Storm Induced Beach Changes along New Jersey coasts

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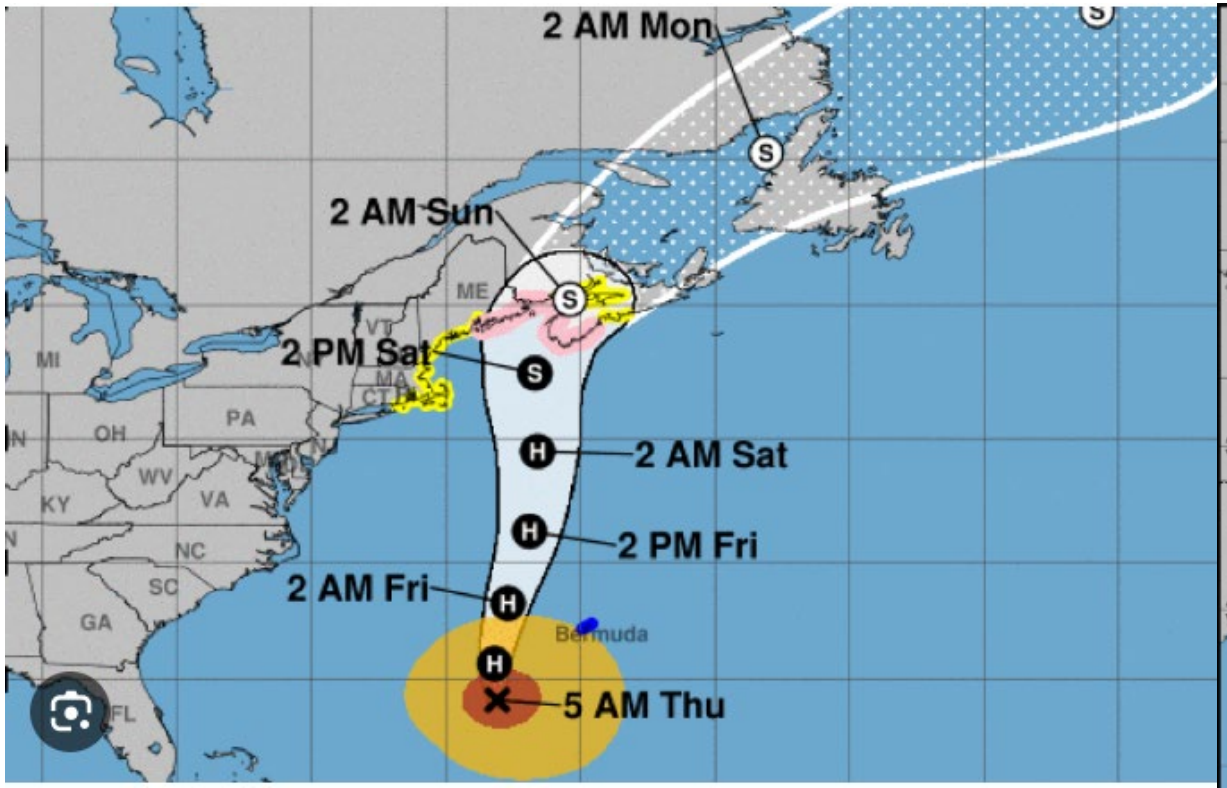
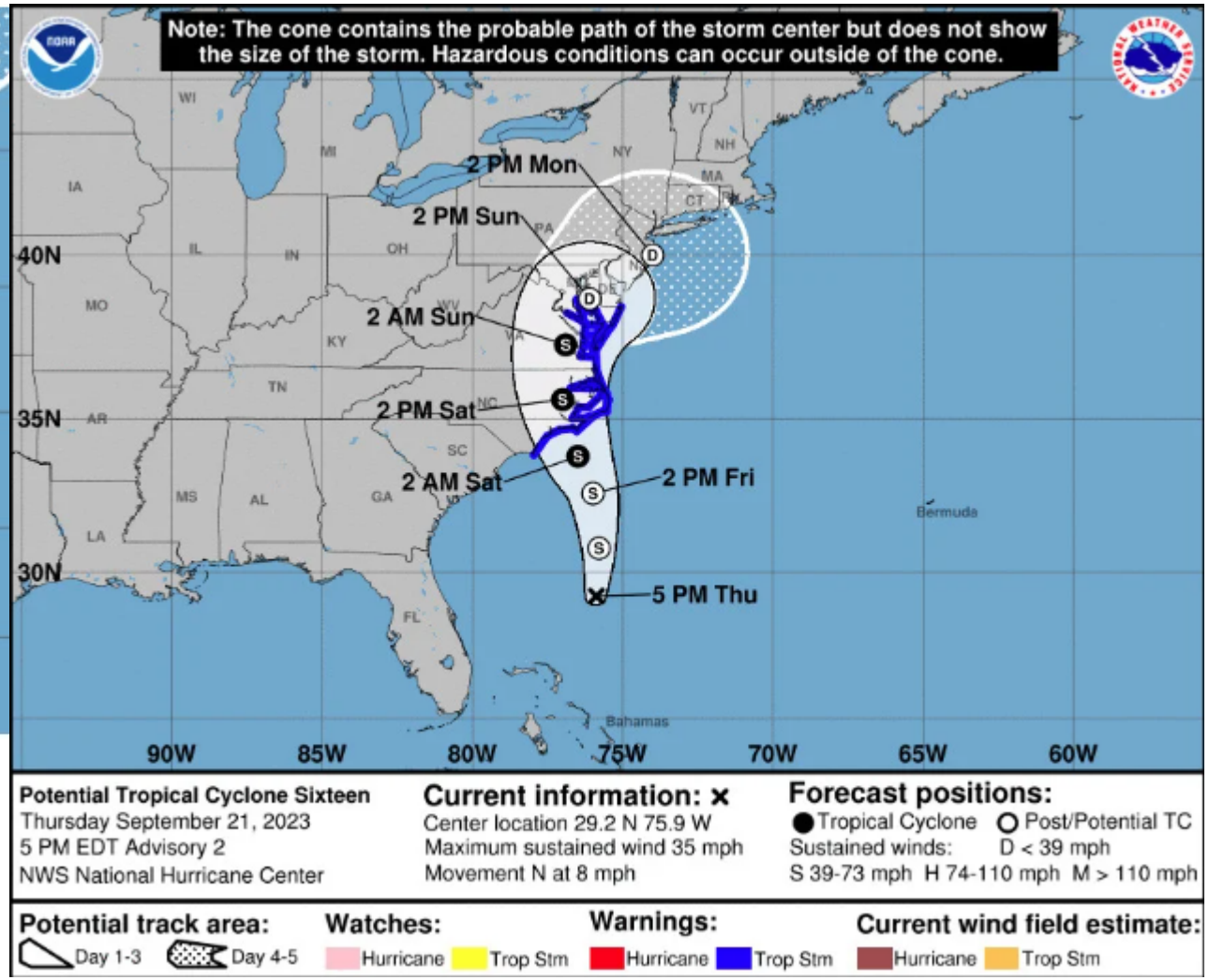
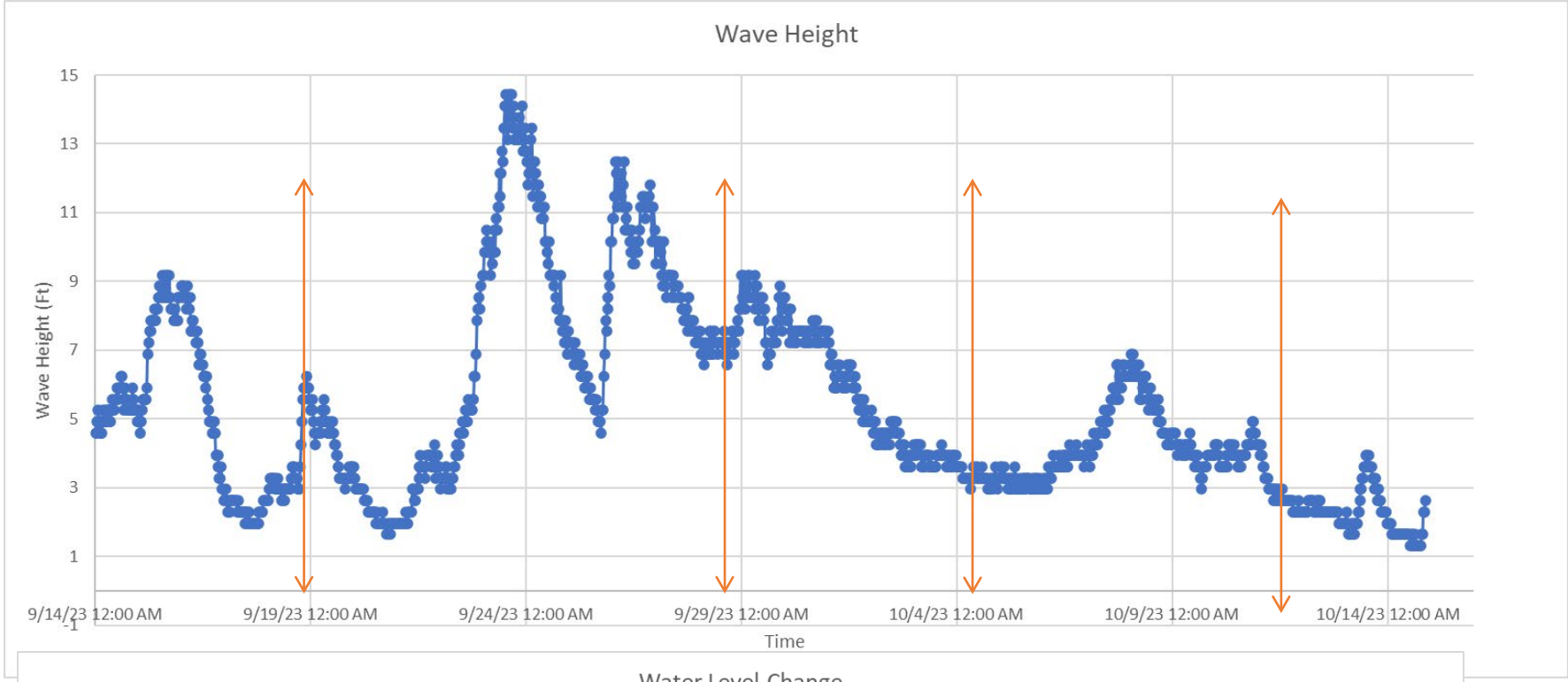


