Real Time Kinematic Technique Application on Coastal Geomorphology at GATEWAY National Recreation Area

Carlos P. Carvajal
Norbert Psuty
Randall Fullmer
William Schmelz
Andrea Spahn
Mosaics in Science Program
Institute of Marine and Coastal Science - Rutgers University

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THE STATE UNIVERSITY OF NEW JERSEY

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Gateway National Recreation Area

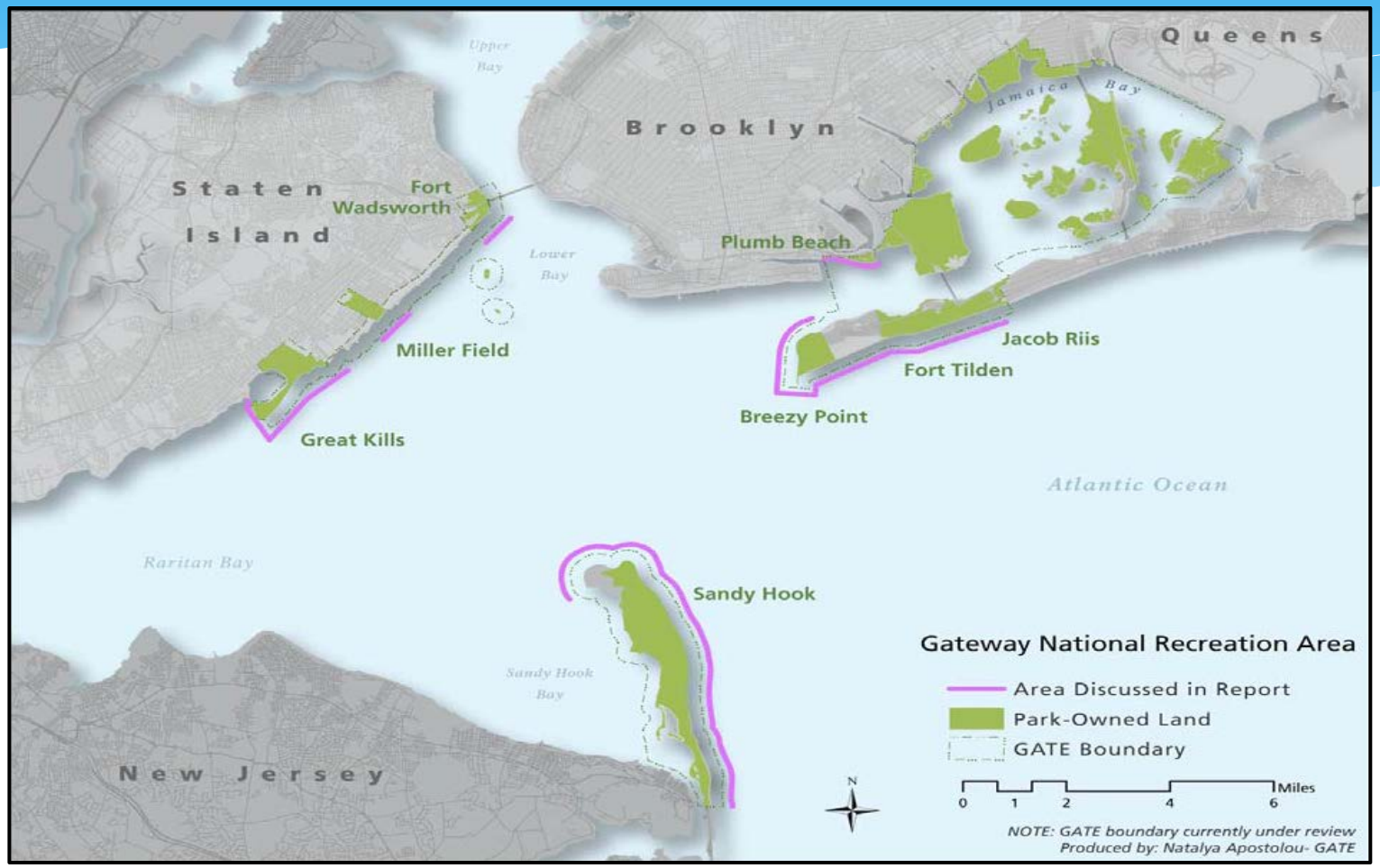

Figure 1 Gateway National Recreation Area locator map (Psuty 2013)

GPS Technology and Survey Methodology evolution

- In 1980:
  - Long data collection days
  - Long post-processing to obtain centimeter-level position.
- In 1990:
  - Tremendous amounts of data in one day.
  - Efficient data management.
  - Centimeter-level positioning in real time.

