

Evaluation of the CODAR Tsunami Detection Algorithm and Software

Hugh Roarty

RUTGERS

Center for Ocean Observing Leadership

George Garcia

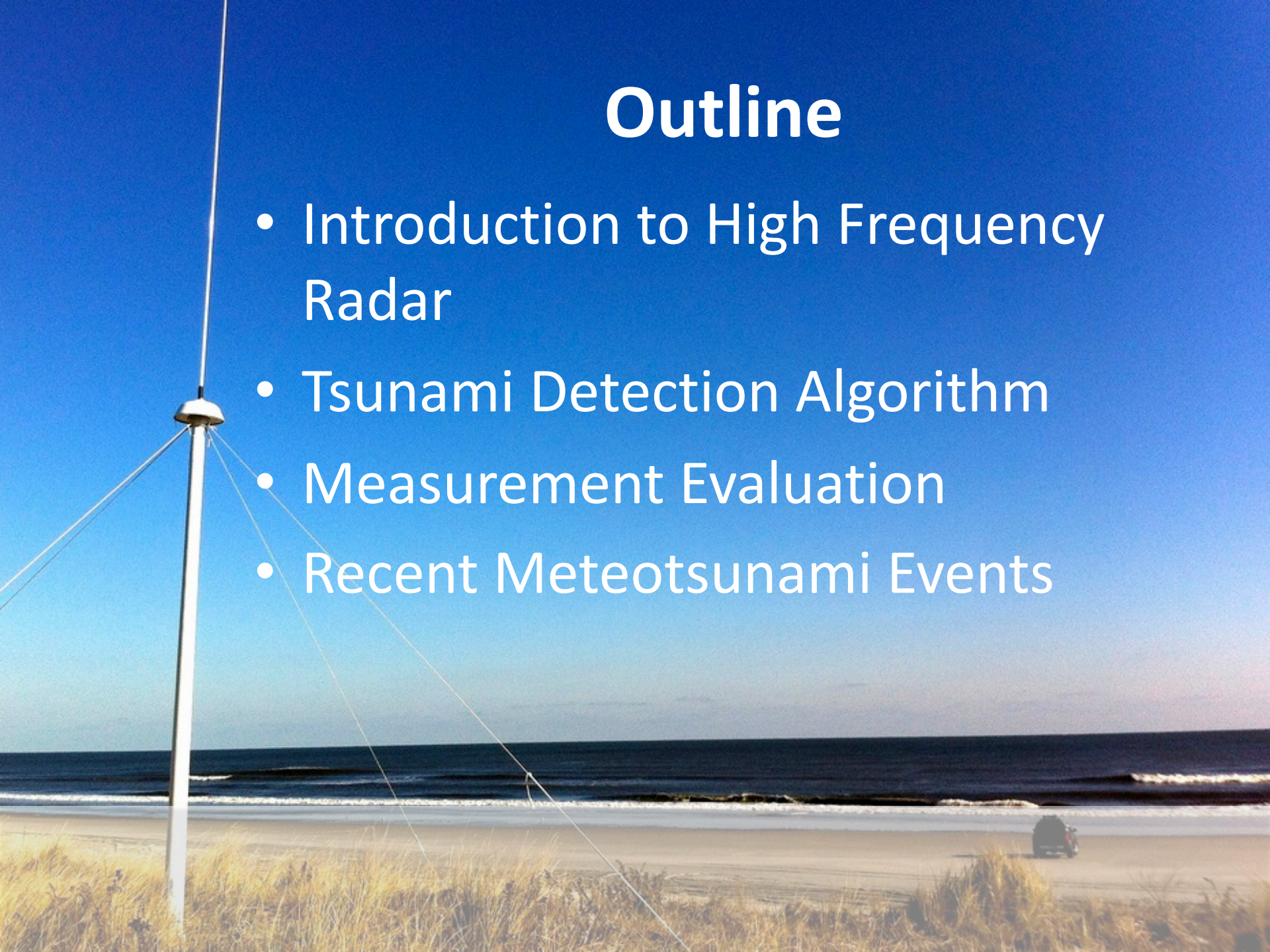
**PASSAIC
COUNTY
COMMUNITY
COLLEGE**

Terry Nichols



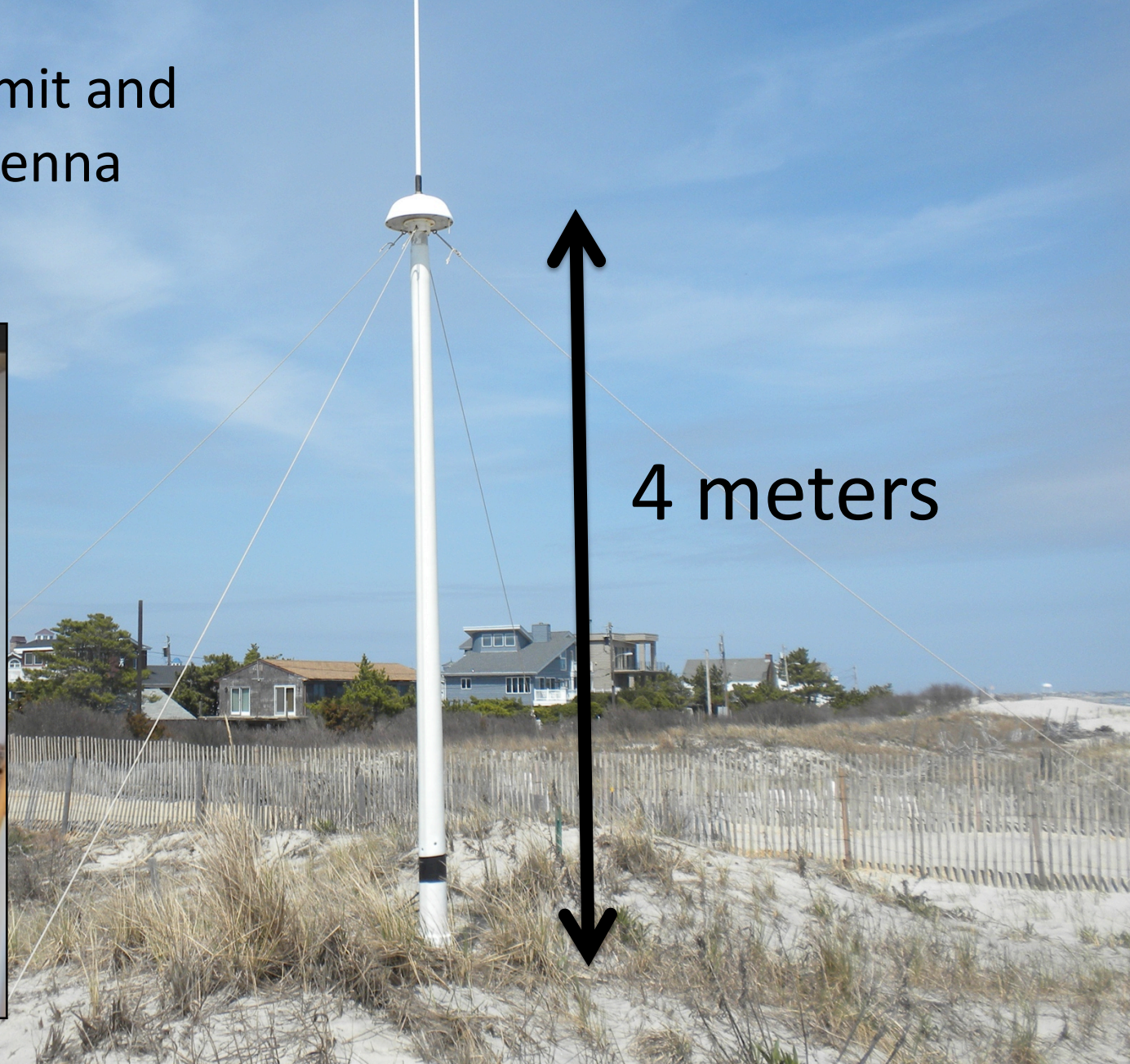
Outline

- Introduction to High Frequency Radar
- Tsunami Detection Algorithm
- Measurement Evaluation
- Recent Meteotsunami Events



