CARICOOS High-Frequency Radar Network

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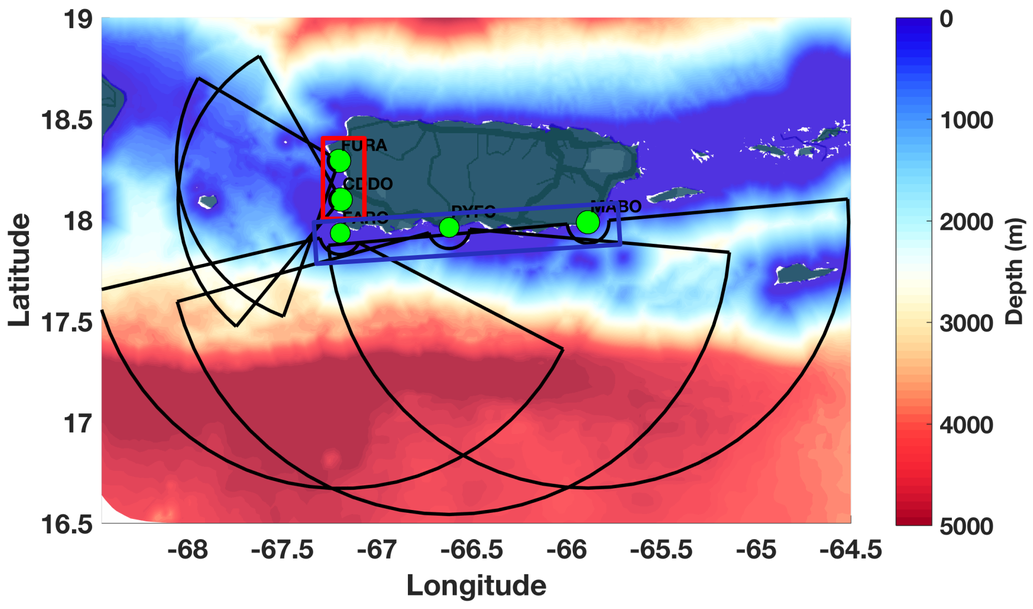
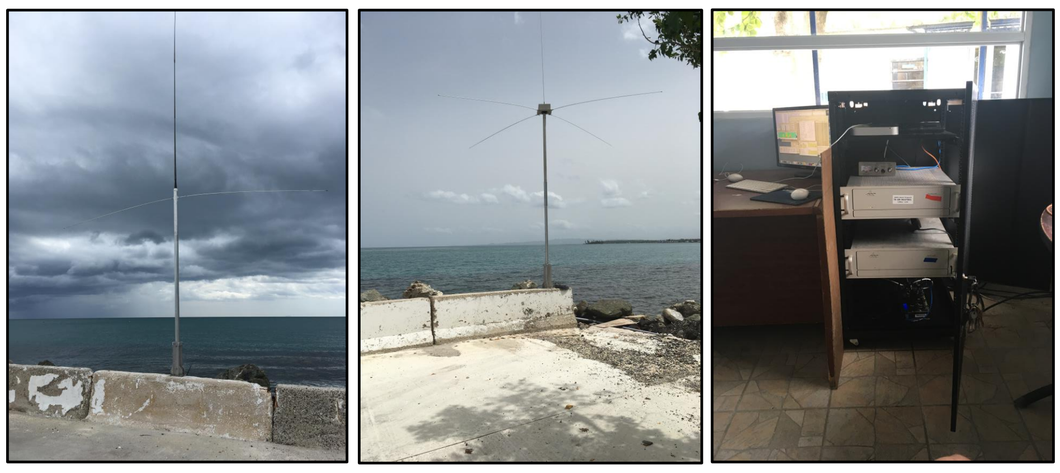
HFR Network Overview

