THE NATIONAL STORM SURGE DATABASE:
PUBLIC ACCESS THROUGH THE STORM SURGE VIEWER AND MOBILE APPLICATION
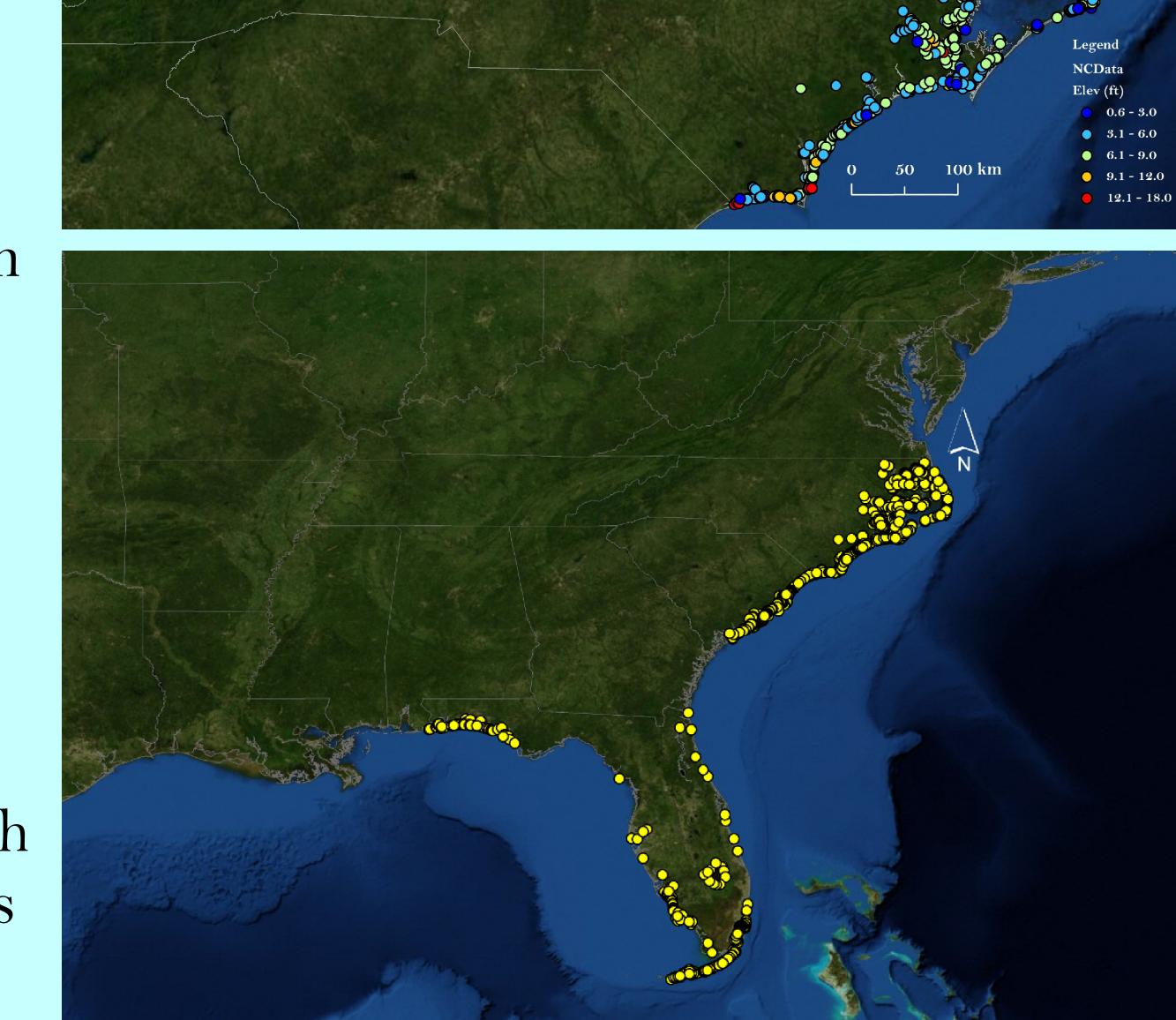
Program for the Study of Developed Shorelines
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PROJECT DESCRIPTION

The Program for the Study of Developed Shorelines (PSDS) at Western Carolina University (WCU) is using relational tools and geographic information systems (GIS) to build a national storm surge database. This project will provide one central location for coastal scientists, engineers and managers to access storm surge and high water mark data (HWM) for the purposes of planning, research, and model validation.

Thus far, over 1,700 storm surge and HWM data points have been processed from the states of North Carolina, South Carolina and Florida. This includes data from 26 hurricanes that have hit the eastern US within the past 65 years.

DATABASE DETAILS

Each storm surge or HWM data point contains attributes including elevation, latitude/longitude, quality and collector. Detailed, georeferenced hurricane landfall characteristics from NOAA's IBTrACS (International Best Track Archive for Climate Stewardship) are also part of the database.