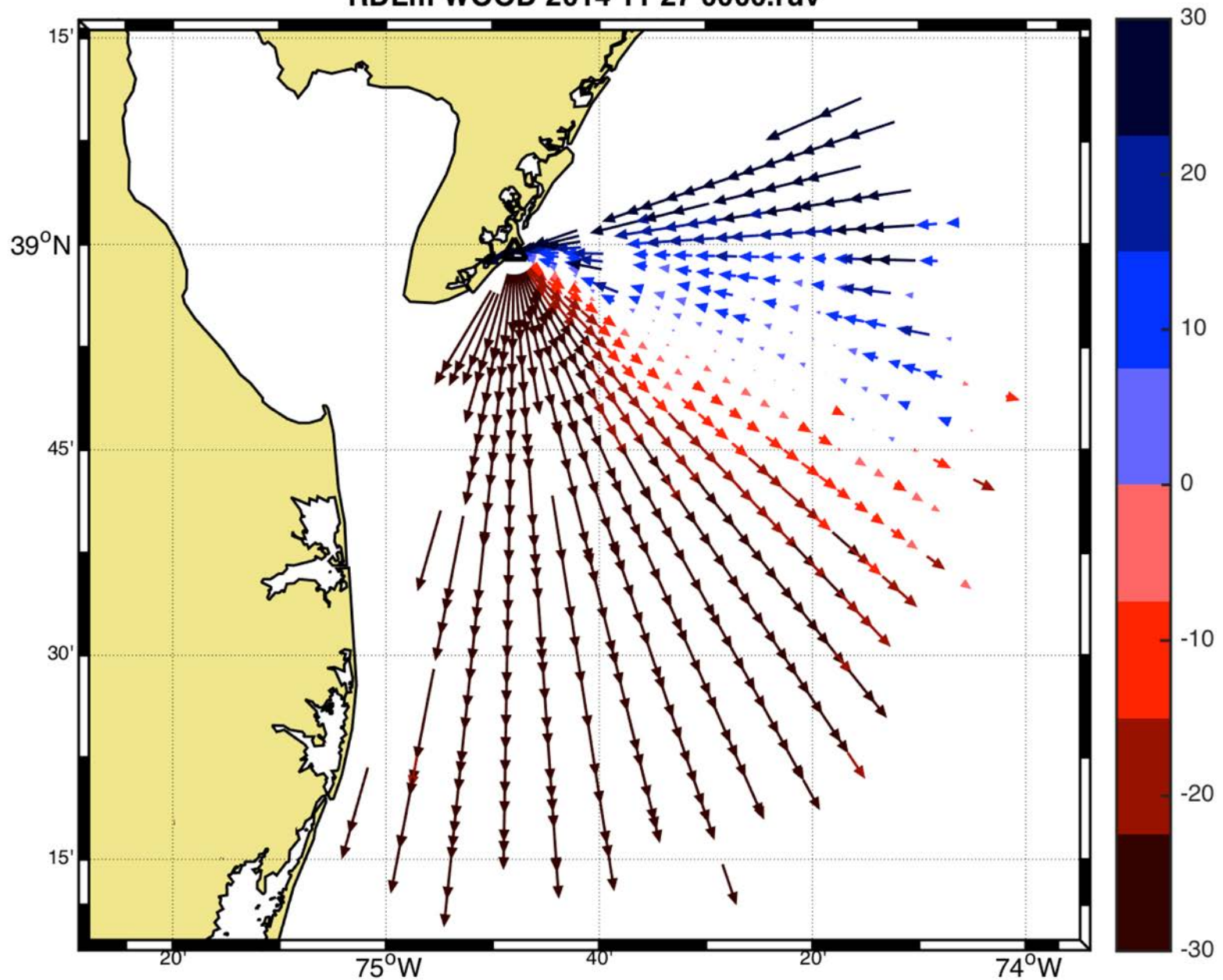
INTRODUCTION TO HIGH FREQUENCY RADAR

13 MHz Transmit and Receive Antenna

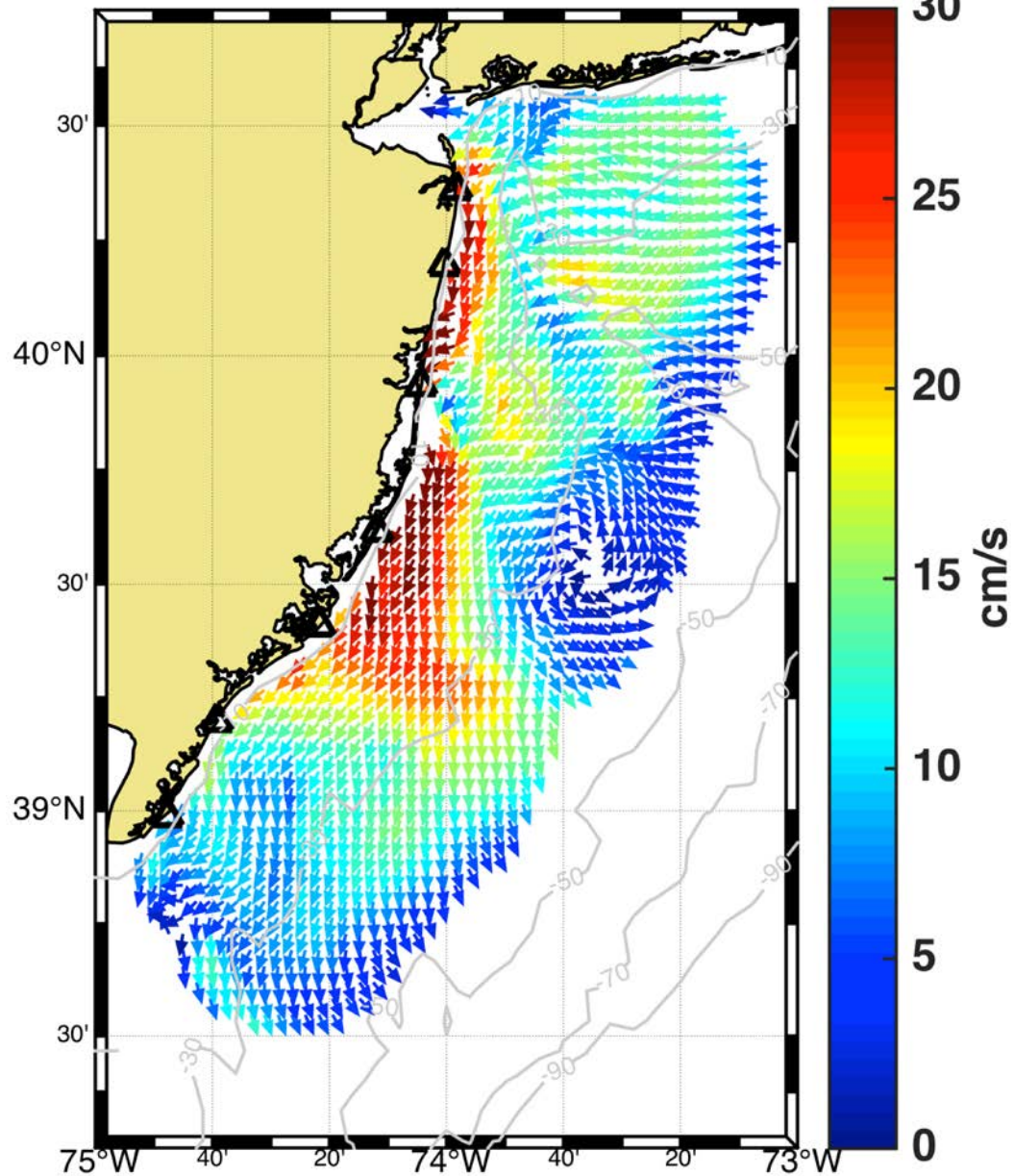


4 meters

RDLm WOOD 2014 11 27 0000.ruv



2017/03/28 07:00 to 2017/03/29 07:00



Surface Currents from HF Radar

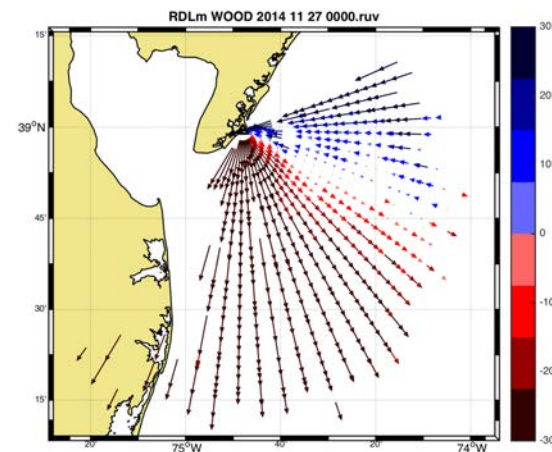
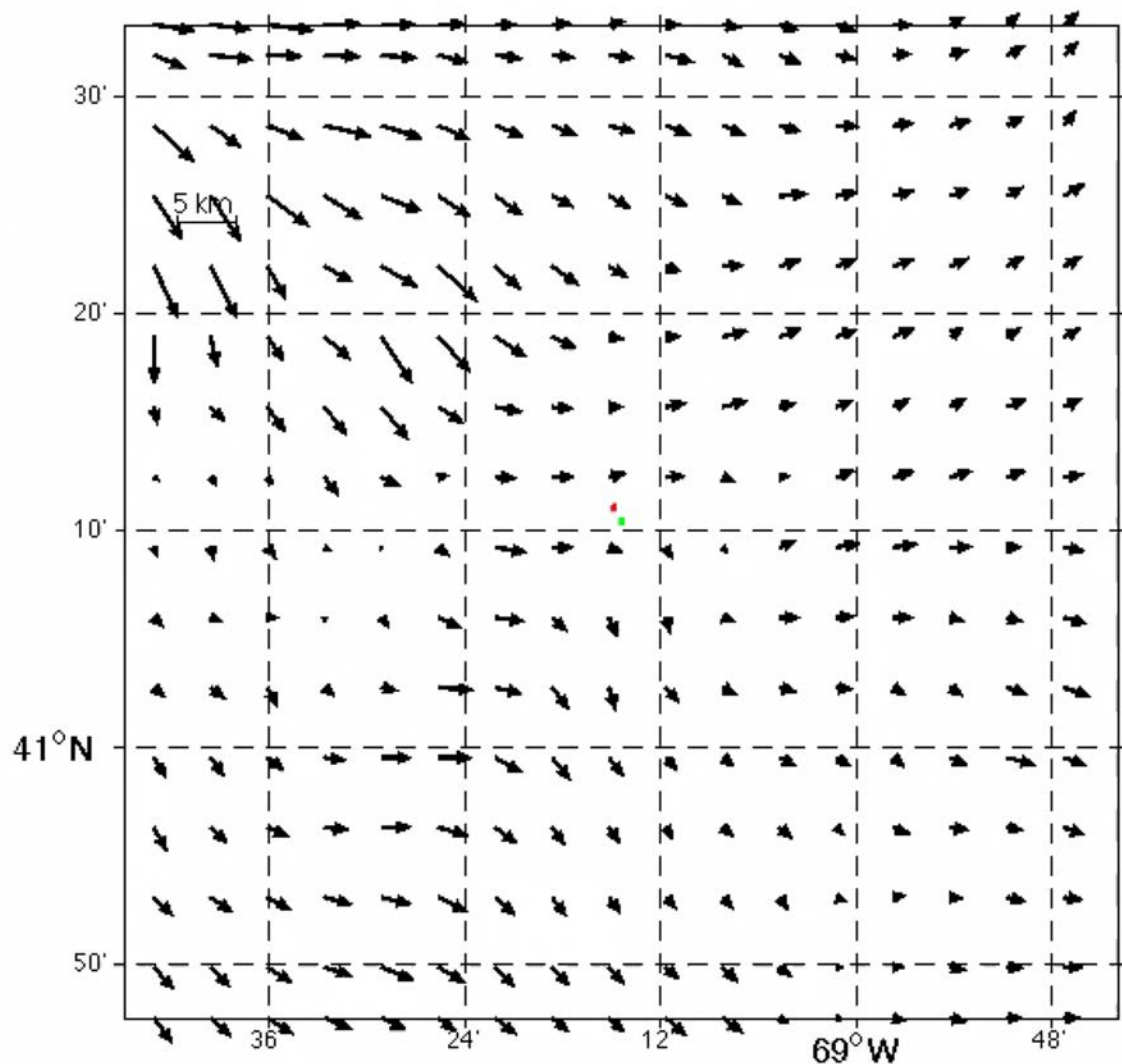
OI_05_Drifter Plot Sep.15,2013 00:00:00