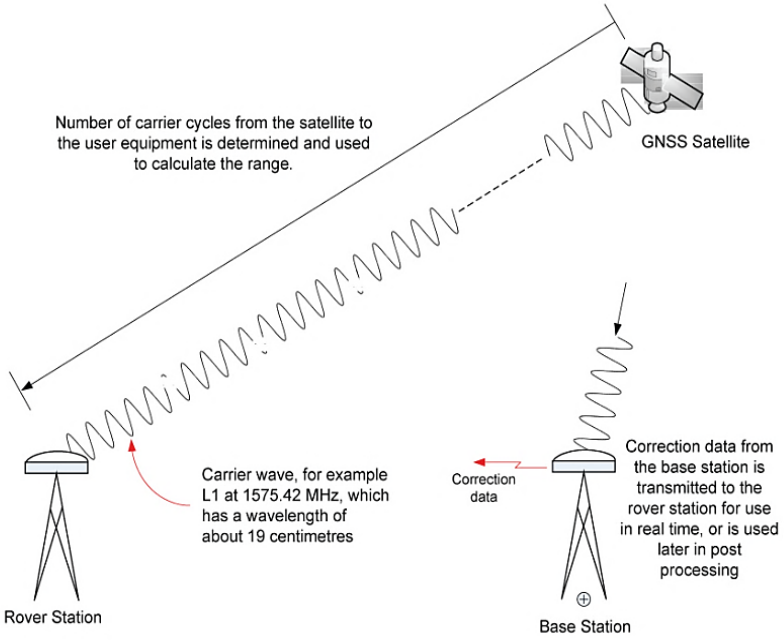

Figure 2 Real Time Kinematics. (NovAtel®)