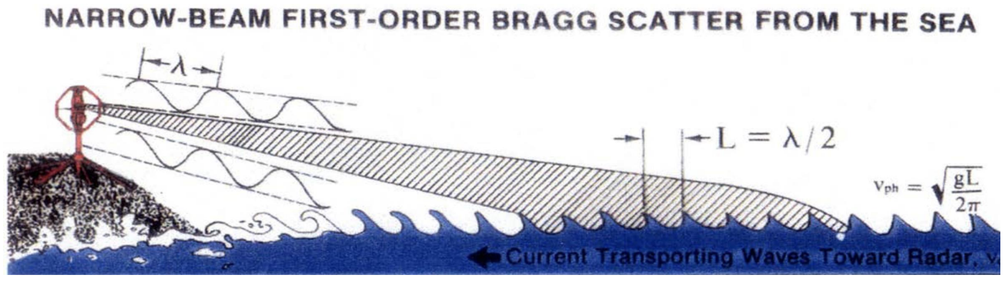


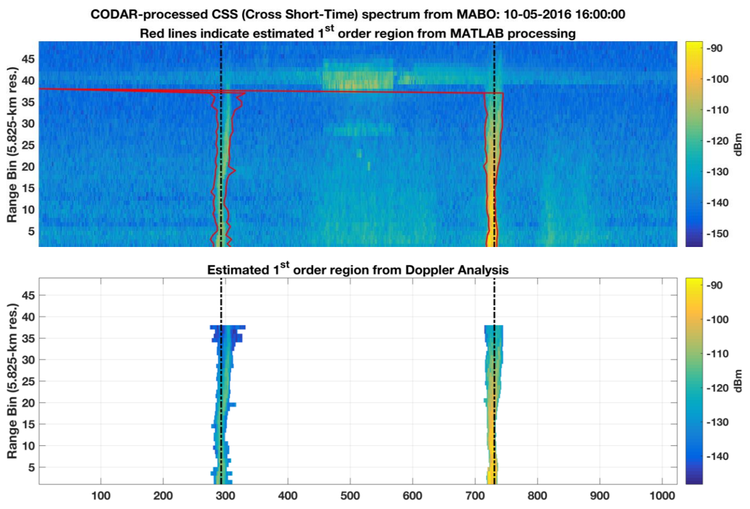
The CARICOOS high-frequency network consists of 5 CODAR stations. The sites outlined in blue operate at 4.35 MHz and the sites outlined in red operate at 13.45 MHz. Hourly surface currents are generated using a 6 km grid.

CODAR Introduction



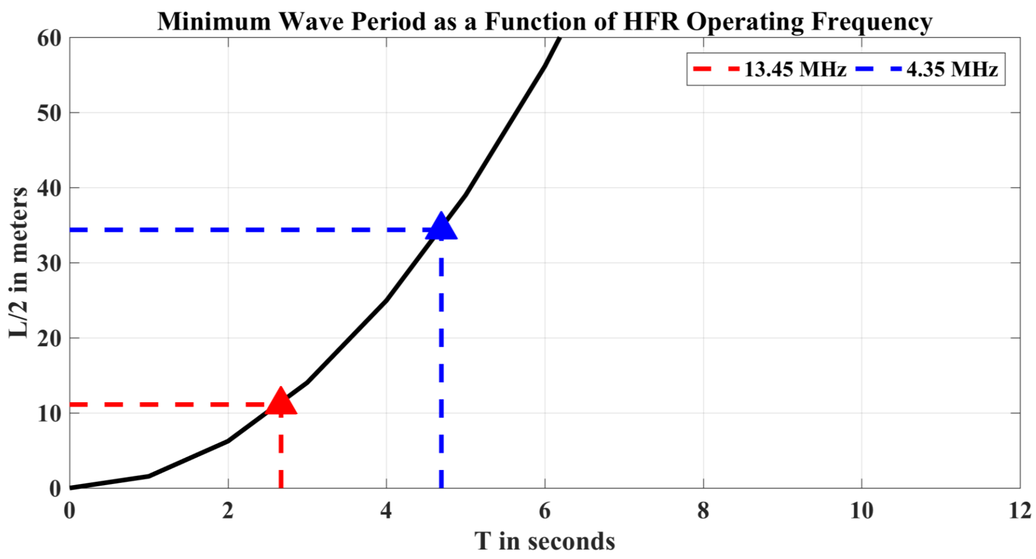
Each HFR site consists of a [left] transmit antenna, [middle] receive antenna, and [right] enclosure with A/C that protects the electronics. The main electronic components consist of a transmitter, receiver, computer, GPS, UPS, internet service, and power switch for remote power cycling.