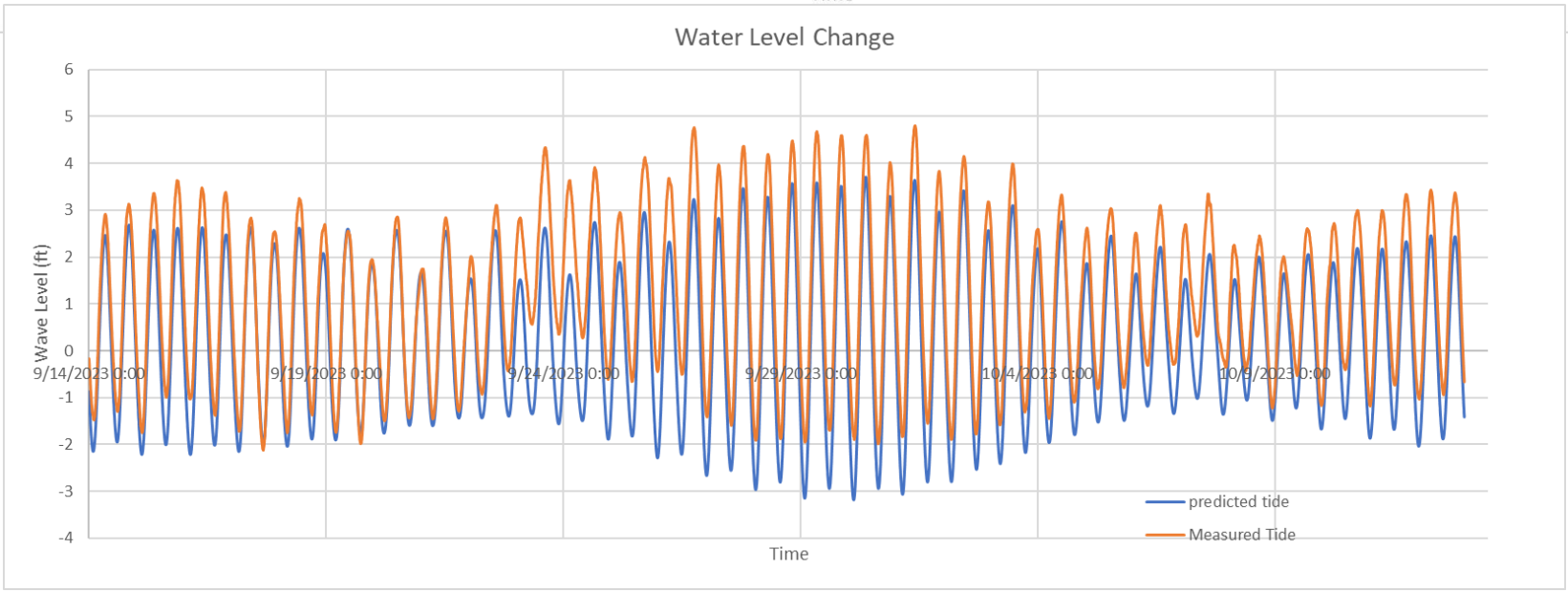
Passage of Hurricane Lee in the mid-September