Hurricane Landfall Attributes

- State/City
- Time
- Winds
- Pressure
- Diameter
- Track Speed
- Storm Impact Angle
- Track Straightness

Imported directly from IBTrACS database

Calculated by PSDS using data from IBTrACS and ArcGIS

Water Mark/Surge Attributes

- Measurement Type (storm surge, HWM, storm tide)
- Elevation of Water Level
- Latitude/Longitude
- Vertical Datum
- Collector
- County/State
- Reported Quality
- Reference

Track straightness calculation performed internally at PSDS using data from IBTrACS. Track straightness was determined for the 72 hours prior to landfall using hurricane track points in ArcGIS and Access. The thicker bold lines represent the actual 72 hour tracks and the thinner lines represent the straight line distance between the first and last point. The number in parentheses after each hurricane name correlates to the HID in the access database.

CURRENT FOCUS

An additional focus of this project is distributing this storm surge information to the "non-scientist" public. Both a user-friendly website and mobile application have been developed from the database. Creating these two features will allow the public to access the most pertinent data from an otherwise complicated and extensive database. This could be a vital tool for educating coastal residents, emergency planners, and developers about past storm surge flood level, and hopefully, will allow individuals to make more informed decisions when purchasing coastal property and planning for hurricane preparedness.

STORM SURGE VIEWER
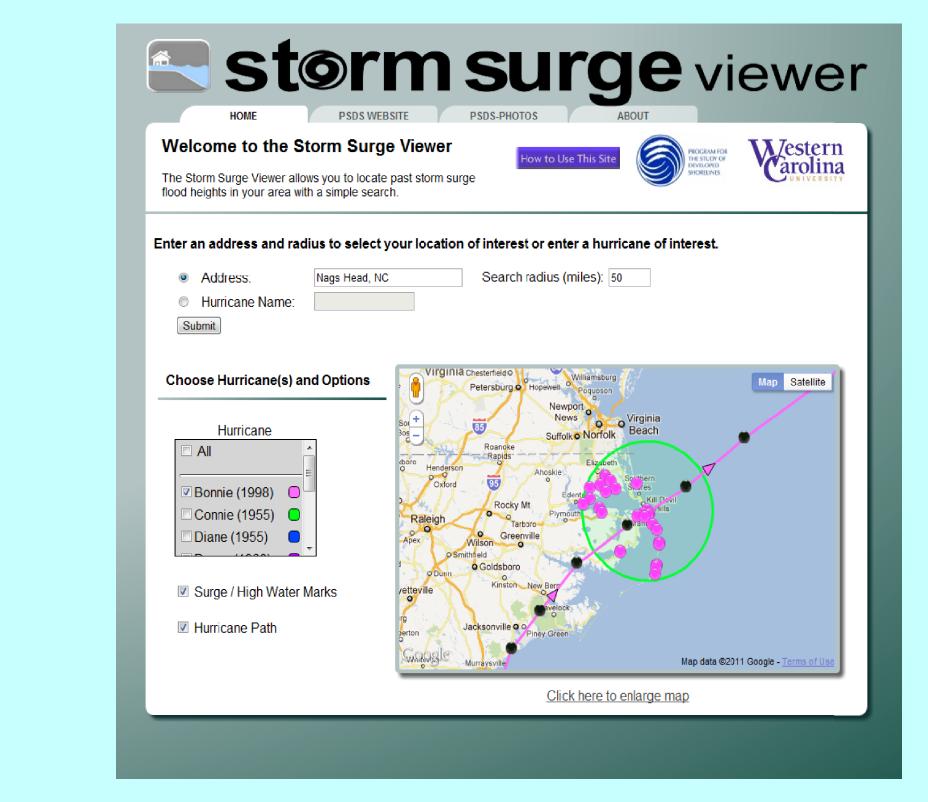
The website, called 'Storm Surge Viewer,' uses Google Maps to search, filter and view storm surge and water mark data using a simple location search. The user enters an address and radius of interest and storm surge data contained within that area is available to view. Data can then be filtered by hurricane and the user can choose to view surge flood data and/or the hurricane path. Each data point contains metadata including hurricane name, year, county and elevation of flooding.

Methods: The front end of the Storm Surge Viewer website is a combination of HTML, CSS3 (for presentation formatting), and Javascript. The jQuery library is extensively used instead of explicit Javascript. The front end also uses the Google Map API to convert latitude and longitude information to map locations. The back end uses MySQL as the relational database system and PHP as the server-side scripting language used to connect to MySQL and issue SQL statements.

STORM SURGE MOBILE APPLICATION

The mobile application has similar features to the website but uses the global positioning system of a smart phone to locate nearby storm surge measurements.

Methods: The mobile Storm Surge Viewer is an application for the Android platform. It consists of a number of software components written in the Java programming language that provide an easy-to-use interface for supplying users with hurricane- and watermark-related information. The software components of the application include: (1) a broadcast receiver periodically starts a service, (2) a service that runs in the background and queries a remote MySQL database for storm surge data and stores that data in a SQLite database on the mobile device, (3) a content provider that enables other components to easily update and query the local database, and (4) a set of user-visible activities (screens) that present users with the relevant information (e.g., hurricane lists, maps with water marks). The application leverages the geo-location services of the mobile devices (e.g., GPS) to display information about the user's current location, or can allow users to select a location by city.