Drifter

HFR Vectors

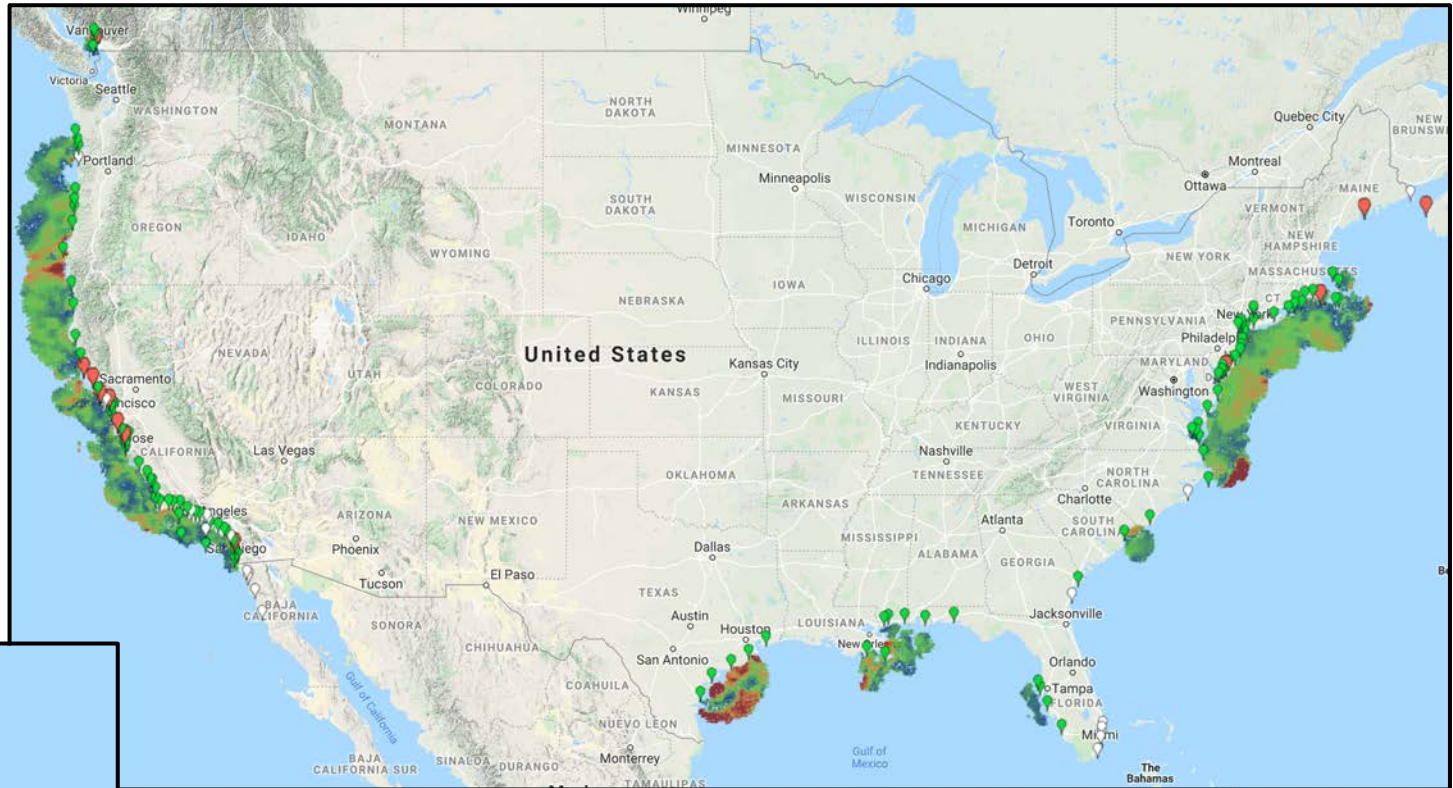
HFR Particles

HFR Mean

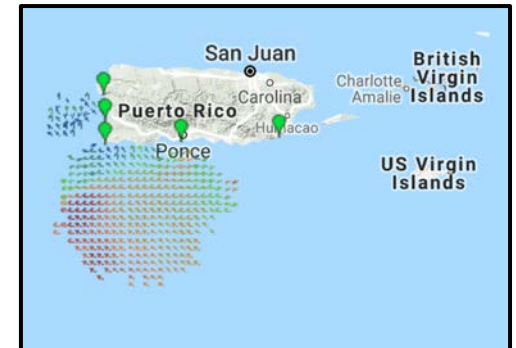


Temporal Resolution: 0.5-1 hour
Spatial Resolution: 1-6 km

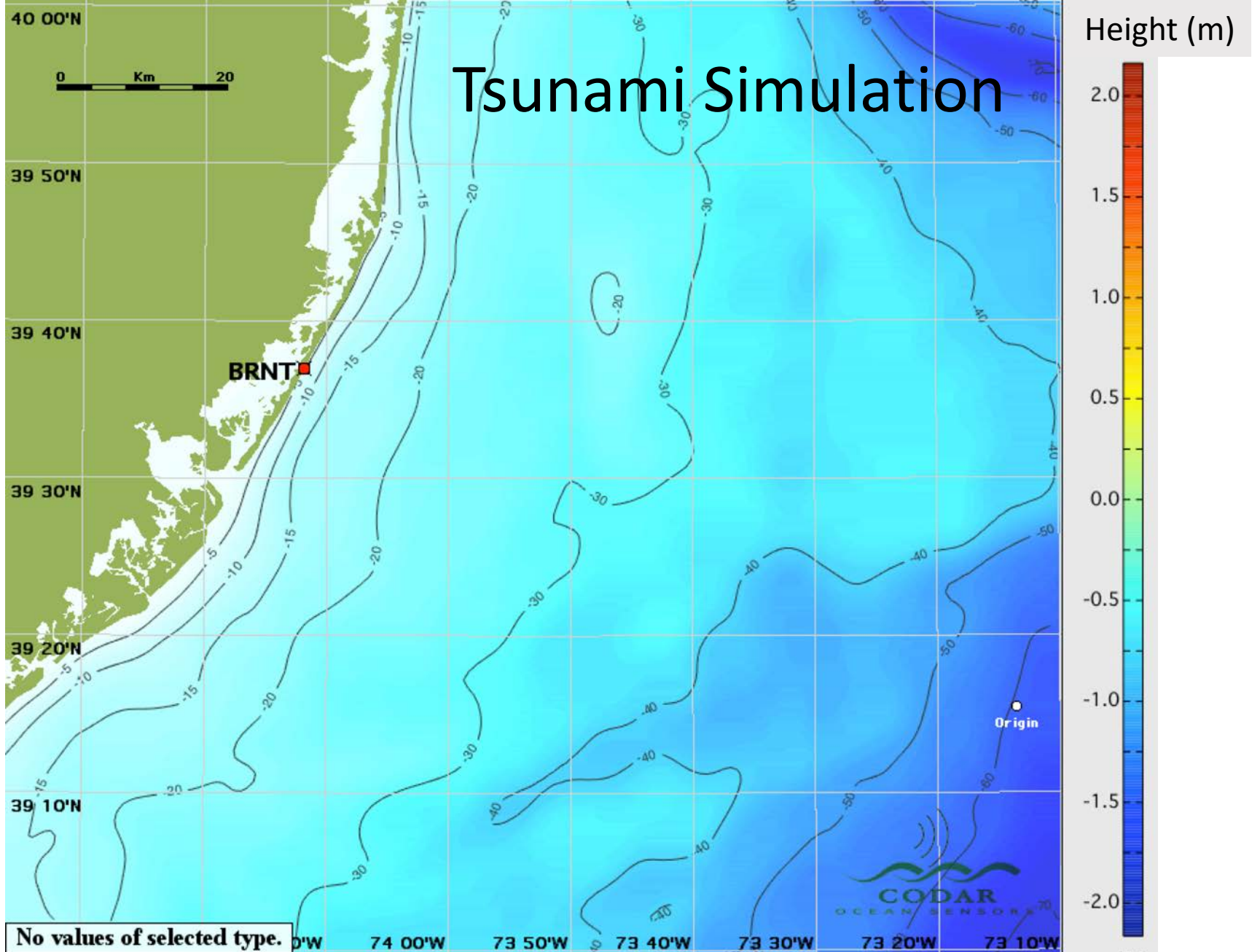
National HF Radar Network



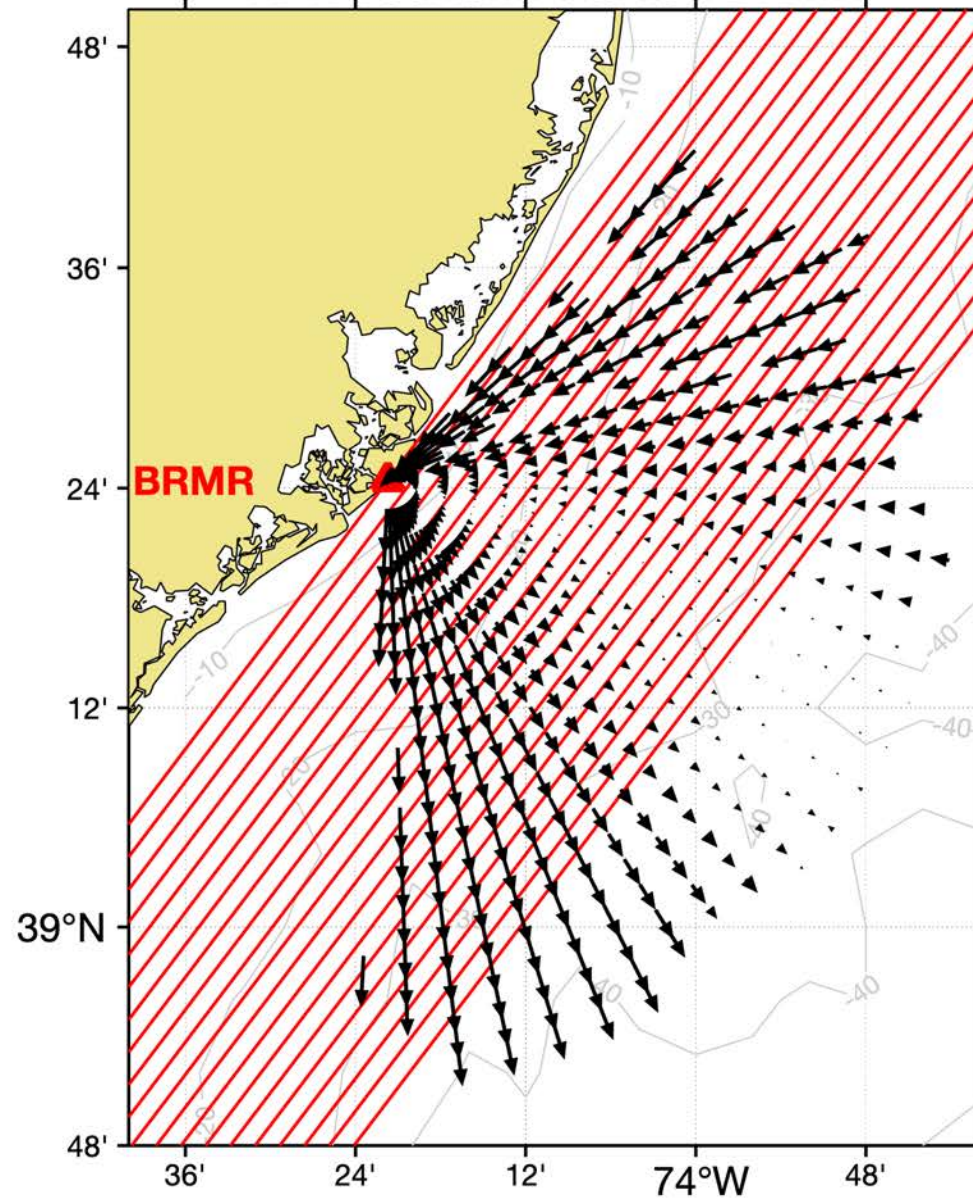
Coverage for 29 OCT 2019
186 HF Radars Registered
145 HF Radars Reporting