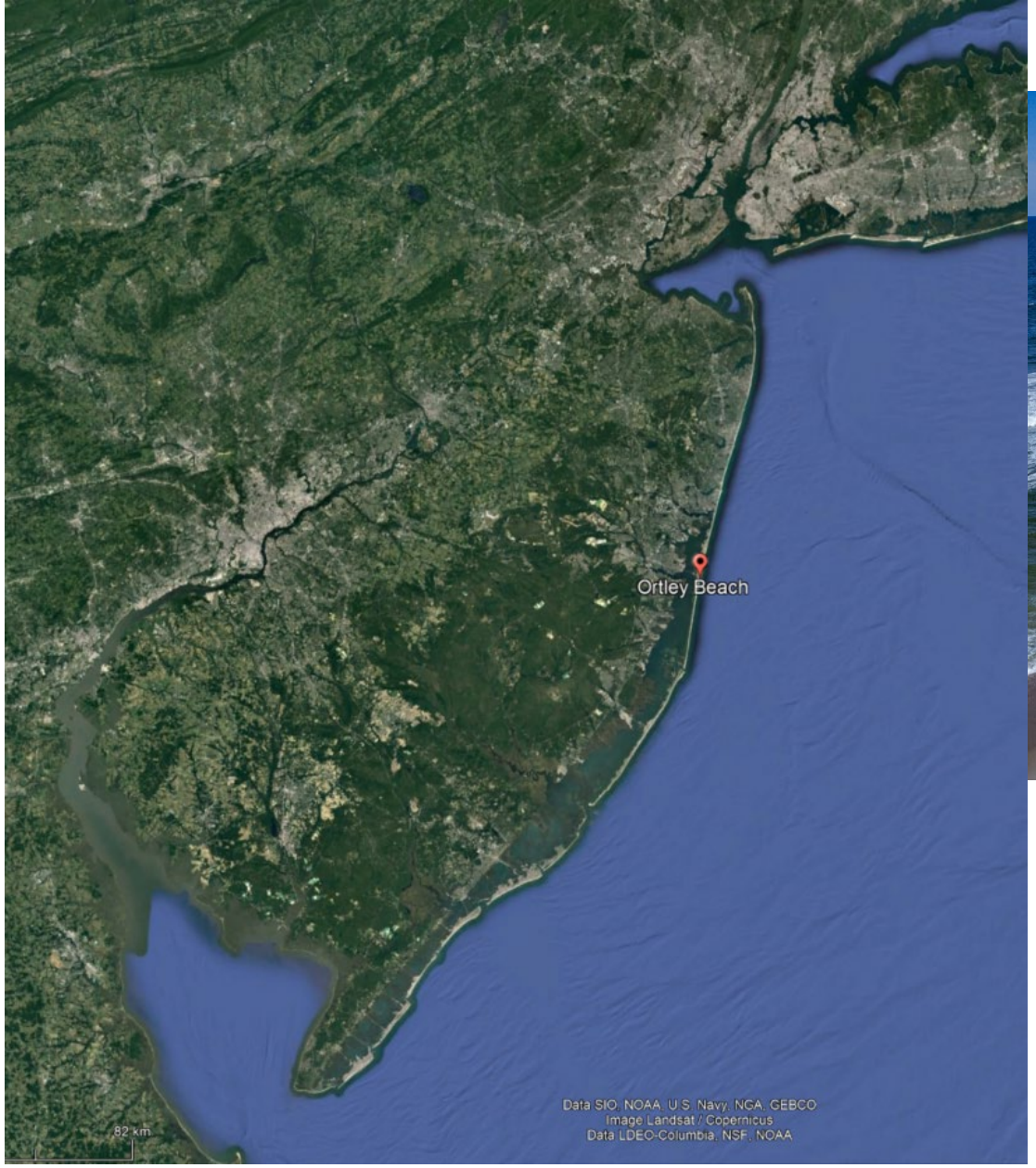


Passage of Hurricane Ophelia in late September


New York
Trenton
New Jersey
Esri, GEBCO, Garmin, NaturalVue | Es

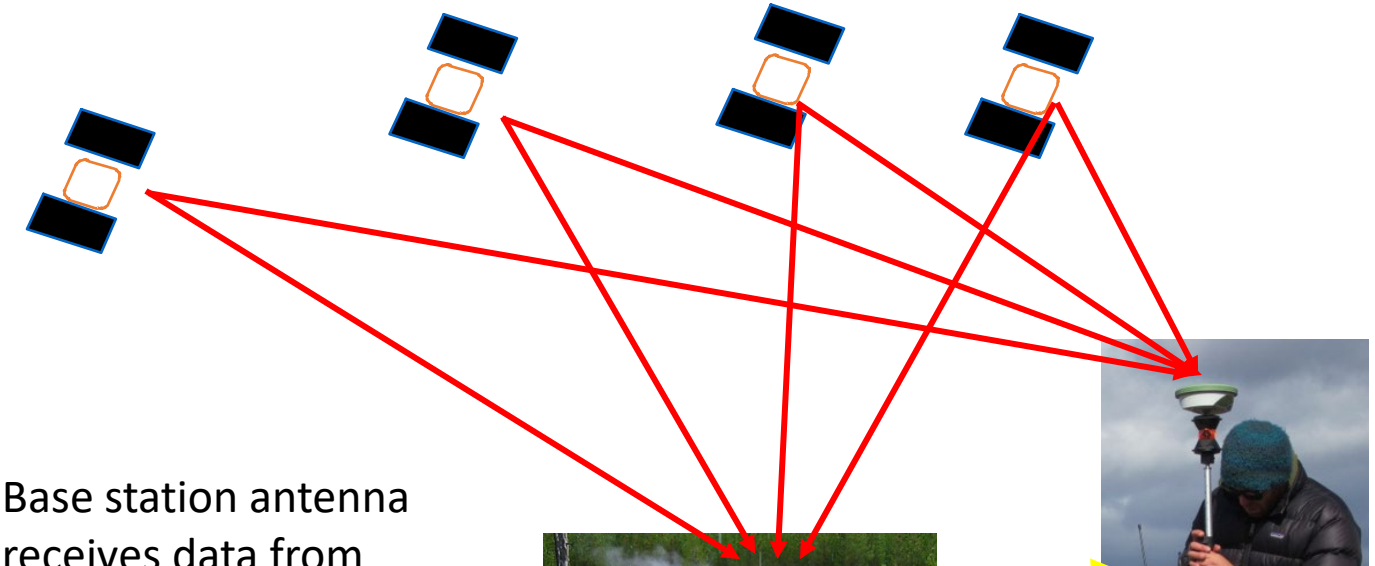

Wave Height
Wave Height (Ft)
15
13
11
9
7
5
3
1
-1
9/14/23 12:00 AM
9/19/23 12:00 AM
9/24/23 12:00 AM
9/29/23 12:00 AM
10/4/23 12:00 AM
10/9/23 12:00 AM
10/14/23 12:00 AM
Time


Water Level Change
Wave Level (ft)
6
5
4
3
2
1
0
-1
-2
-3
-4
9/14/2023 0:00
9/19/2023 0:00
9/24/2023 0:00
9/29/2023 0:00
10/4/2023 0:00
10/9/2023 0:00
predicted tide
Measured Tide
Time



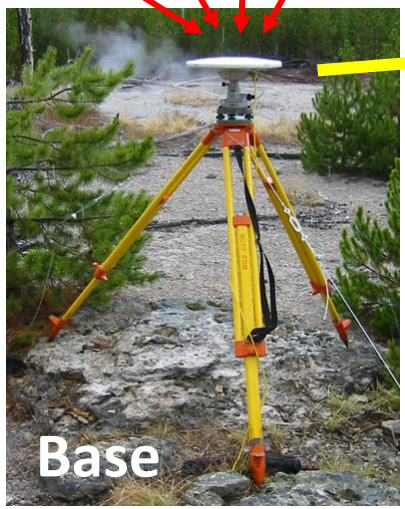
Ortley Beach

Kinematic systems



Base station antenna receives data from satellites.

The position drifts over time relative to the known, stable location of the antenna. This offset is communicated to the rover as a correction.



At the same time, rover antenna also receives position data from satellites.