The transmitted radio wave backscatters off ocean waves with wavelengths that are half the transmitted signal in a linear, coherent fashion [top]. This is called Bragg resonance and this results in high-energy areas [left] that broaden due to the Doppler shifting of ocean currents.

Operating Parameters

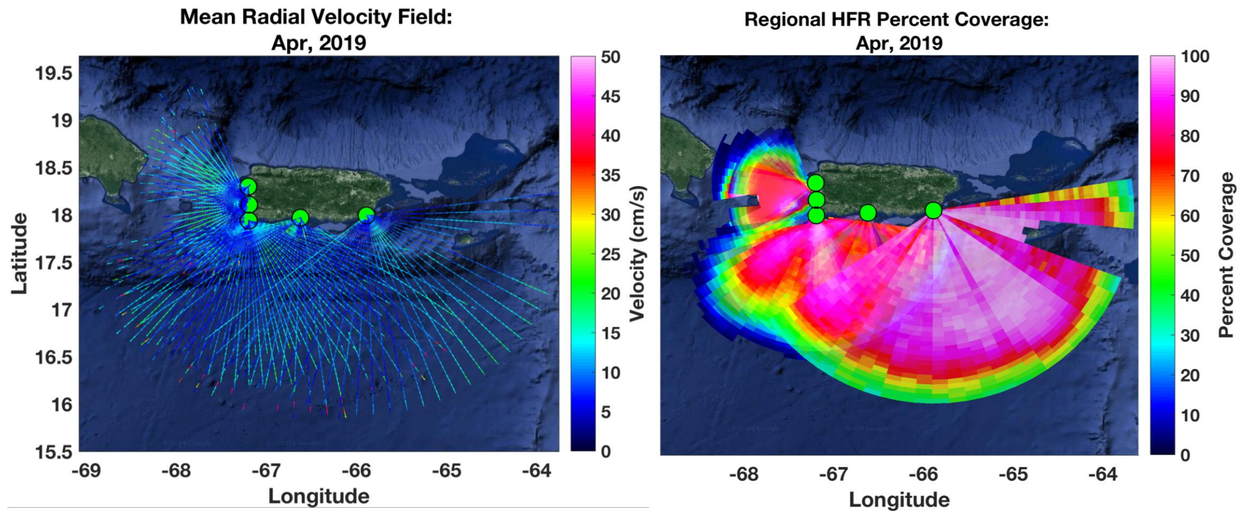


CARICOOS HFR Operating Parameters

Parameter	Mona Passage	Southeast
Center Freq.	13.45 MHz	4.35 MHz
Sweep Rate	2 Hz	1 Hz
Max. Range	100-110 km	215-225 km
Resolution	3.025 km	5.825 km
Doppler Length	512	1024
Coverage Time	75 min	180 min