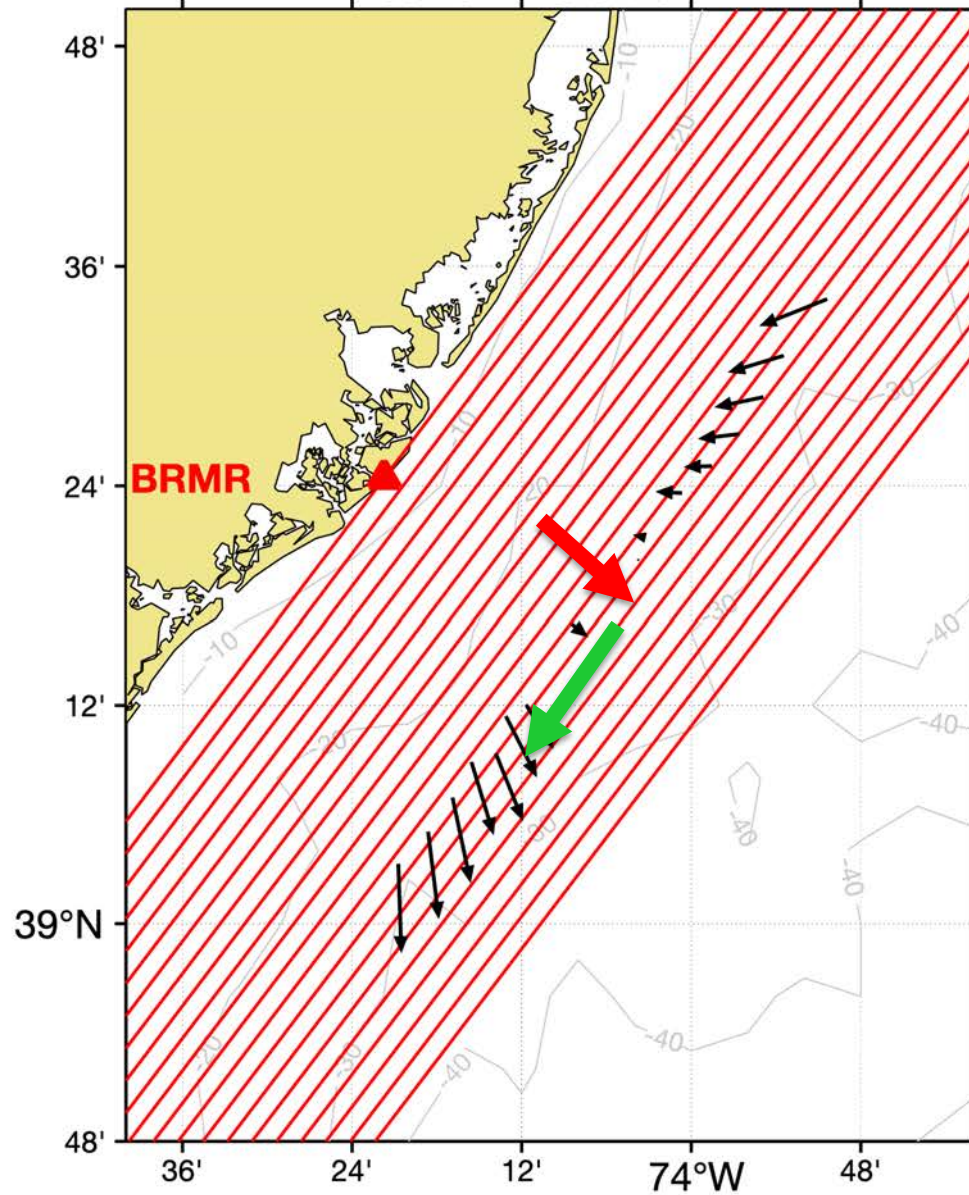
TSUNAMI DETECTION ALGORITHM



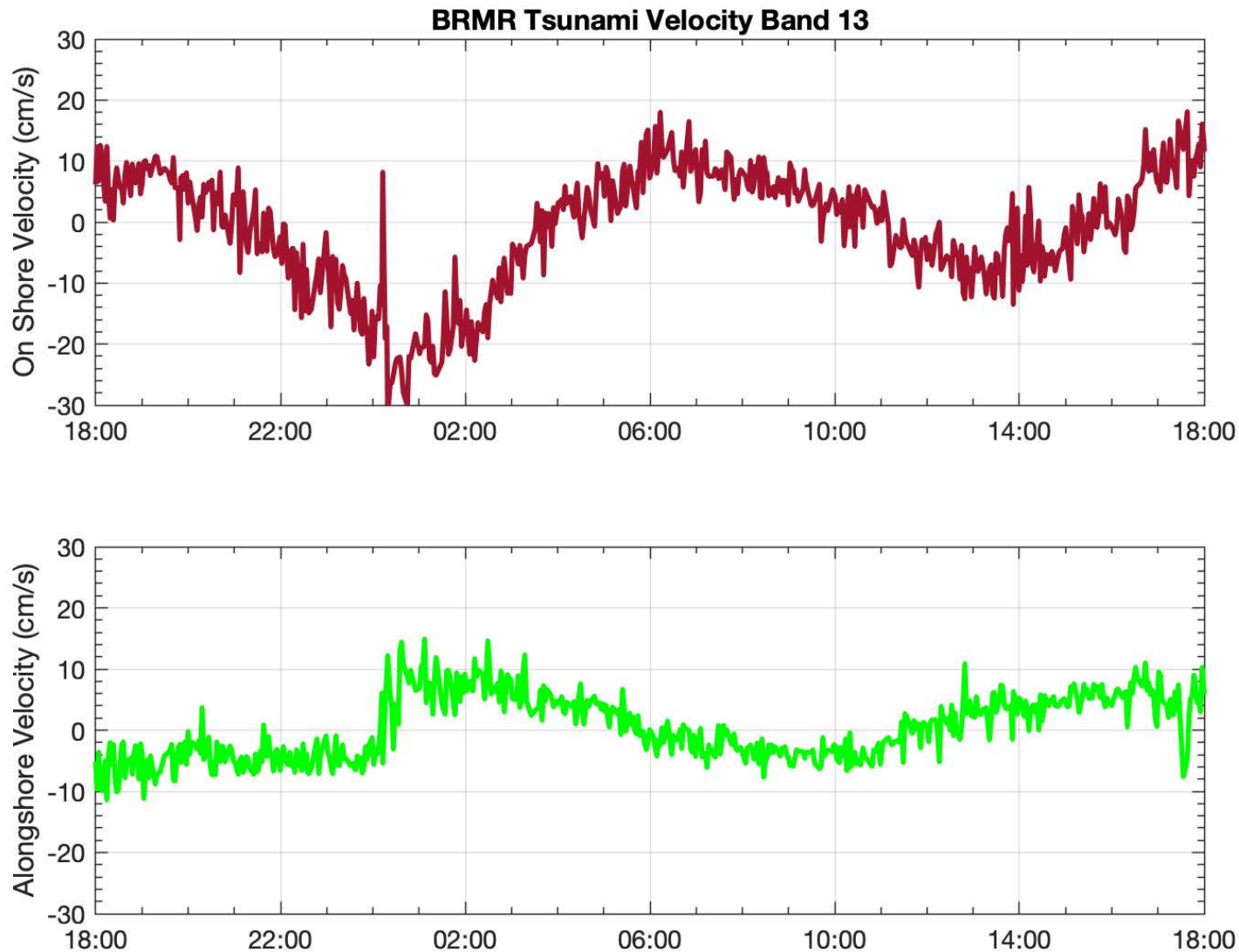
HFR Tsunami Station BRMR



HFR Tsunami Station BRMR

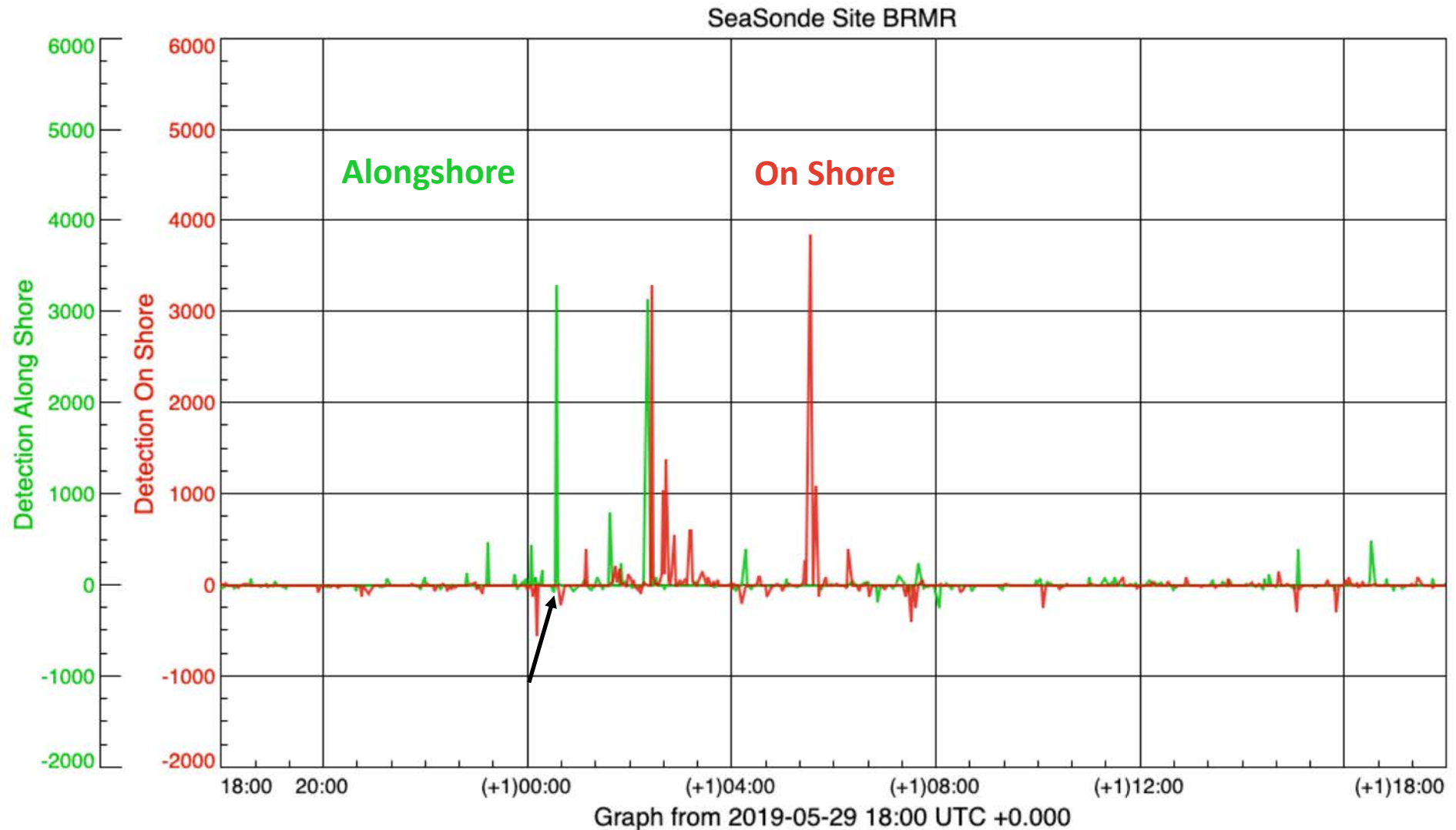


Time Series of Onshore and Alongshore Velocity



Velocity
updates
every 2
minutes

HF Radar q-factor Detection Data

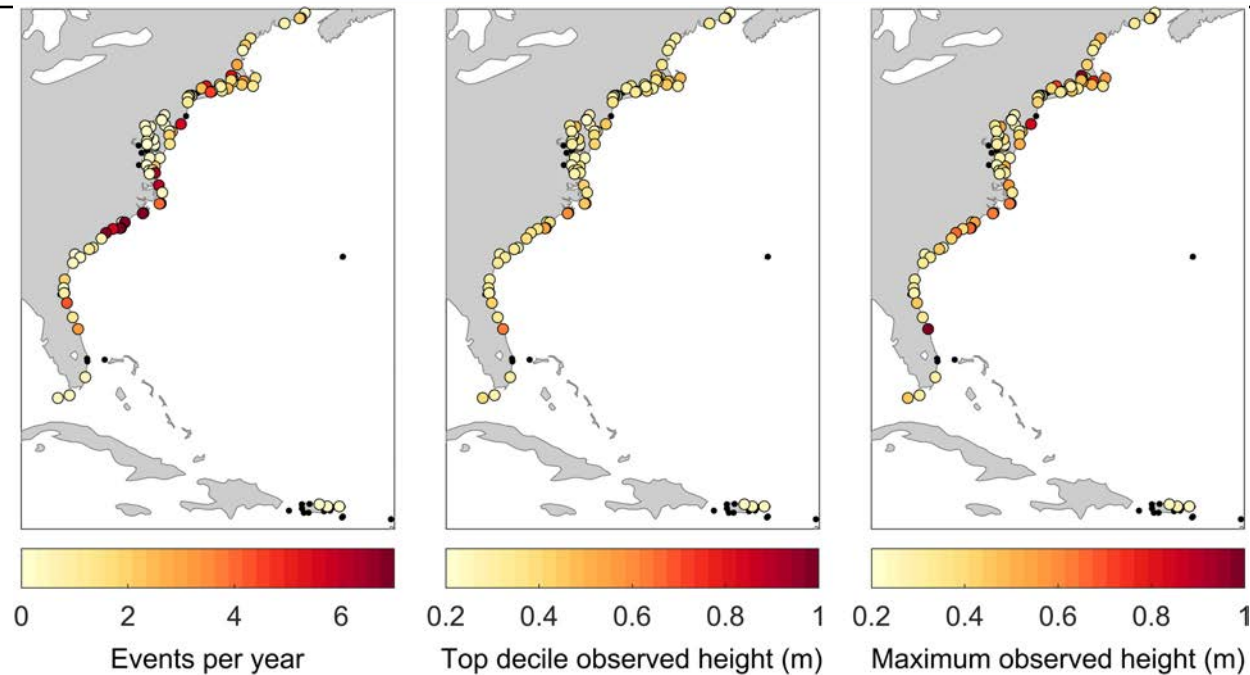


EVALUATION OF DATA

A METEOTSUNAMI CLIMATOLOGY ALONG THE U.S. EAST COAST

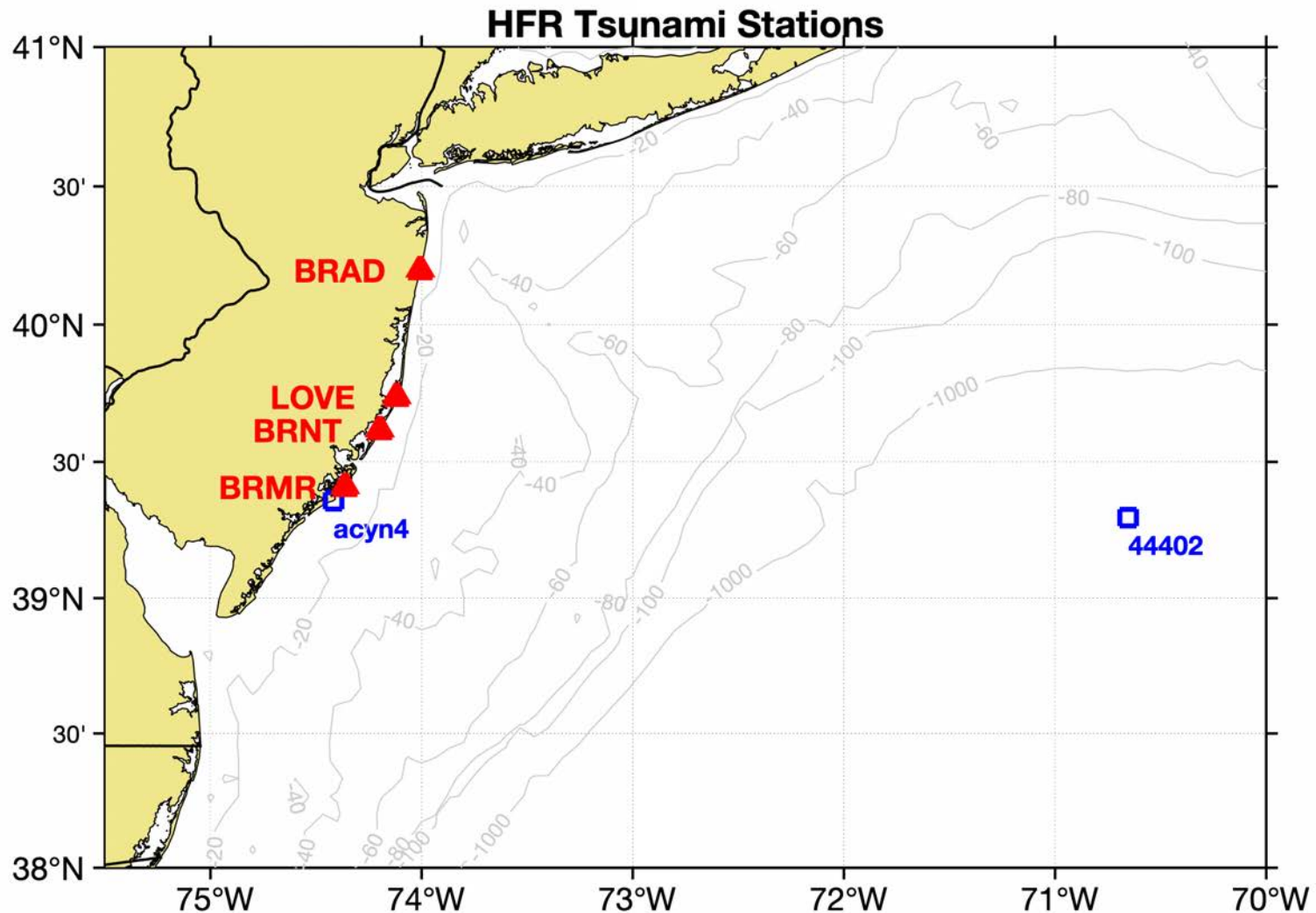
GREGORY DUSEK, CHRISTOPHER D'VEGLIO, LOUIS LICATE, LORRAINE HEILMAN,
KATIE KIRK, CHRISTOPHER PATERNOSTRO, AND ASHLEY MILLER

About 25 meteotsunamis per year were observed by NOAA tide gauges along the U.S. East Coast with wave heights exceeding 1 meter in several cases.