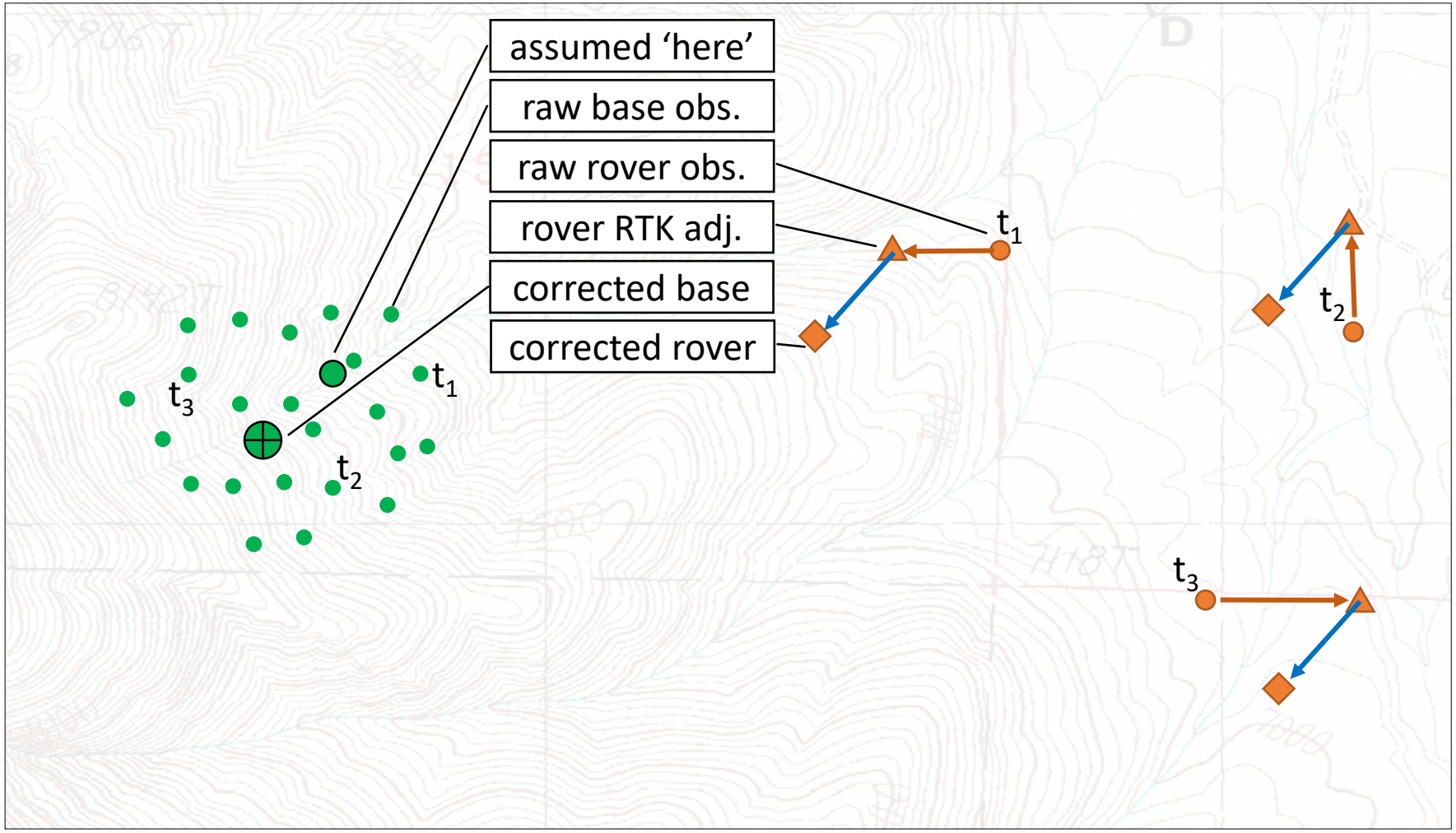
Rover also receives a position correction from the base, in real time for RTK.

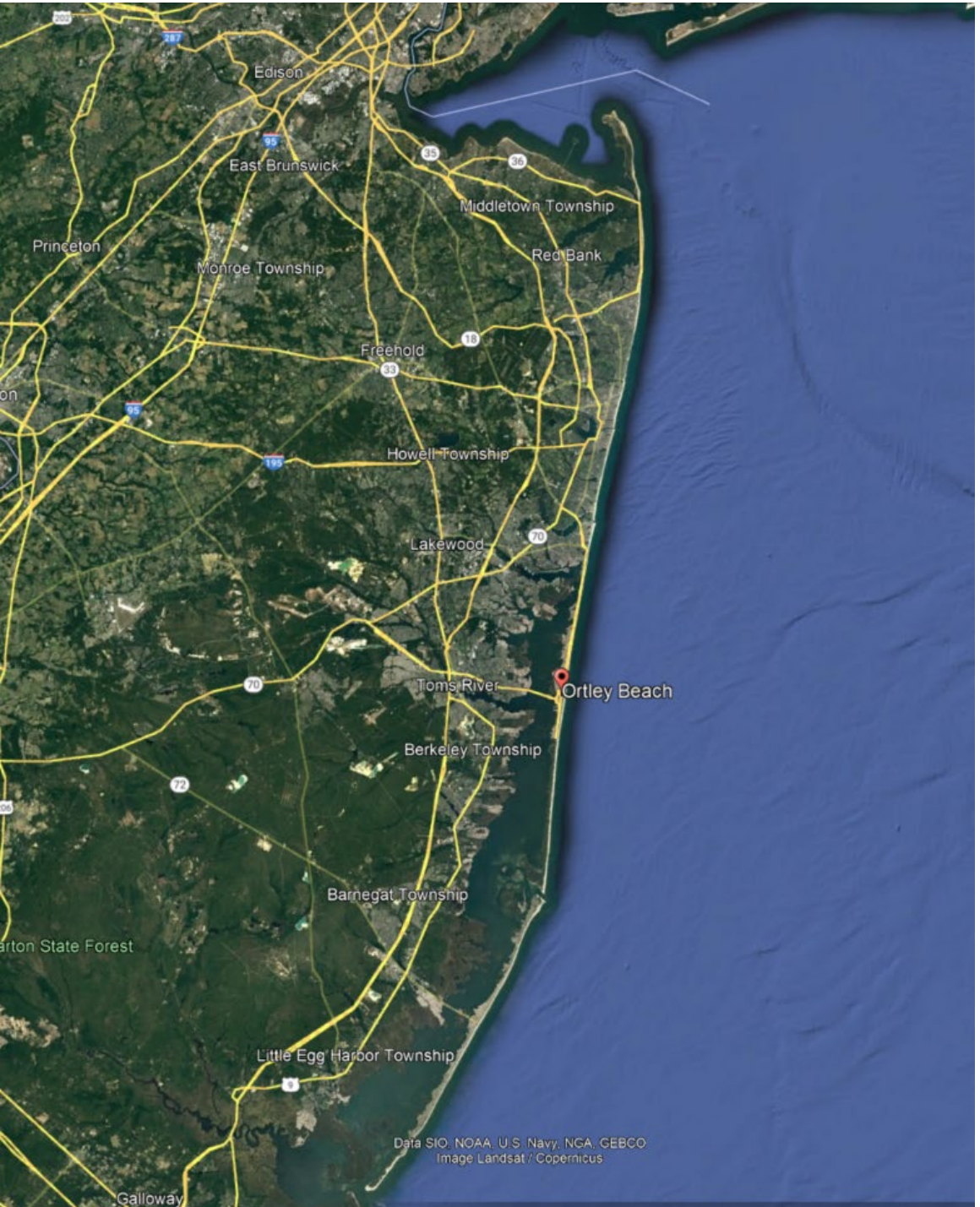
(Images: Ben Crosby)