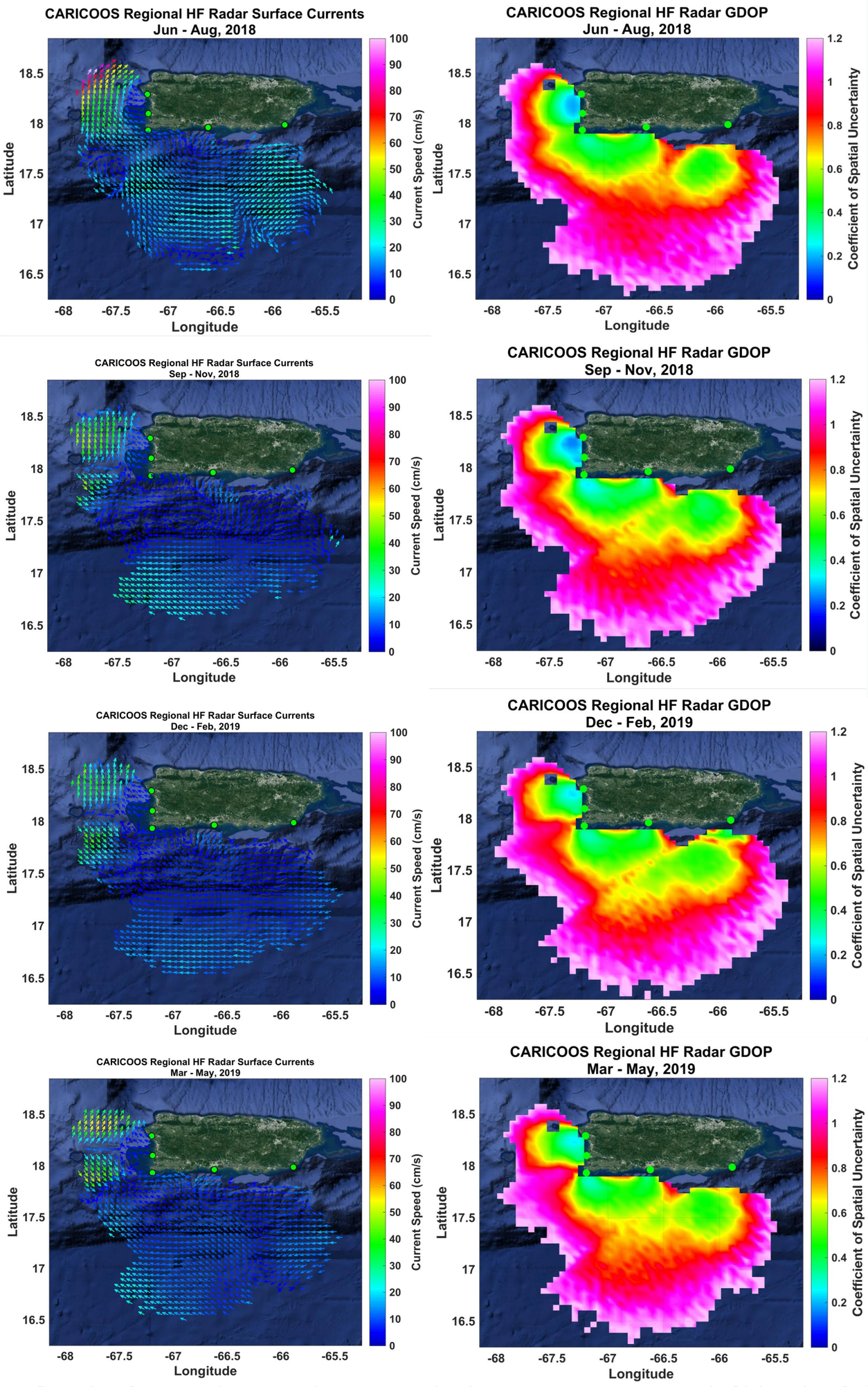
[left] Parameters used in the operational setting. Spectra averaging, resolution, range, and FFT length depend on the transmit frequency.

Radials



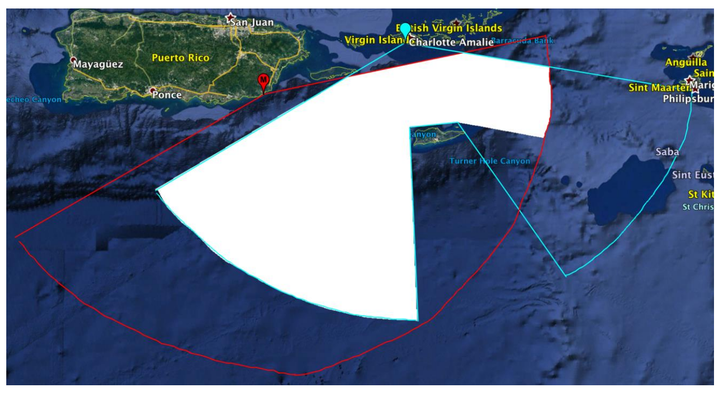
[left] Radial velocities averaged for April, 2019. Note that by averaging, the M_2 tidal flow in the west coast is essentially masked out. Although not shown here, radial velocities typically exceed 100 cm/s in the northern area of the Mona Passage. [right] Associated radial percent coverage map.

Totals & GDOP



[let column] Seasonal mean surface currents for the CARICOOS HFR network. [right column] Seasonal GDOP (Geometric Dilution of Precision), which is a QC method for determining the stability of the current measurements at each grid point.

Future Work



We are in process of expanding the CARICOOS HFR network. The site location will be on Water Island off of St. Thomas, where the radial coverage will overlap with MABO. This will provide very useful information about the surface currents within the St. Croix/Vieques channel, which is important for larval dispersal, *Sargassum* tracking, and boat traffic.