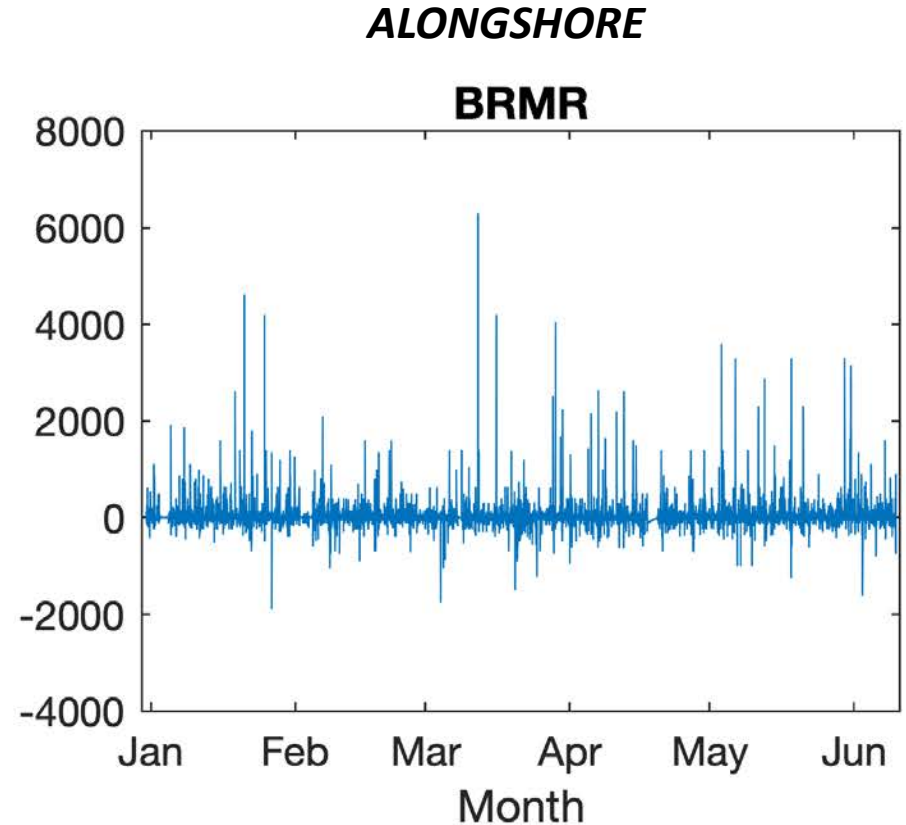
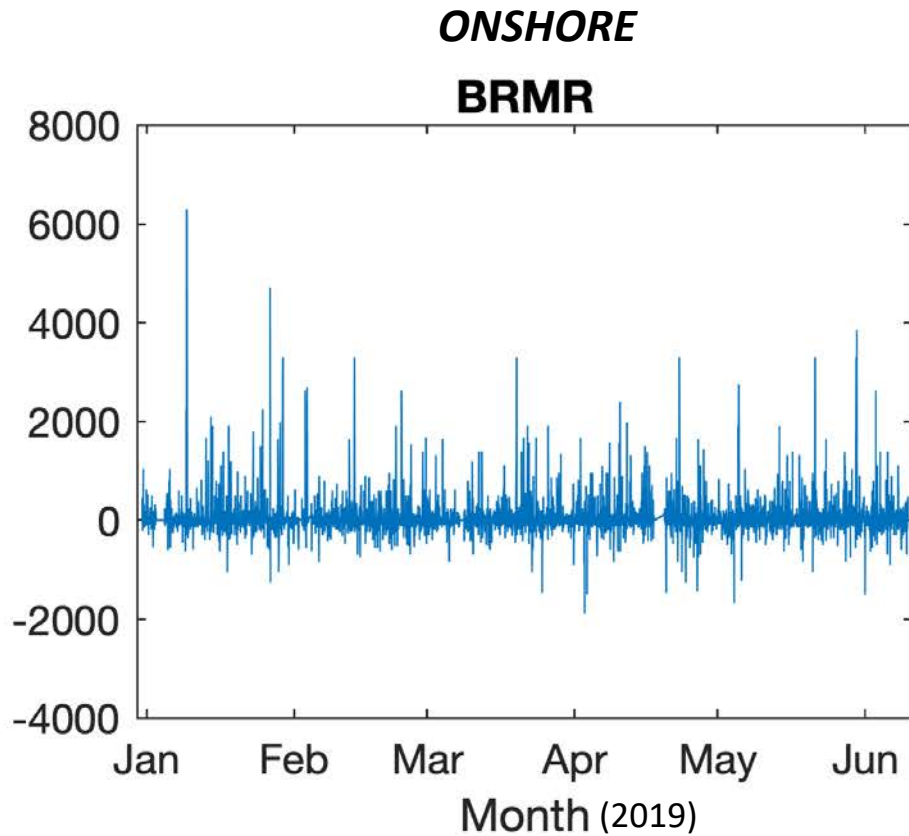


