USING MIKE TO MODEL COASTAL CATASTROPHE RISK

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SUMMARY

- About RMS
  - Who are we and what do we do?
  - How do we use MIKE in our workflow?
- Case study: Mapping coastal risk in Texas
  - A more detailed look at a recent project
  - Real time and post event modelling

RISK MANAGEMENT SOLUTIONS

AGRICULTURE

CYBER

EARTHQUAKE

FLOOD

HWIND

LIFERISKS

MARINE CARGO

SEVERE CONVECTIVE STORM

TERRORISM

TROPICAL CYCLONE

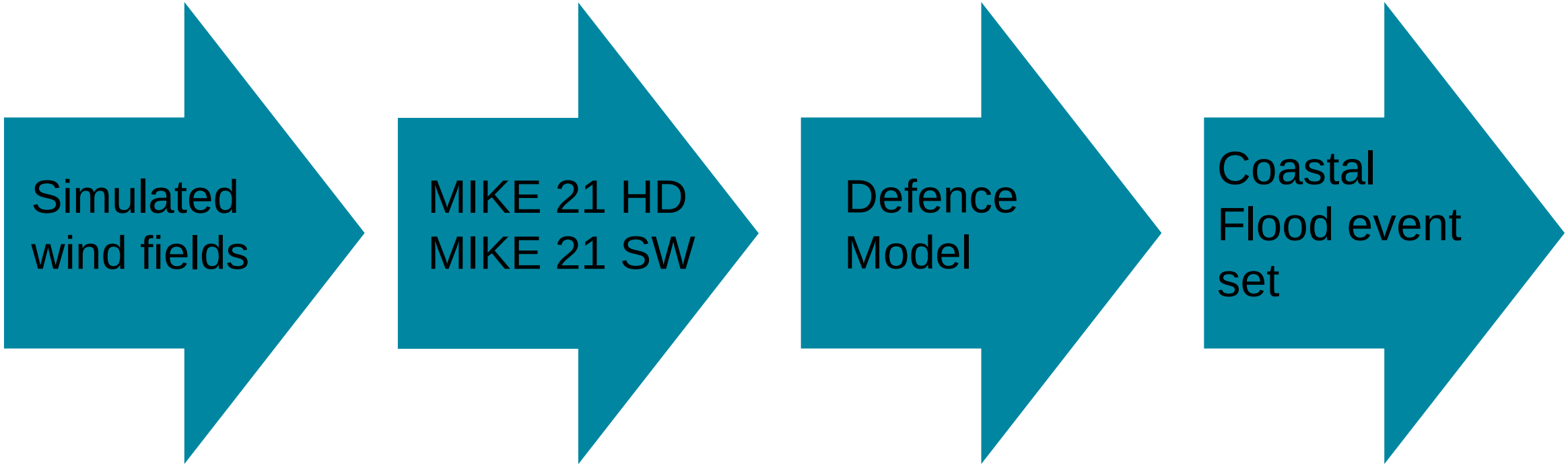
TSUNAMI

WILDFIRE

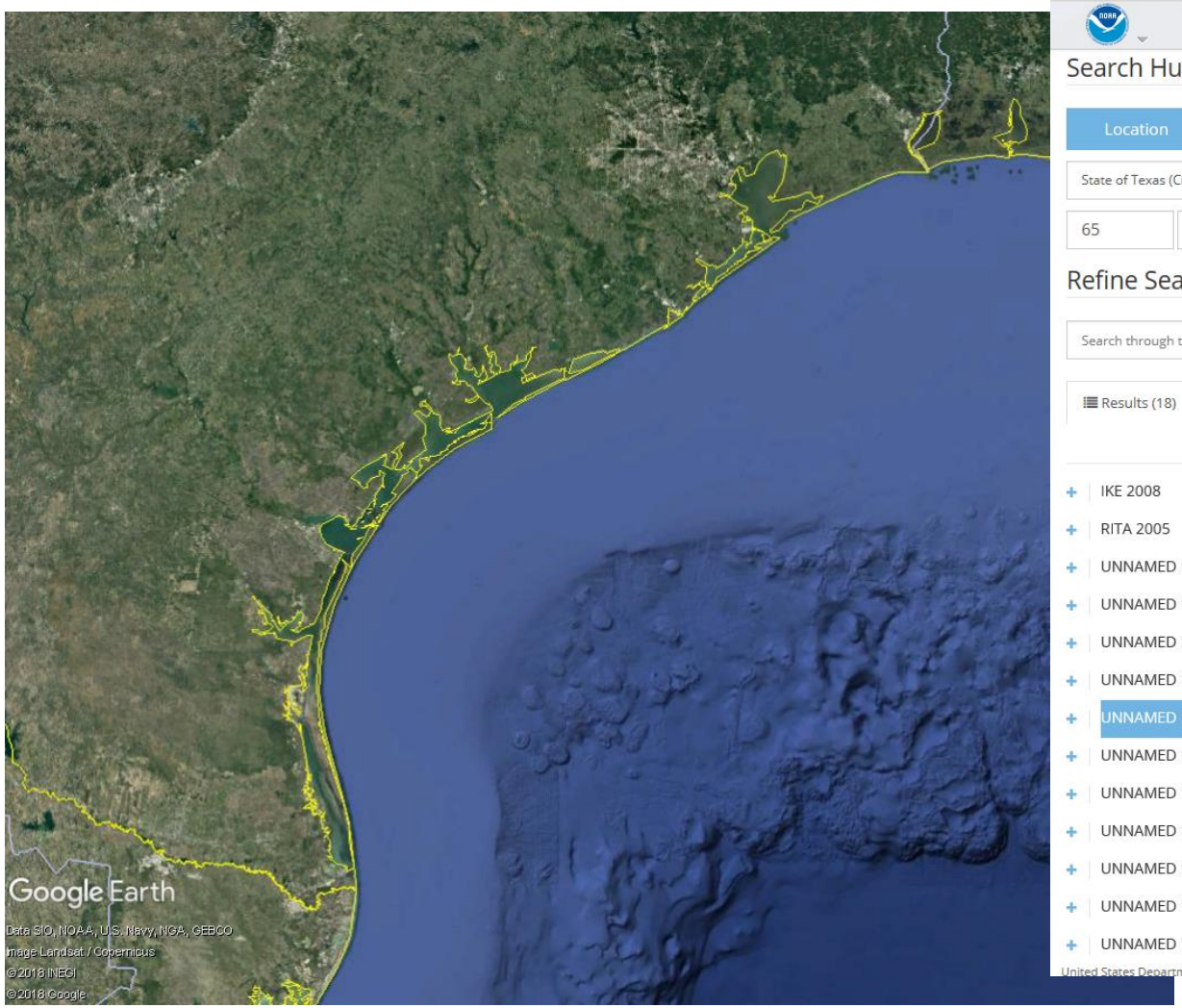