Real Time Kinematic or RTK survey technique

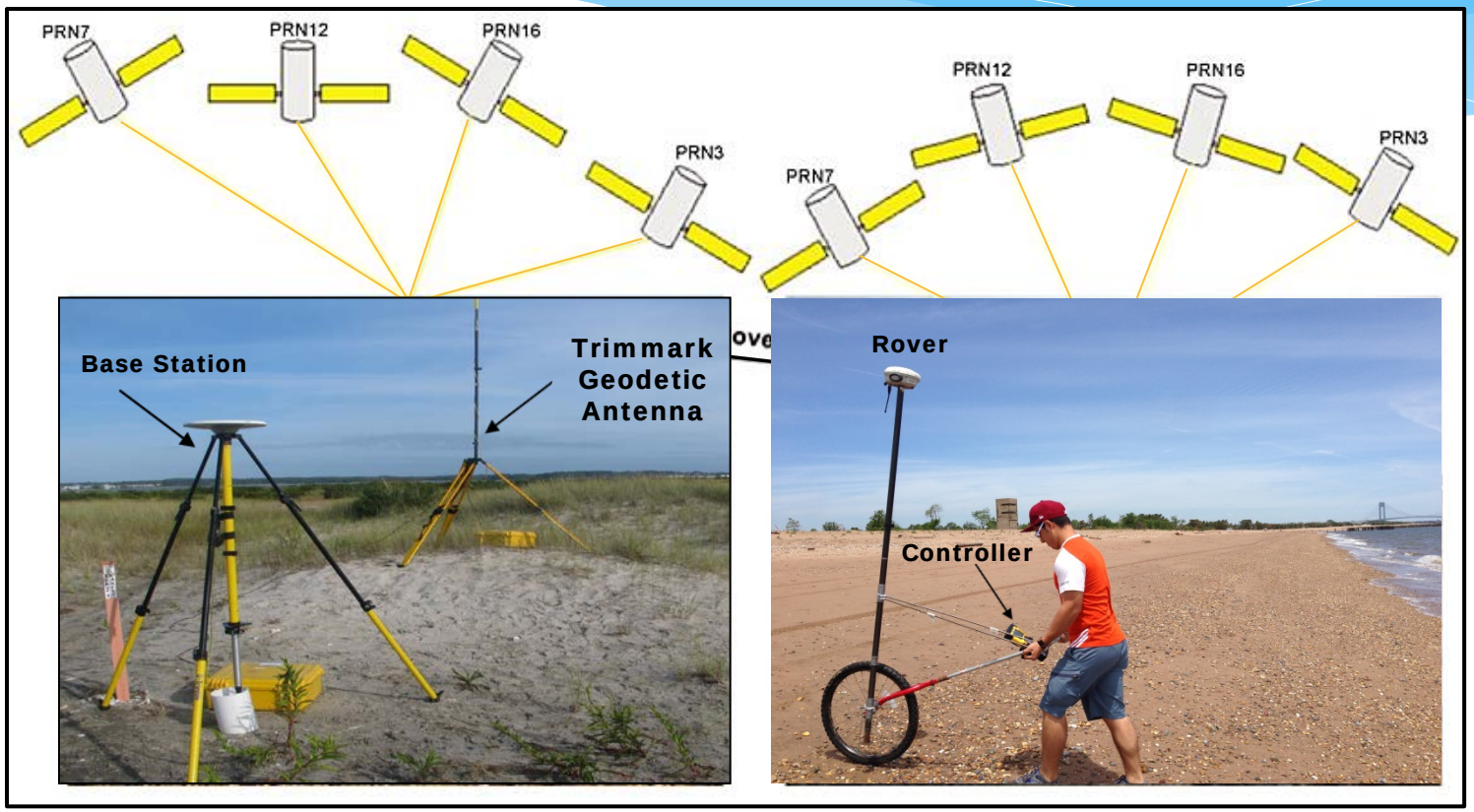

Figure 3 *Real-Time Kinematics (RTK) procedures* courtesy of the U.S. Geological Survey

Real Time Kinematic or RTK survey technique

* Virtual Reference Stations (VRS) configuration
  * Cellphone Corrections
  * Several spaced permanent station communicating with a central station.
  * Central station corrects position to the RTK user terminal.
  * Easy Set up

Figure 4. Leica Rover and Controller

RTK Technique: Accuracy and Precision

- Dilution of Precision (DOP)
- Base Station:
  - Accuracy of known location of the base station
  - Quality of base stations' satellite information.
- Rover:
  - Accuracy of Base-Station location.
  - Distance from the base station.
  - Site selection to minimize environment effects.

