The availability of new data and imagery research is helping coastal communities be more proactive with risk management. IMAGE COURTESY DEWBERRY

Remapping the Atlantic Coastline

A shoreline mapping project undertaken after Superstorm Sandy will benefit coastal communities for years to come.

By Amar Nayegandhi, CP, CMS, GISP

Superstorm Sandy was the largest Atlantic hurricane on record, and impacted every state along the Eastern Seaboard from Florida to Maine, as well as several inland states. The October 2012 storm resulted in nearly 160 deaths and billions of dollars in damage to properties and infrastructure. The waves and surges caused extensive beach and dune erosion to the Altlantic coastline.

Recognizing the significant shifts in shoreline position, dune elevation, and beach width and volume along the coast, the National Oceanic Atmospheric Administration (NOAA) contracted Dewberry to collect and process Topobathymetric Lidar products and 4-band digital camera imagery data for 1,200-mi along the coast from Myrtle Beach, S.C., to Long Island, N.Y.

The data were prepared for NOAA's National Geodetic Survey Coastal Mapping Program to enable accurate, consistent measurement of shoreline and nearshore elevation data. The program regularly updates the national shoreline to define the nation's marine territorial limits and manage coastal resources. The updated information is applied to nautical charts and is considered authoritative in determining the official shoreline for the United States.

MEETING THE CHALLENGE

Topobathymetric Lidar is an airborne remote sensing technique used to measure the height of the surface on land and underlying streams, rivers, lakes, bays, and shallow coastal waters. While airborne lidar technology has been available for more than 20 years, seamless Topobathymetric Digital Elevation Models (DEMs), which merge topography (land elevation) and bathymetry (water depth) data at high spatial resolution, are still relatively new.

Topobathymetric Lidar data collection required intensive planning so that data acquisition occurred at low tide and during optimal water clarity conditions. Data acquisition began in November 2013. Execution required the deployment of two Riegl VQ820G Topobathymetric sensors alongside a pair of topography lidar sensors on two separate aircraft to conduct simultaneous operations along the 1,200-mi of coastline. A third topobathymetric sensor configuration was also deployed briefly to expedite the acquisition. The effort included 304 flight missions; 6,700 flight lines; and over 60-tb of Topobathy Lidar data delivered to NOAA. In addition to meeting the challenge of working on a compressed, weather-sensitive timeframe, Dewberry developed a new tool to correct the refraction of the laser signal as it traverses through the water column, creating an accurate elevation of the surface under water.

The data acquisition and deliverables were completed within two years, including a lidar reviewer portal that enables the public to visualize and interrogate the DEMs and imagery.

A TOOL FOR ALL

The data products developed for the Supplemental Sandy Topobathymetric Lidar and Imagery project serve as the baseline for use in coastal modeling, inundation studies, and other applications aimed at preserving, protecting, and enhancing the environment. The data are being used in geodesy services, marine debris surveys, and mapping and charting of inland bays, mountain streams, and rivers with suitable water clarity.

Given the depth and breadth of uses and applications, the products were made available on NOAA's Digital Coast, a website that provides data, training, and tools to the coastal management community. NOAA Supplemental Sandy Topobathymetric Lidar and Imagery has been a success, and will continue to deliver benefits to communities along the Atlantic.

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