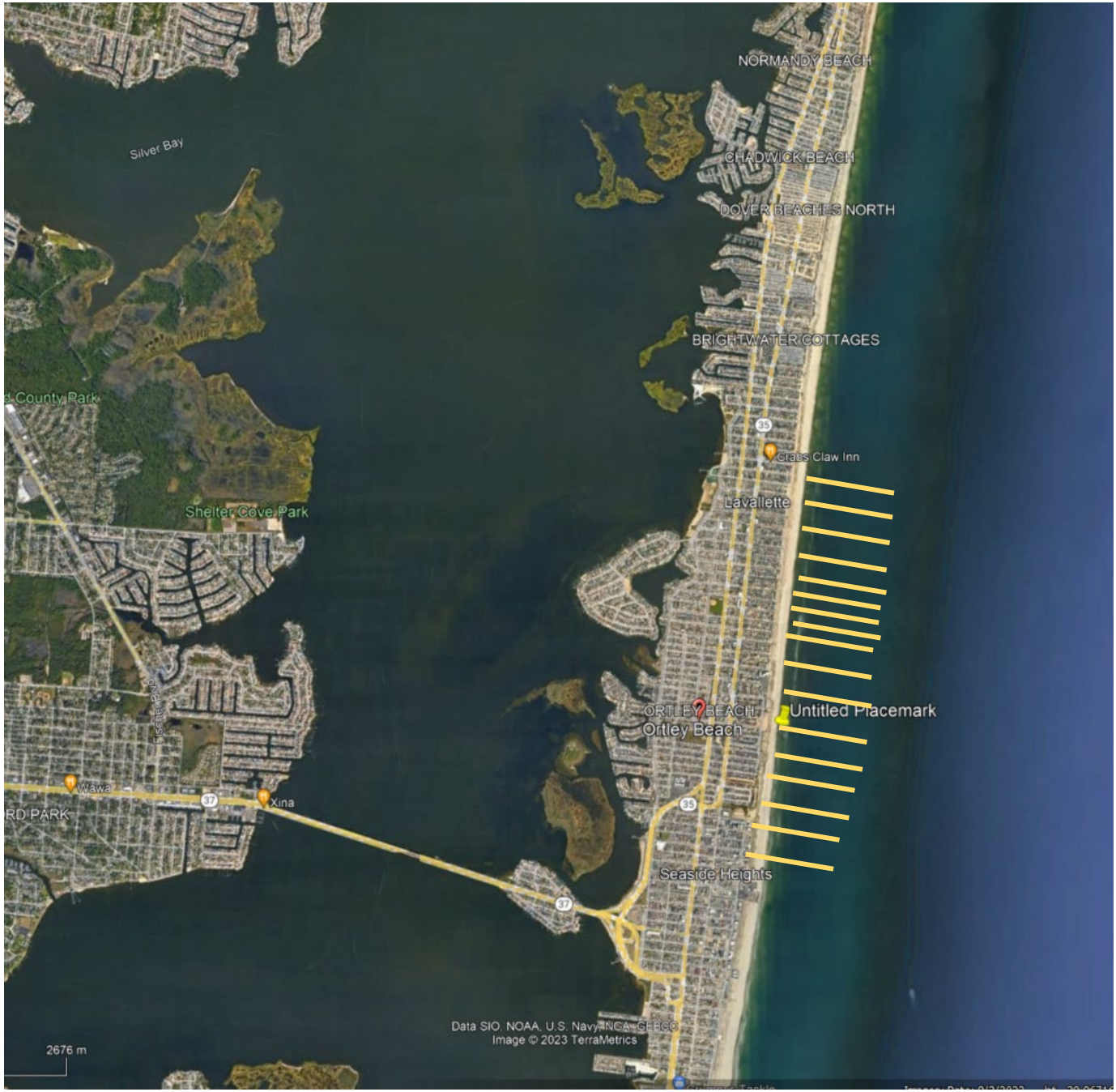
Map View of an RTK Survey

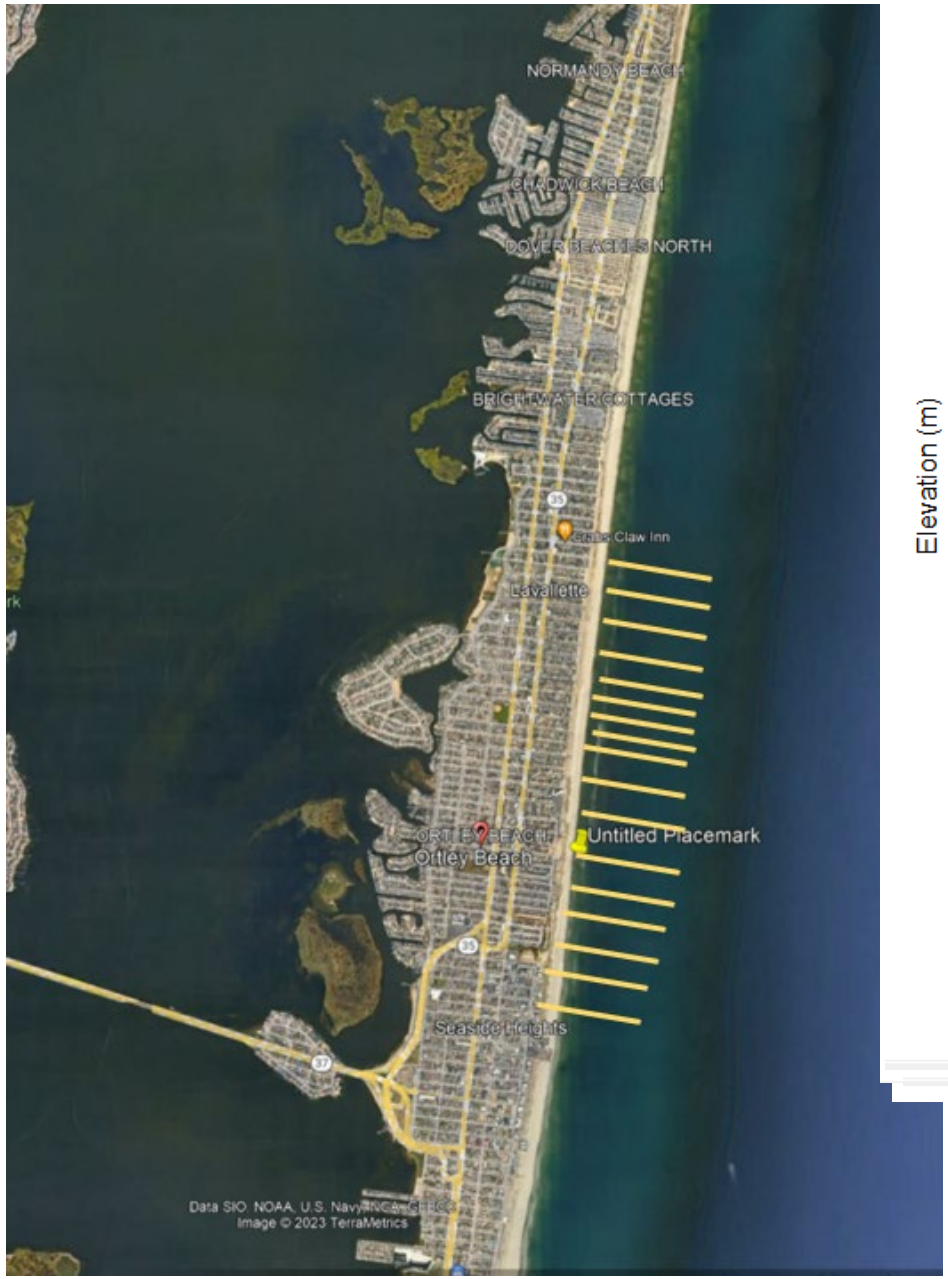
Base Station

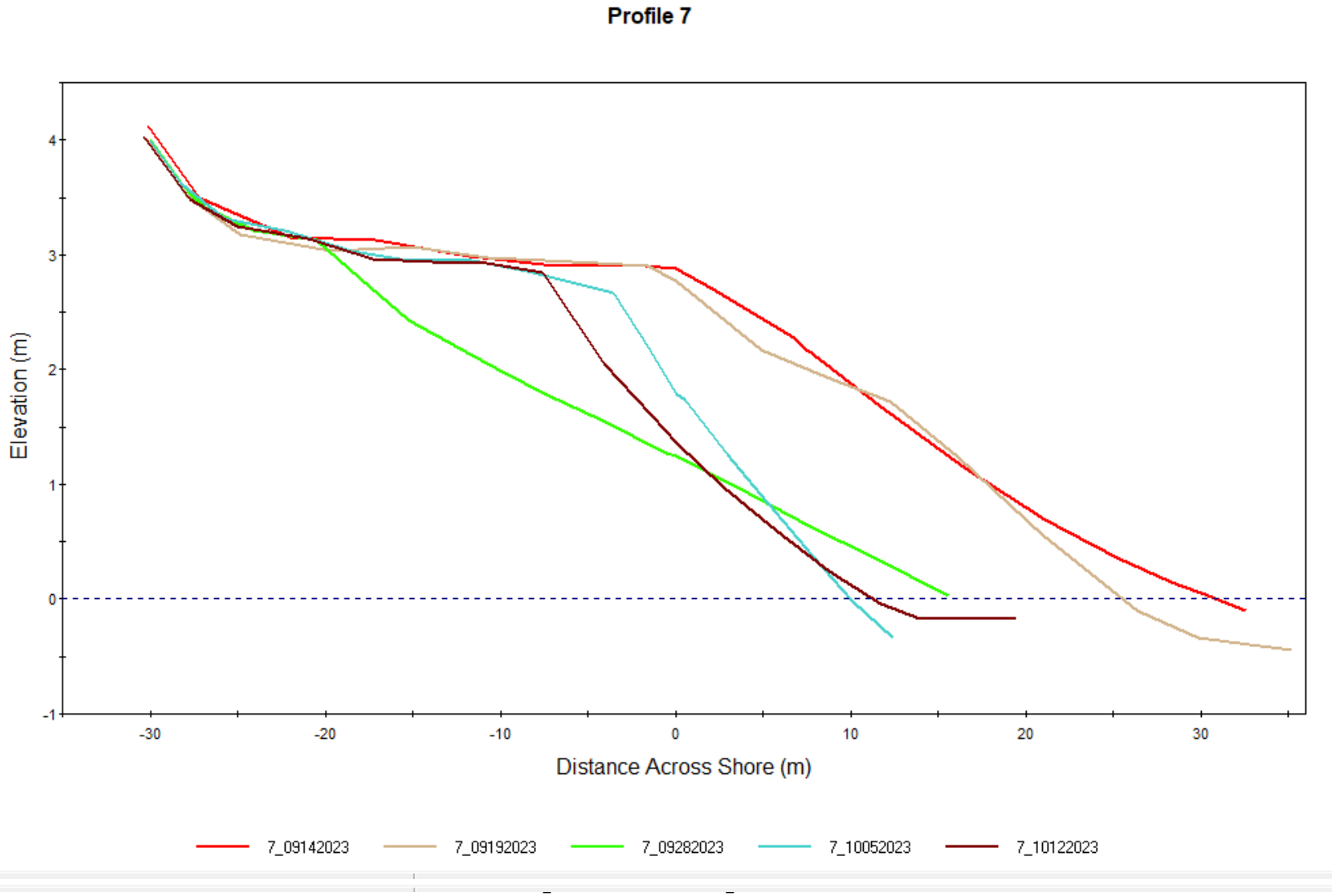
Three Different Rover Positions



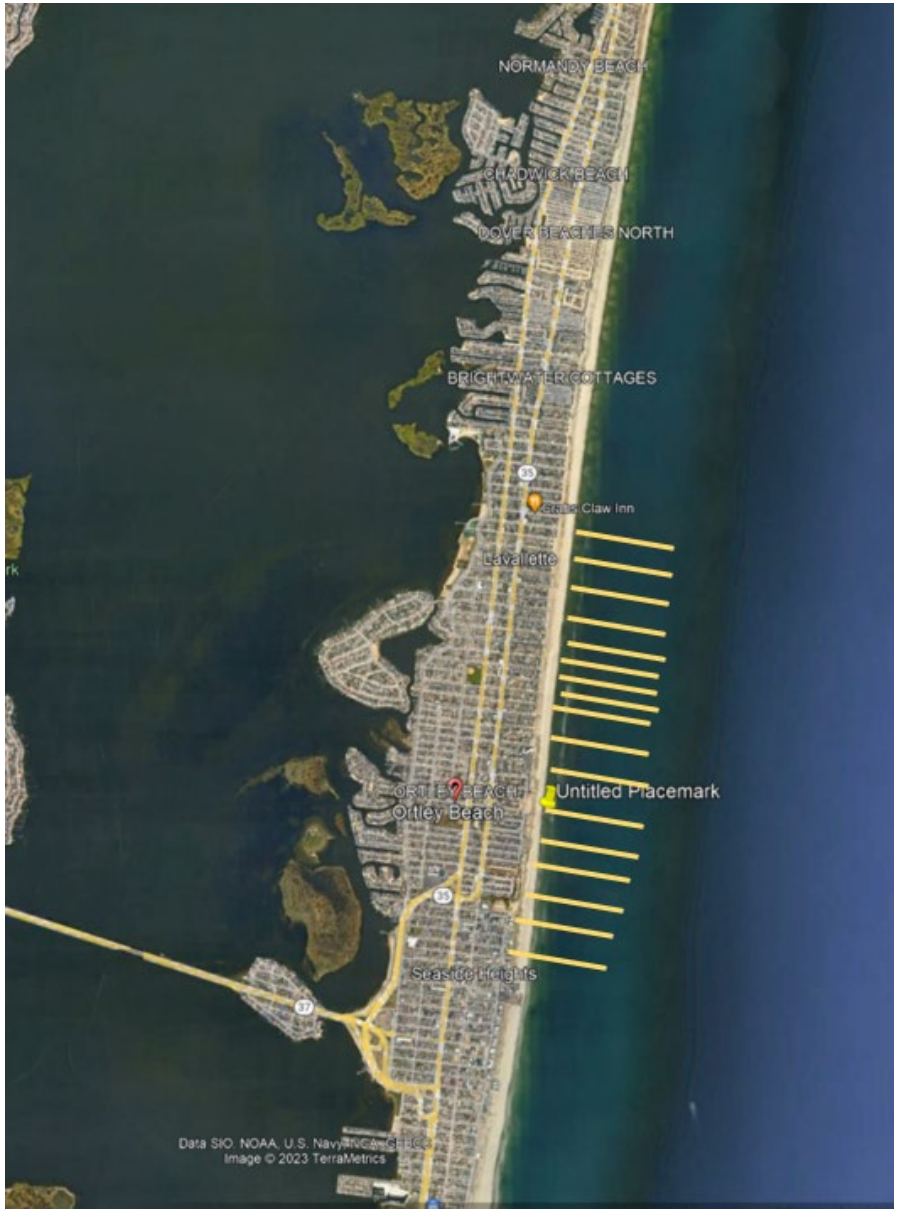

Edison
East Brunswick
Middletown Township
Princeton
Monroe Township
Red Bank
Freehold
Howell Township
Lakewood
Toms River
Ortley Beach
Berkeley Township
Barnegat Township
Little Egg Harbor Township
Galloway
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