<https://doi.org/10.1175/BAMS-D-18-0206.1>

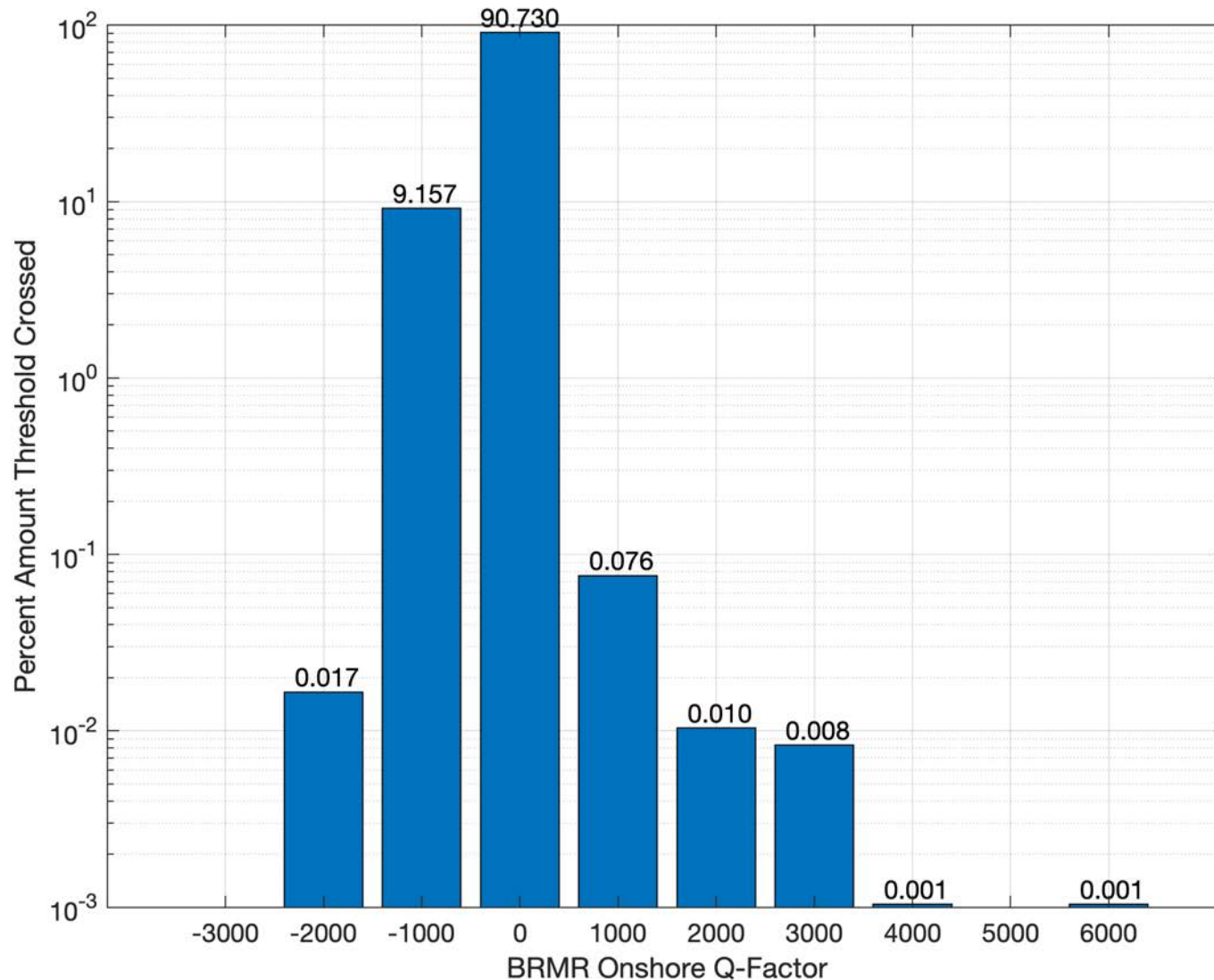
Study Area



Time Series of q-factor at BRMR



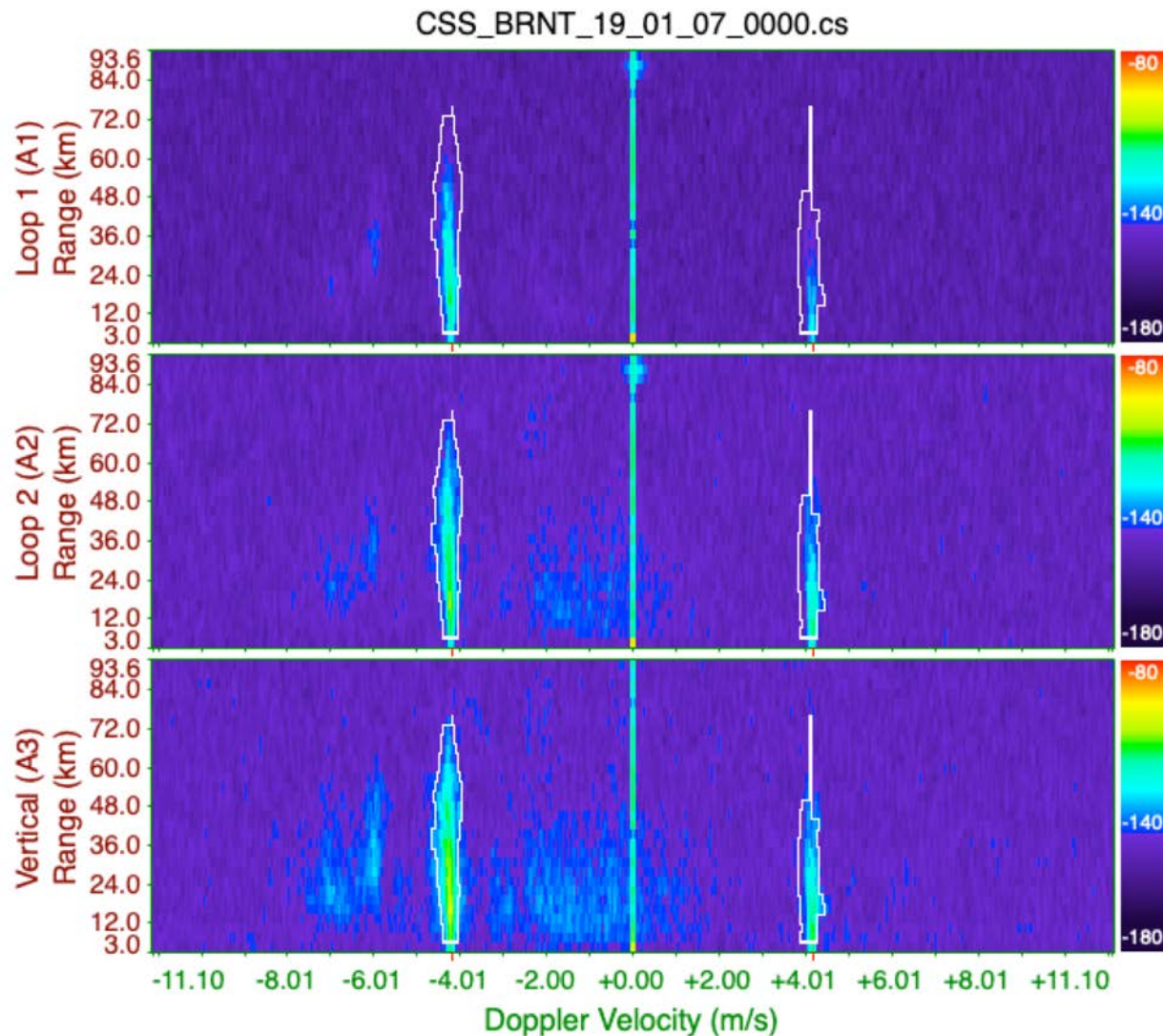
Histogram of Onshore q-factor



16 instances of q-factor above 4,000

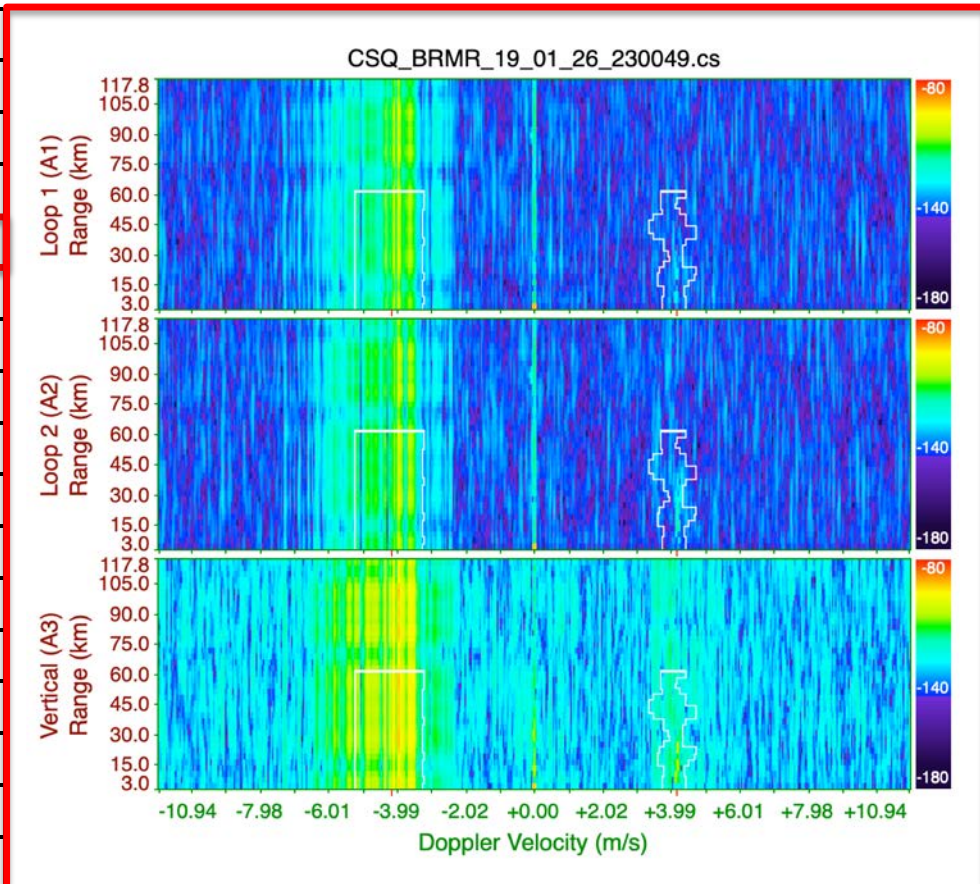
Station	Date	q-factor
BRAD	3/14/19 23:00	6,000
BRAD	6/11/19 1:00	4,000
BRMR	1/9/19 10:00	6,000
BRMR	1/26/19 23:00	4,000
BRNT	1/14/19 7:00	4,000
BRNT	1/26/19 12:00	5,000
BRNT	4/8/19 8:00	6,000
BRNT	4/10/19 22:00	4,000
BRNT	4/14/19 23:00	5,000
BRNT	4/23/19 9:00	5,000
BRNT	5/9/19 0:00	4,000
BRNT	5/18/19 2:00	4,000
LOVE	2/3/19 19:00	4,000
LOVE	2/23/19 6:00	4,000
LOVE	5/22/19 7:00	5,000
LOVE	6/13/19 3:00	6,000

Typical Spectra from the Radar



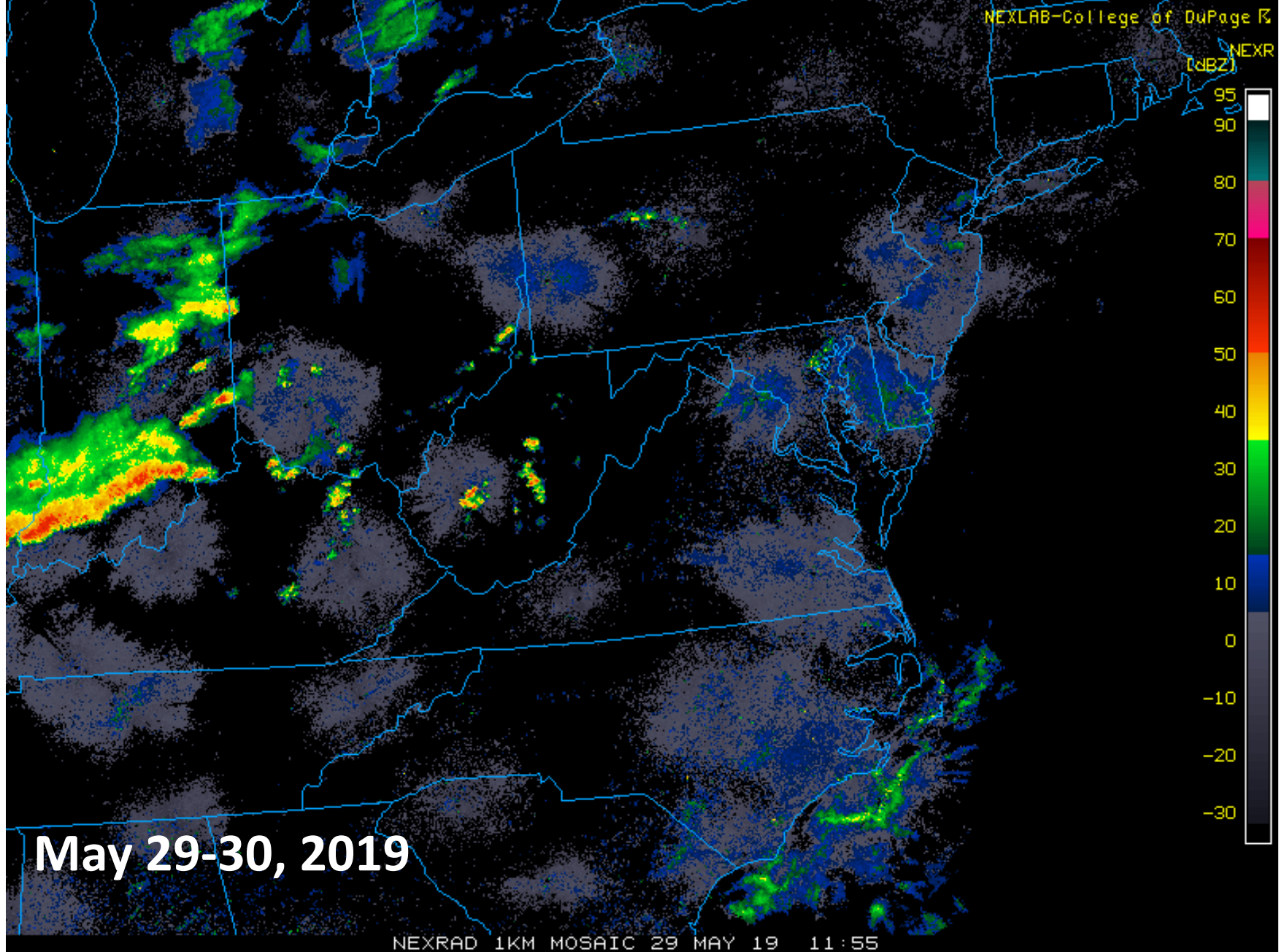
Noise Levels During High q-factor Events

Station	Date	q-factor	Noise Level
BRAD	3/14/19 23:00	6,000	low
BRAD	6/11/19 1:00	4,000	low
BRMR	1/9/19 10:00	6,000	medium
BRMR	1/26/19 23:00	4,000	high
BRNT	1/14/19 7:00	4,000	low
BRNT	1/26/19 12:00	5,000	medium
BRNT	4/8/19 8:00	6,000	low
BRNT	4/10/19 22:00	4,000	medium
BRNT	4/14/19 23:00	5,000	medium
BRNT	4/23/19 9:00	5,000	medium
BRNT	5/9/19 0:00	4,000	medium
BRNT	5/18/19 2:00	4,000	medium
LOVE	2/3/19 19:00	4,000	low
LOVE	2/23/19 6:00	4,000	medium
LOVE	5/22/19 7:00	5,000	medium
LOVE	6/13/19 3:00	6,000	medium

