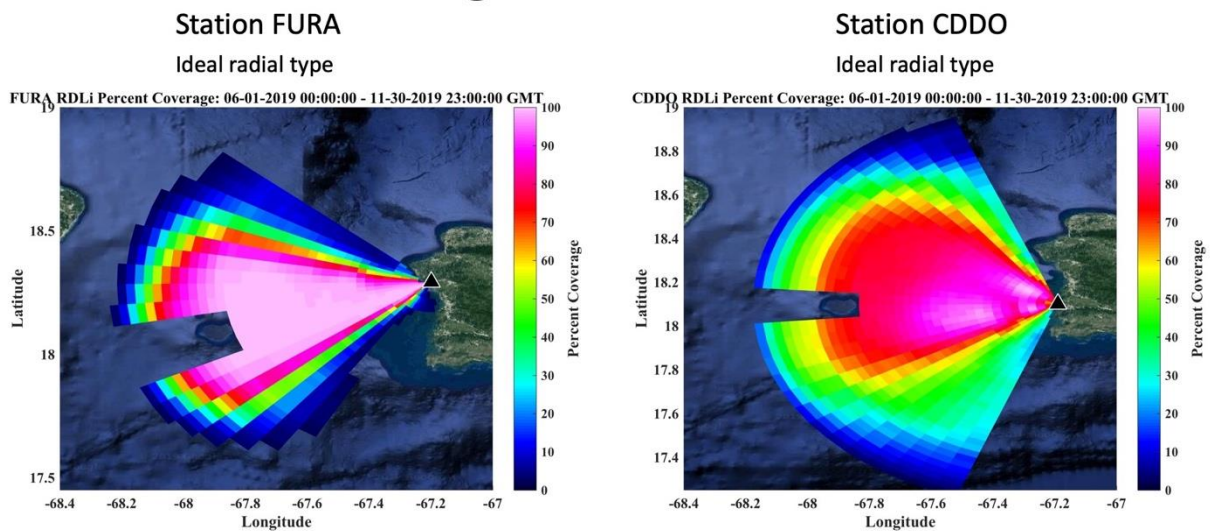## Station CDDO
Ideal radial type

Figure 3: Radial coverage maps for FURA (left) and CDDO (right) for June 1 to November 30, 2019.
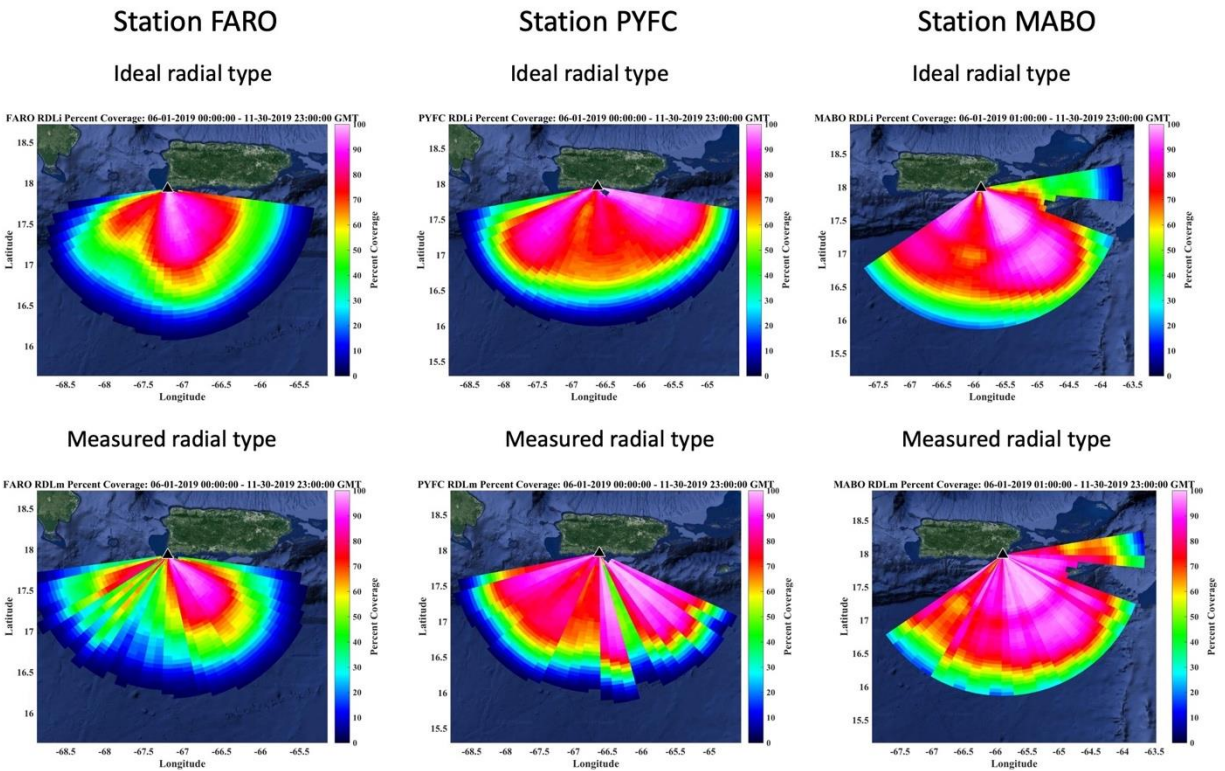
Radial Coverage JUN 1-NOV 30, 2019