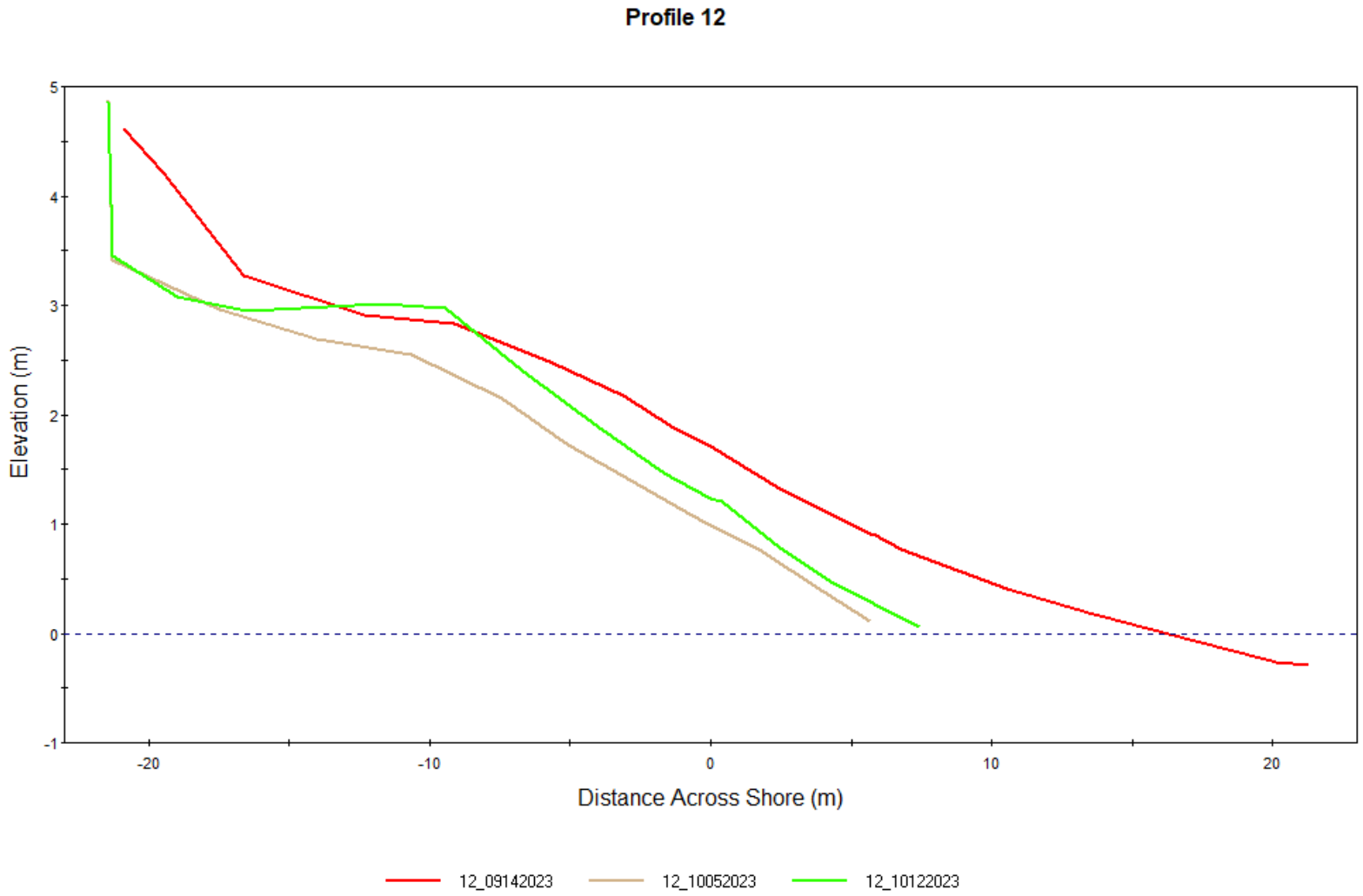

NORMANDY BEACH
Silver Bay
CHADWICK BEACH
DOVER BEACHES NORTH
BRIGHTWATER COTTAGES
Crabs Claw Inn
Lavallette
Shelter Cove Park
ORTLEY BEACH
Ortley Beach
Untitled Placemark
Wawa
Xina
Seaside Heights
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2023 TerraMetrics
2676 m





The shoreline retreat 15 m (49 ft)
the dry beach (from mean high tide line to dune edge) lost 50 yard^3/yard
The dune remain the same. One third of the lost sand was recovered within a couple of weeks.

