Understanding Coastal Flooding

Terminology

• Storm Surge vs Storm Tide
• Total Water Level
• Inundation
• Erosion, Overwash, Inundation
• Datums
  – Geodetic
  – Tidal
Storm Surge vs Storm Tide?

- ASTRonomICAL TIDE - The twice daily alternating rise and fall of sea-level produced by gravitational attraction of the moon and sun.

- STORM SURGE – An abnormal rise of water generated by a storm, over and above the predicted astronomical tide.

- STORM TIDE – The water level rise during a storm due to the combination of storm surge and the astronomical tide.
Total water level = Storm surge + Tides + Wave runup/setup + Freshwater
Inundation - Water covering normally dry land.

- Inundation events are among the more frequent, costly, and deadly coastal hazards that can impact coastal communities in the U.S.
- Riverine and coastal inundation causes the highest number of natural-hazard-related deaths.

How can we better provide you inundation info and communicate the impacts?
Erosion, Overwash, Inundation along Beaches

Waves/surge higher than base of dune lead to erosion

Waves/surge overtop dune crest, moving sand landward

Mean water levels are higher than dune crest, submerging beach system

Overwash

Inundation

Courtesy of USGS

Sallenger 2000
What does a stormtide of 6...7...8 ft mean to you?

- Water levels need to be referenced to a vertical datum.
  - Tidal Datums vs Geodetic datums

- A vertical datum is simply a reference level, a zero level, to which stormtides are referred.

- Be very careful when converting between datums
  - NOS Vdatum Tool
Geodetic Datums

- Based on a simplified surface (lot of geodetic and mathematical calculations) that represents the Earth’s shape and size
  - National Geodetic Vertical Datum of 1929 (NGVD29) (Old)
  - North American Vertical Datum of 1988 (NAVD88) (New)
    - Referenced to a single tidal station. It is the official vertical datum for the United States.
Tidal Datums

- Reference water levels defined by a phase of the tide
  - MLLW, MSL, MHW, MHHW, HAT
  - Based on data recorded in that specific area for 19 years (tidal epoch).
Datum Clarification

When in doubt, rely on the NWS!

- Currently forecasts are referenced in MLLW...but looking to move to MHHW
  - Proxy for start of inundation across the most vulnerable coastal areas
  - Easier to conceptualize water above normal high tide levels.