WINDSTORM

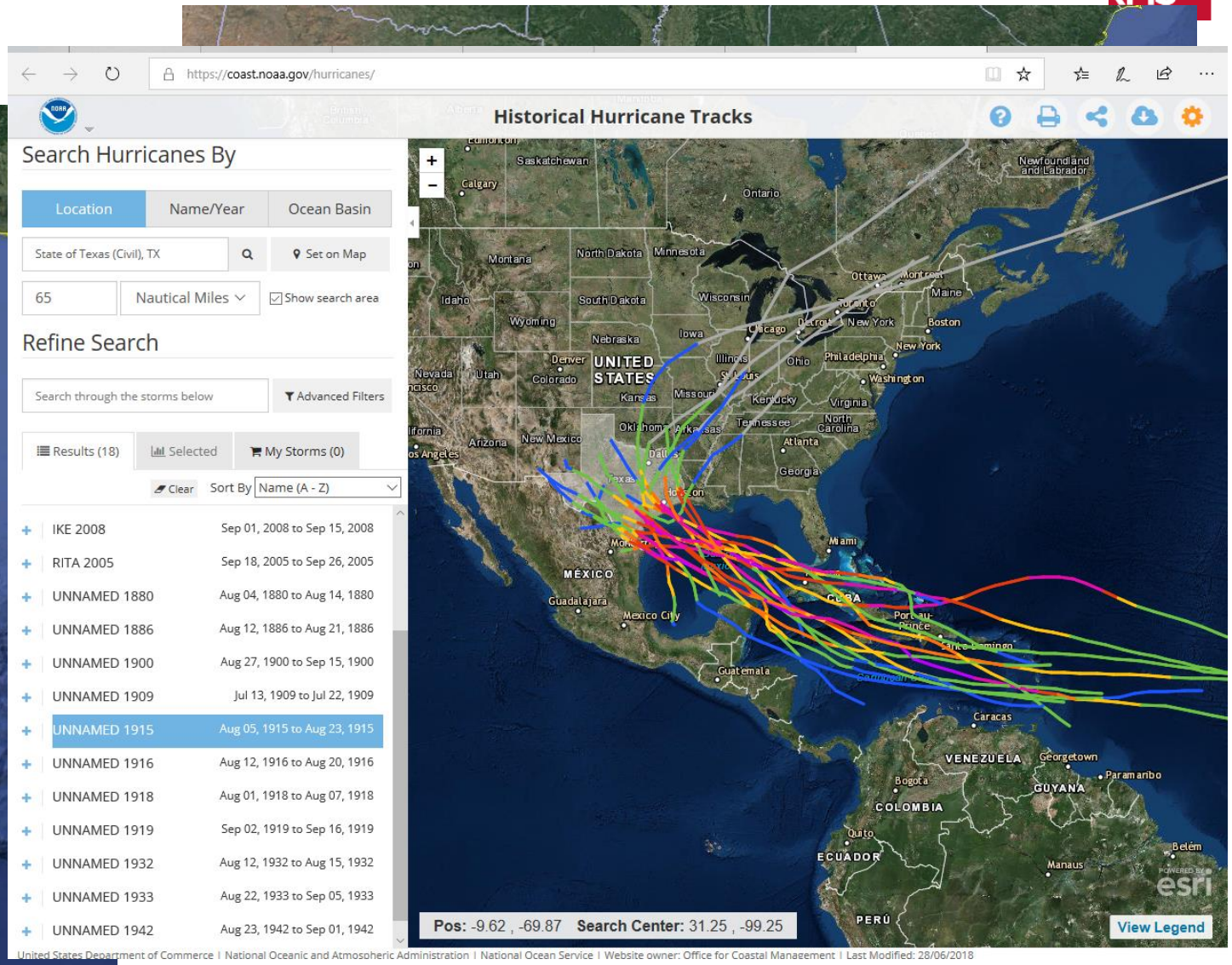
WINTER STORM

MIKE IN OUR WORKFLOW – EXAMPLE



TEXAS

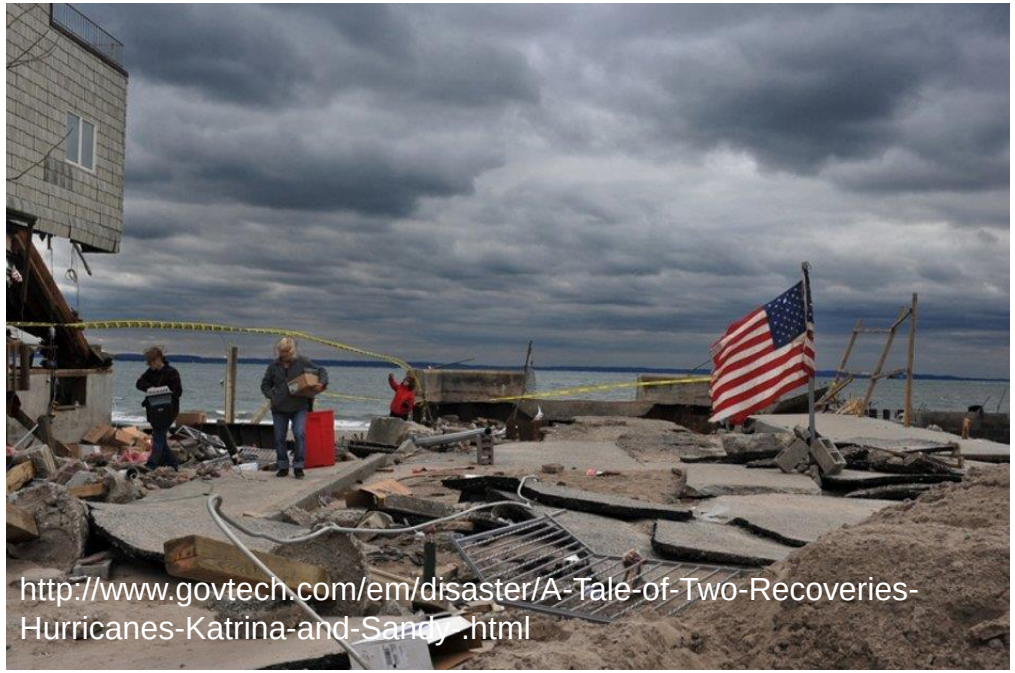




TEXAS HURRICANES

- Notable Hurricanes:
  - Harvey 2017
  - Ike 2008
  - Rita 2005
  - Allison 2001
  - Alicia 1983