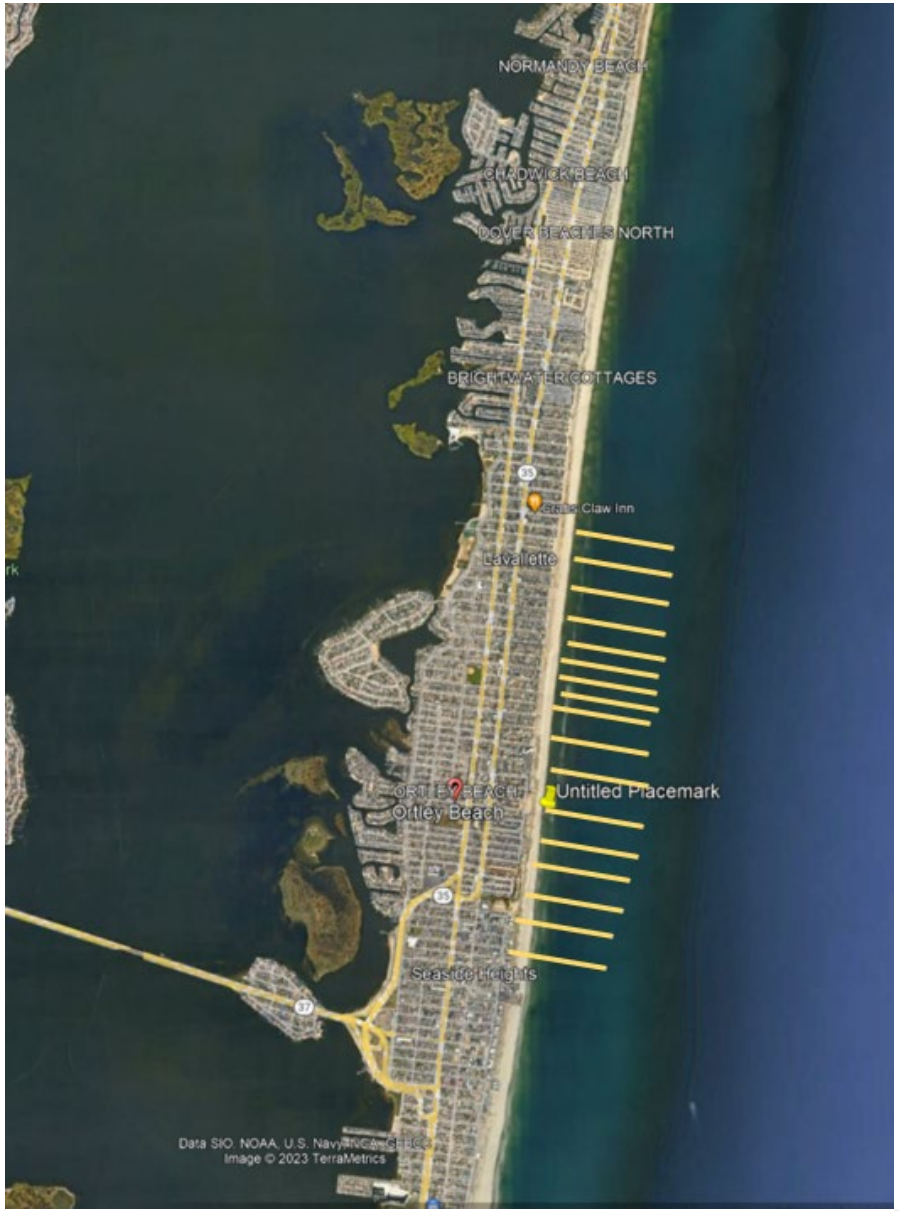


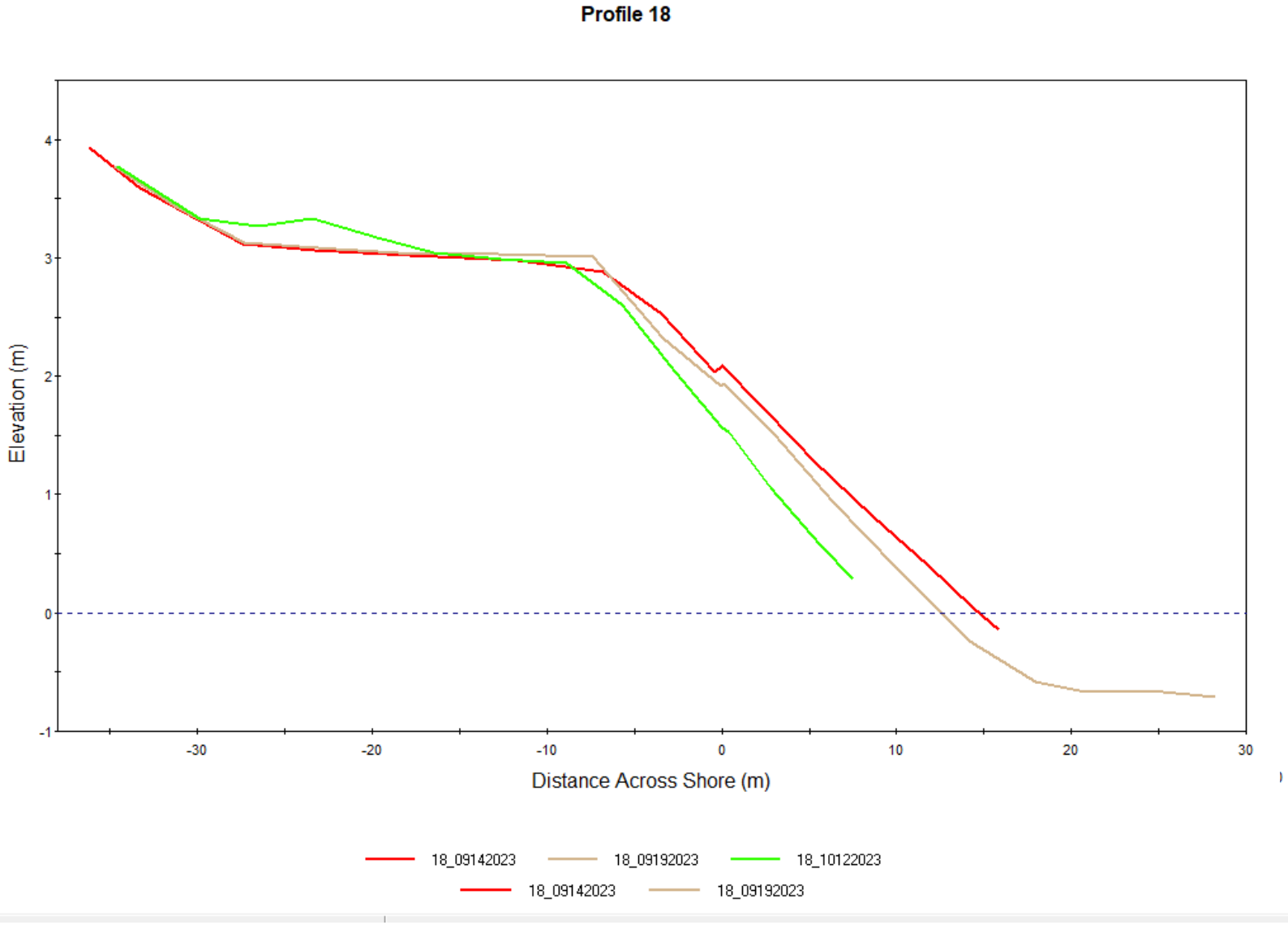


Shoreline retreat 15 feet. The dune line retreat 11 feet

20 yd^3/yd of sand was eroded.

Half of the lost beach sand recovered within 2 weeks after the storm. But the lost sand at dune was not recovered.


NORMANDY BEACH
CHADWICK BEACH
DOVER BEACHES NORTH
BRIGHTWATER COTTAGES
Lavallette
Untitled Placemark
Ortley Beach
Seaside Heights
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2023 TerraMetrics


Profile 18
Elevation (m)
Distance Across Shore (m)
4
3
2
1
0
-1
-30
-20
-10
0
10
20
30
18_09142023
18_09192023
18_10122023
18_09142023
18_09192023

On-going research task

volume calculations.

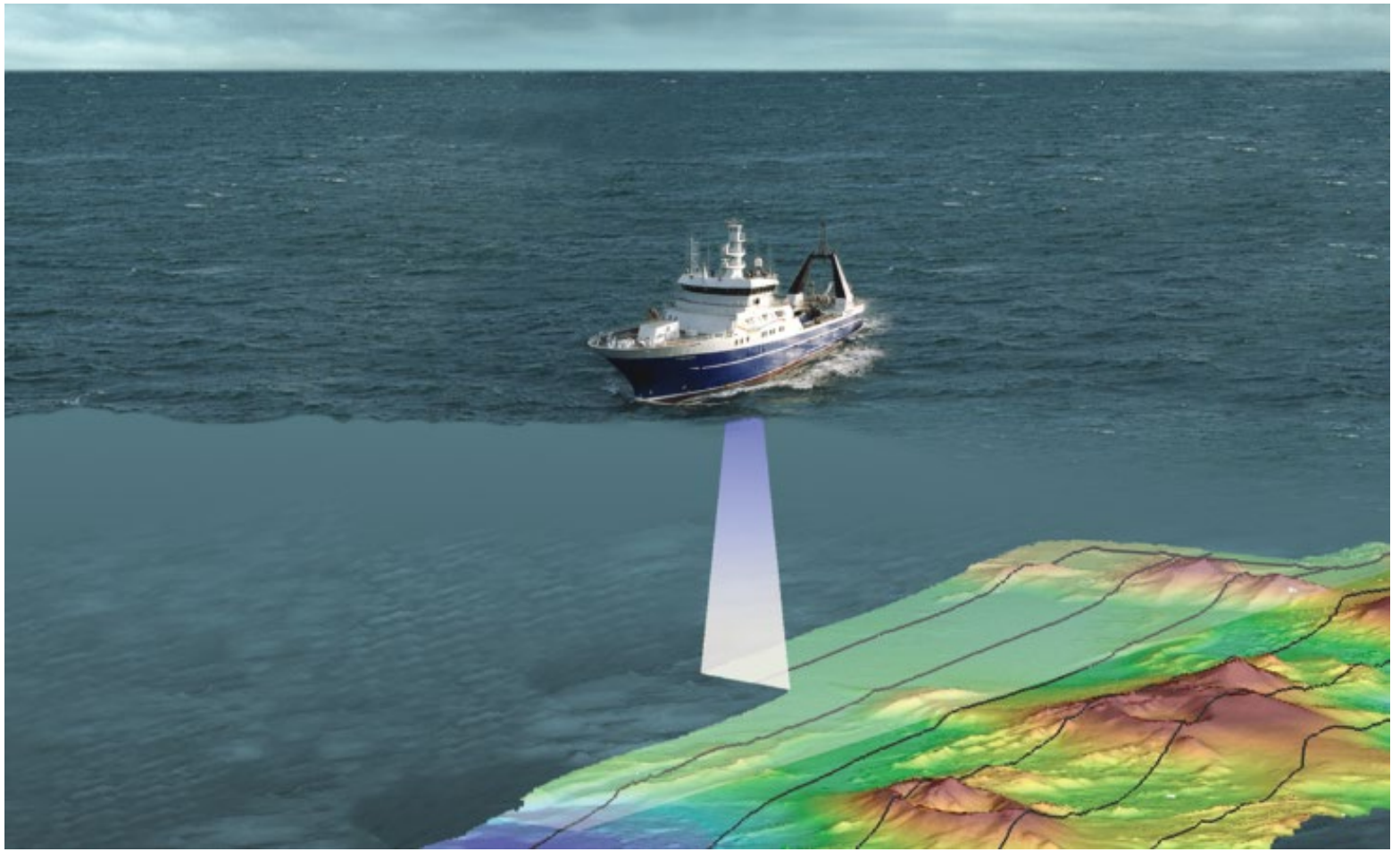
Link the volume loss to offshore wave energy.

The ground control data can be used to verify the remote sensing images.

Prediction of shoreline changes under future storms.

Collaborative research at Long Branch Beach with MSU, funded by NJ Sea Grant.

Seafloor eco-sounder mapping, on-going project funded by NJ Sea Grant.



John’s Cove and Keyport Funded by NJ Sea Grant

Field measurement at John’s Cove

Living shoreline at Keyport and John’s Cove

Summary

Beach is a very dynamic environment. Measurements with high special and temporal resolution are critical to capture its changes.

We can provide systematic beach surveys and conducting wave and tide measurement to investigate the mechanism of shoreline changes.

By collaborating within the DESS of Kean, our team can access the effectiveness of living shoreline and other shore protection measures.

Thanks!

Undergraduate students from Kean: Michael Heuser, Dallas Ragusa helped with the field observations.

The study get supports from Kean University, and New Jersey Sea Grant.