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
Kinematic systems

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.

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.

(Images: Ben Crosby)
Map View of an RTK Survey

Base Station

Three Different Rover Positions

assumed ‘here’
raw base obs.
raw rover obs.
rover RTK adj.
corrected base
corrected rover

$\text{t}_1$

$\text{t}_2$

$\text{t}_3$
The shoreline retreated 15 m (49 ft) from the mean high tide line to dune edge, losing 50 yard$^3$/yard. The dune remained 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.
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!

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