Figure 4: Radial coverage maps for station FARO (left), PYFC (middle) and MABO (right). The ideal radial type is the top row and the measured radial type is the bottom row.
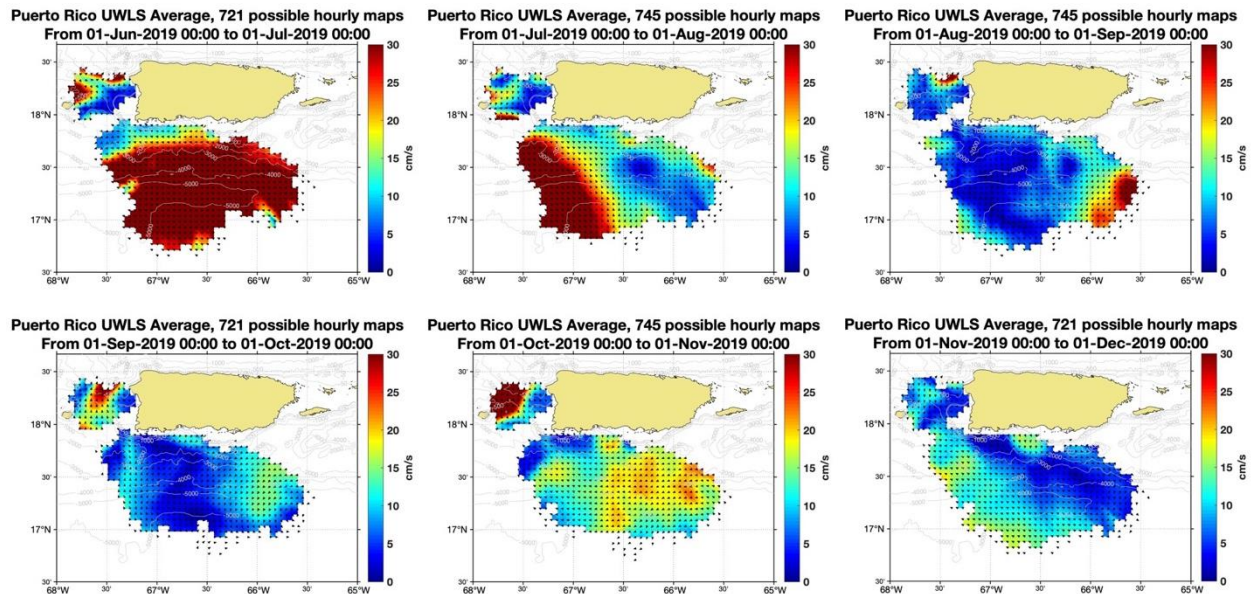
Figure 5: Monthly mean surface current measurements on the 6 km grid from June 2019 (top left) *to December 2019* (bottom right)*. The color bar indicates speed from 0-30 cm/s and the arrows on the map indicate direction the current is towards.* Each map requires 50% temporal coverage in order to plot a vector

RELATED PROJECTS

None

PUBLICATIONS & PRODUCTS
1. Roarty, Anarumo, Aeschliman (2019) "Implementation of a Sargassum Seaweed Tracker for the Caribbean" MTS Seattle