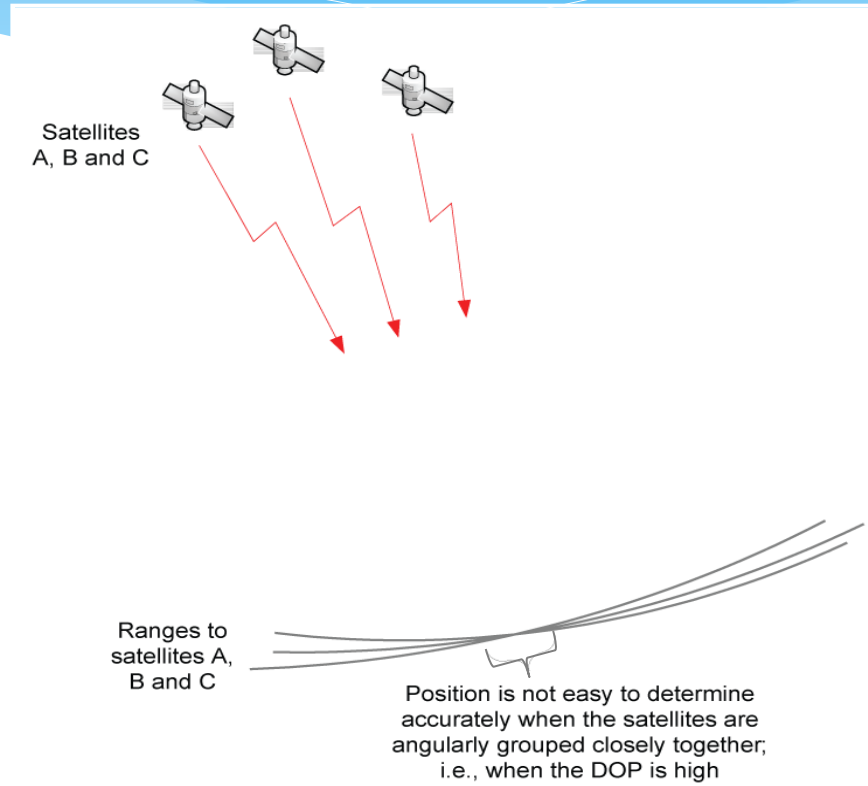

Figure 5. Dilution of Precision showing poor satellite geometry. (NovAtel®)

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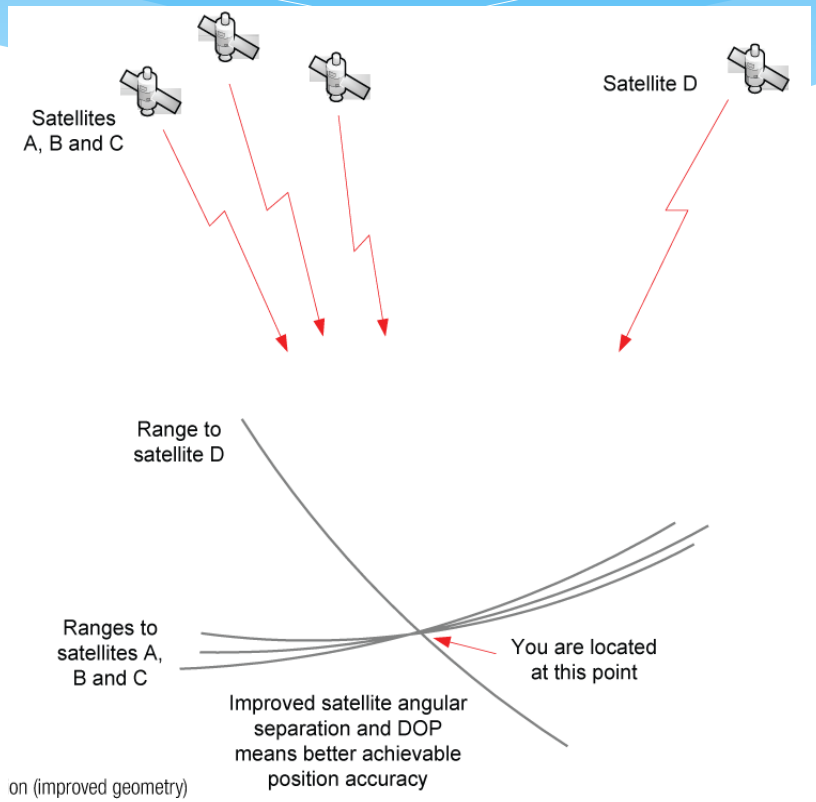

Figure 6. Dilution of Precision showing improved geometry. (NovAtel®)

Northeast Coastal and Barrier Network (NCBN)

- Gateway National Recreation Area
- Geomorphological Monitoring Protocol
- Goal and objective
- Protocols
  - Part I – 1D Ocean Shoreline Position
  - Part II – 2D Coastal Topography
  - Part III – 3D Digital Elevation Models (in progress)
- Data Analysis and final products