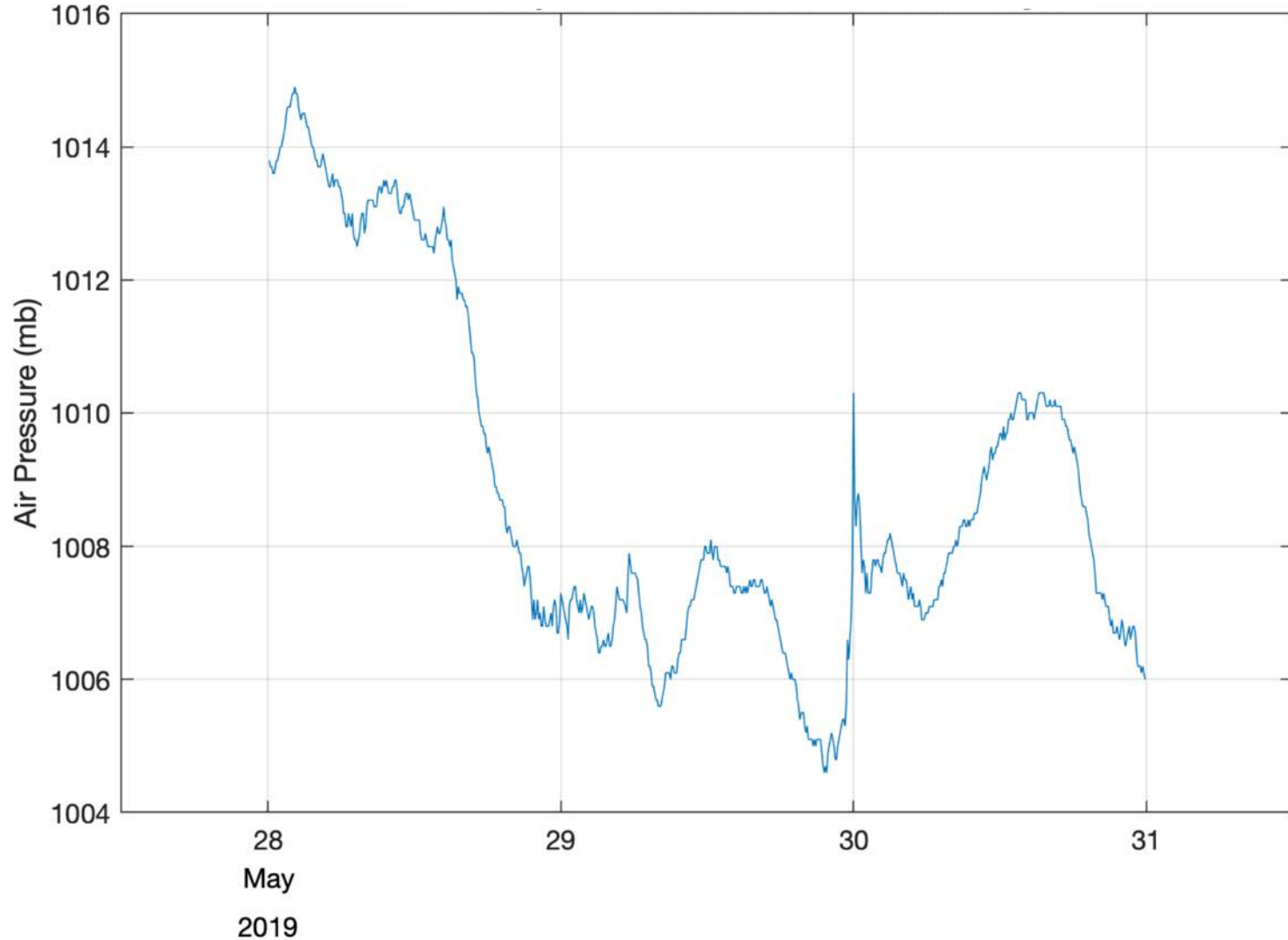


70% of high q-factor events associated with medium to high HF noise

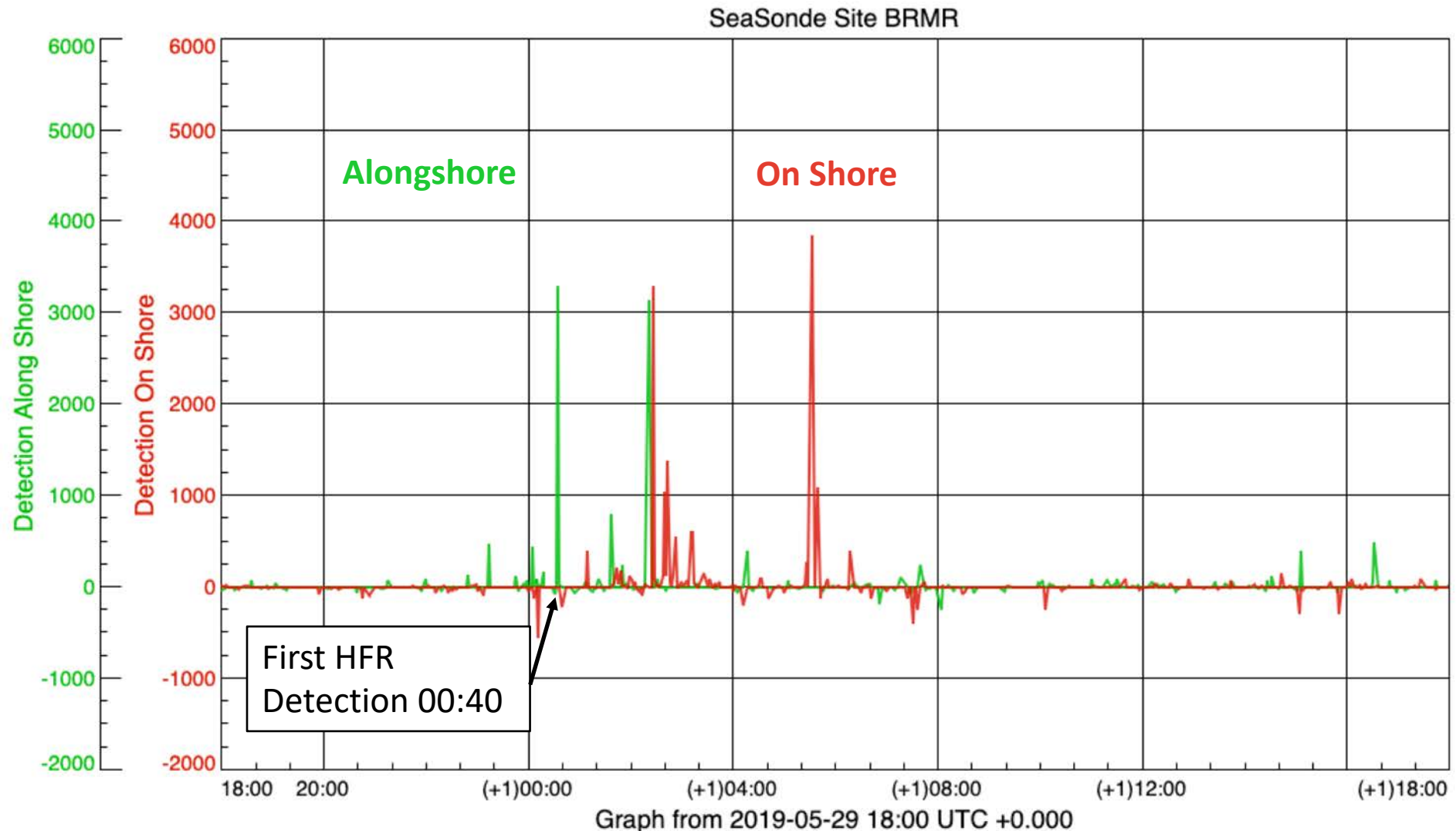
RECENT METEOTSUNAMI EVENTS



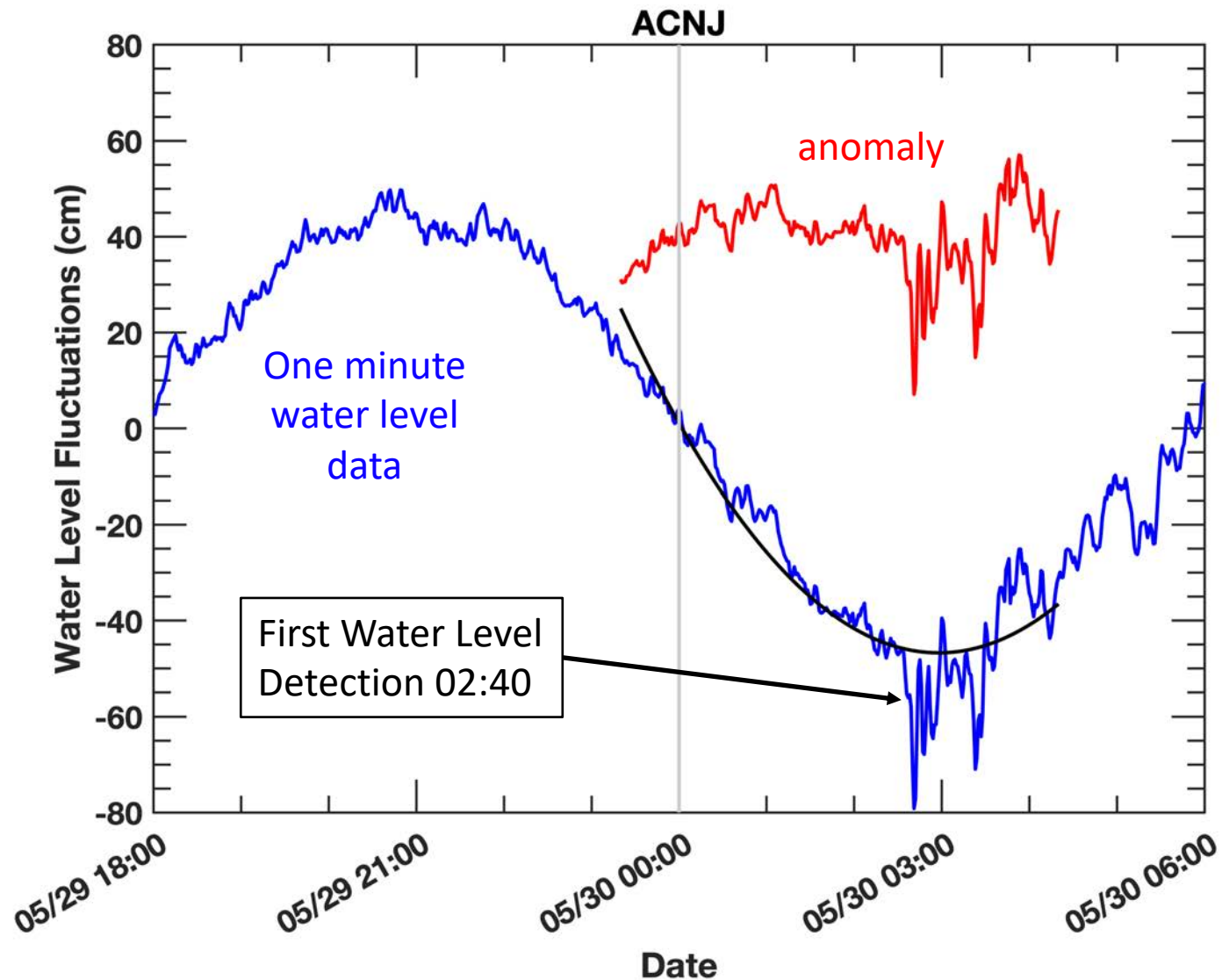
Atmospheric Pressure at Atlantic City



HF Radar q-factor Detection Data



Water Level at Atlantic City, NJ



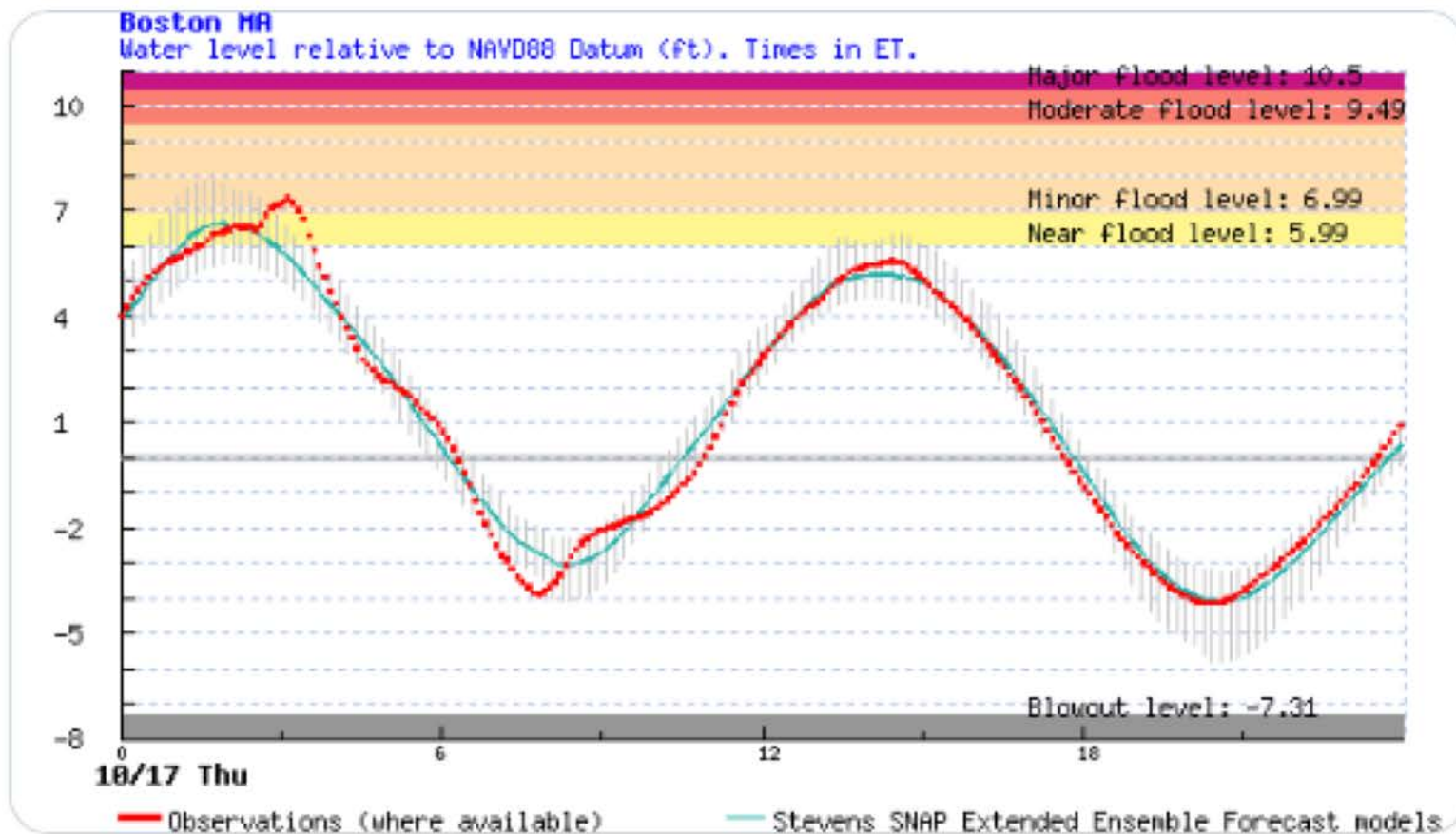
October 16-17, 2019

NEXRAD 1KM MOSAIC 15 OCT 19 23:55

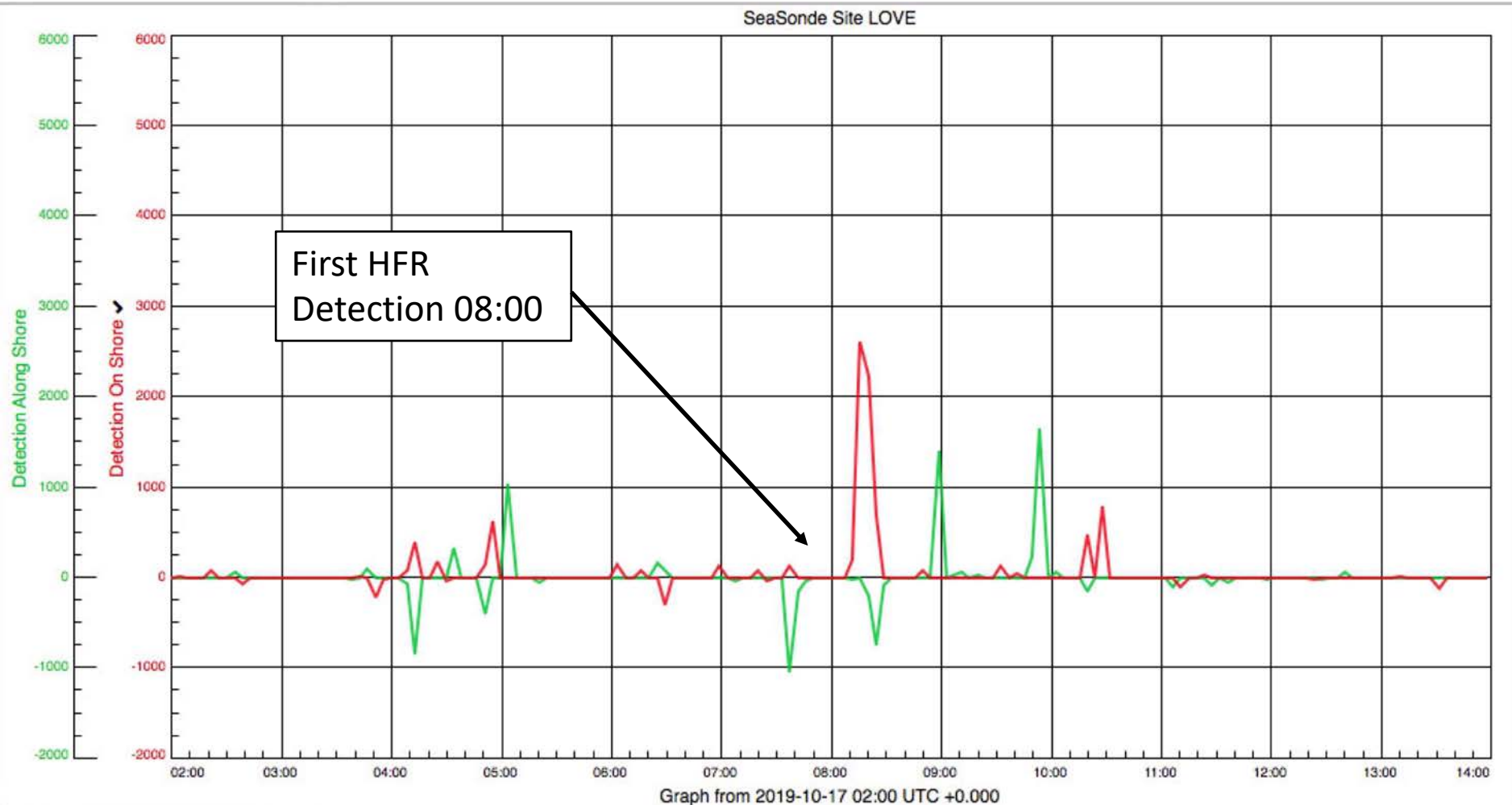


Tom Herrington @TomHerrington65 · Oct 18

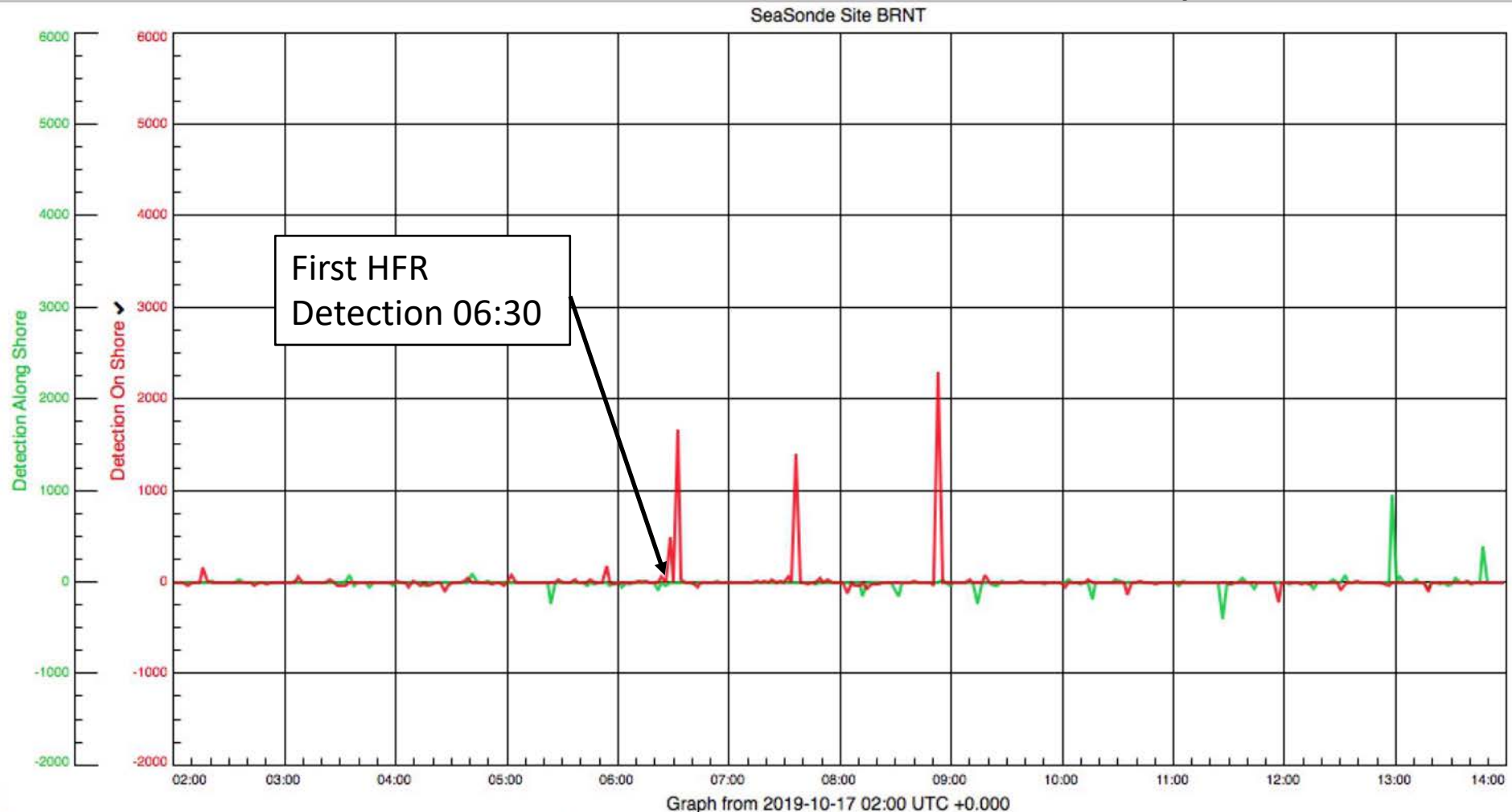