https://edition.cnn.com/2017/08/25/us/hurricane-harvey/index.html

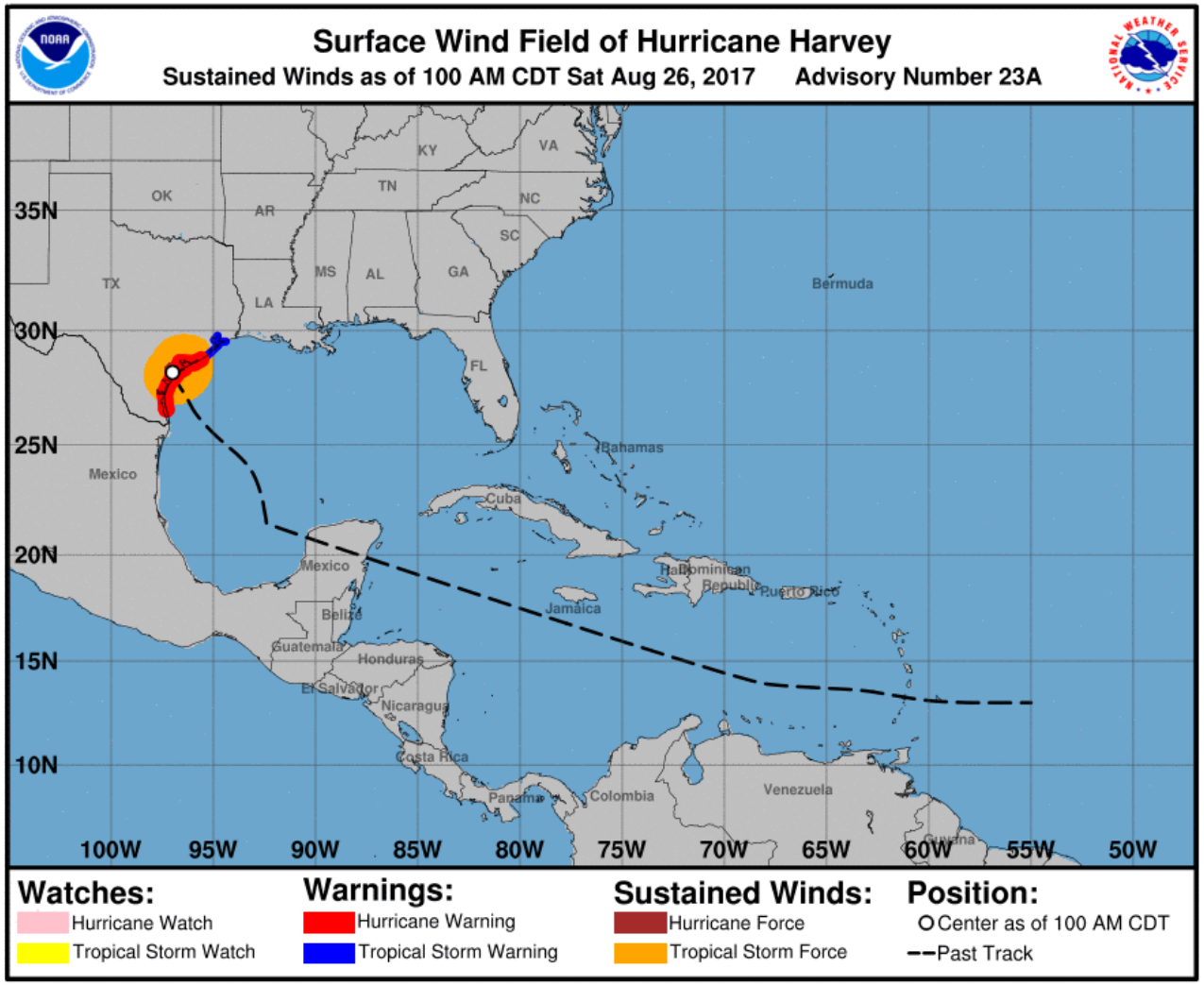

http://www.govtech.com/em/disaster/A-Tale-of-Two-Recoveries-Hurricanes-Katrina-and-Sandy-.html


http://archive.boston.com/bigpicture/2008/09/the_short_but_eventful_life_of.html#photo5