2D Coastal Topography

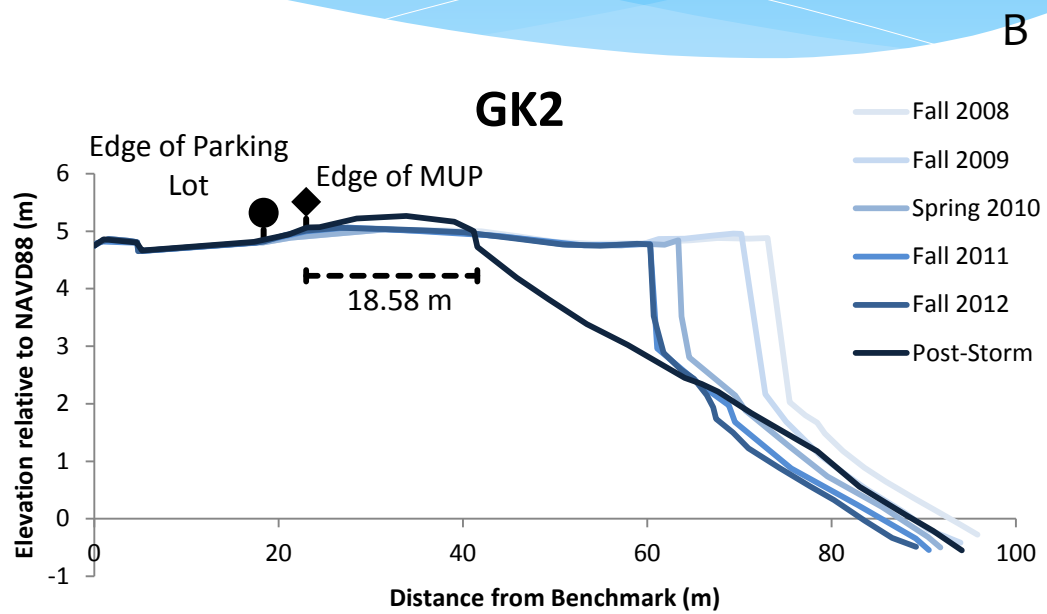

Figure 7. (A) Benchmark monuments locations at Great Kills, (Psuty, 2012). (B) Profile of GK2 showing drastic changes prior and post hurricane Sandy.

Digital Elevation Model (DEM)

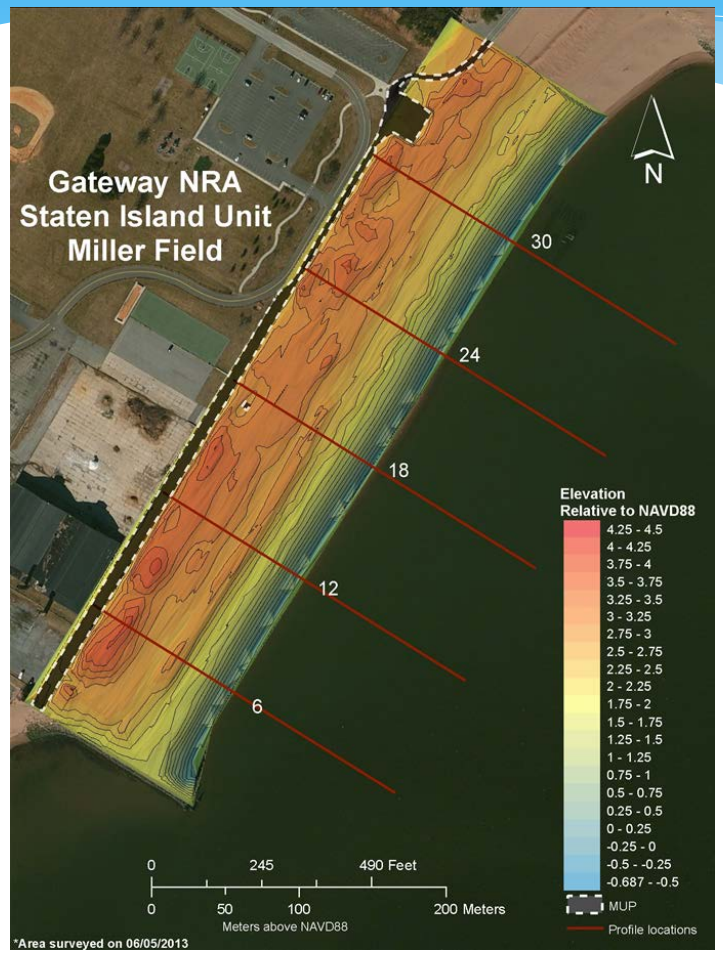

Figure 8. DEM of Miller Field showing profile transects

Figure 9. Produced by Tucker Fullmer. DEM of Great Kills showing an artificial feature.

Resources

Literature Cited

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Thank you