Yesterday's #Meteotsunami shows up in the tide gauge data from King's Point NY to Portland, ME @MUUrbanCoast @NJSeaGrant hudson.dl.stevens-tech.edu/sfas/d/index.s...



Two HFR Stations Detected Meteotsunami on October 17, 2019

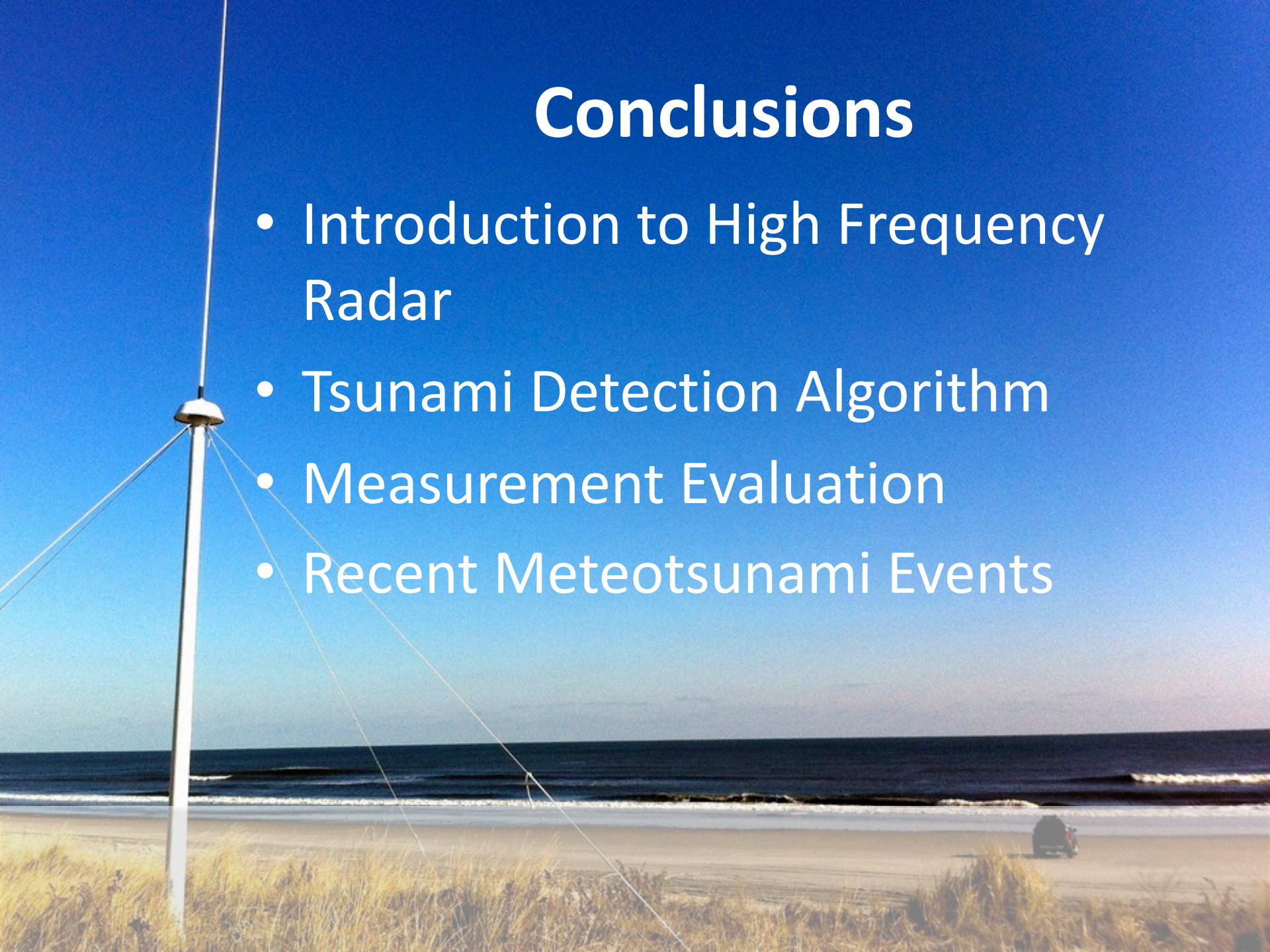


Two HFR Stations Detected Meteotsunami on October 17, 2019



Conclusions

- Introduction to High Frequency Radar
- Tsunami Detection Algorithm
- Measurement Evaluation
- Recent Meteotsunami Events



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Thank You!



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