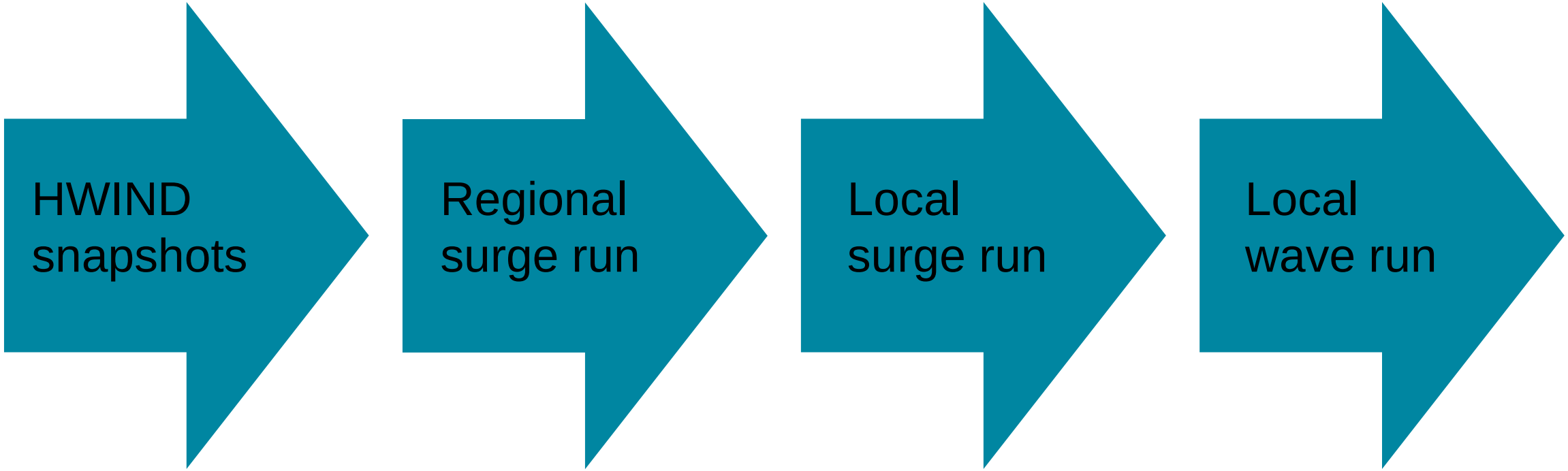
THE CHALLENGE

When a hurricane makes landfall:

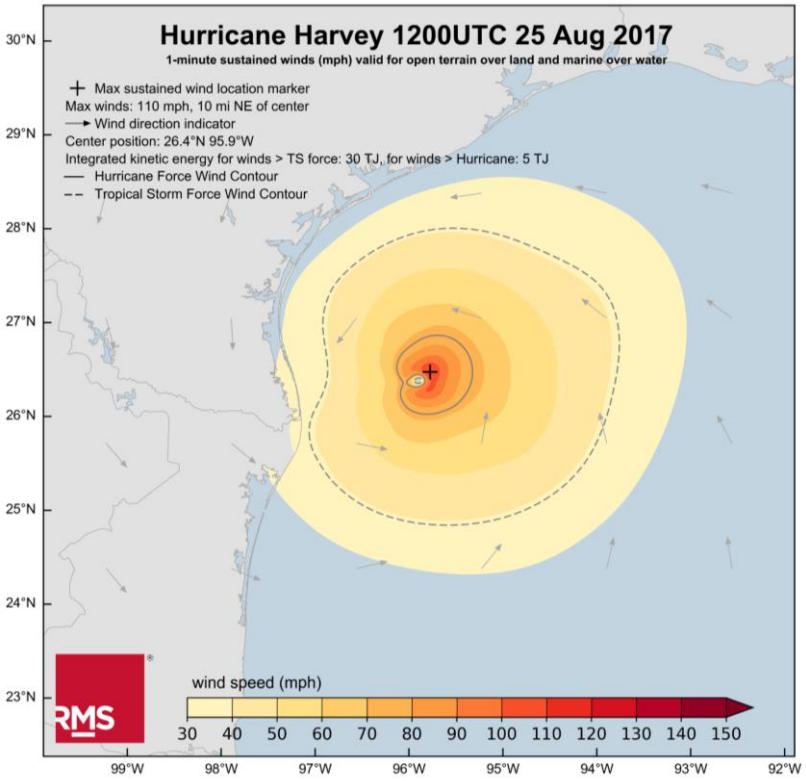
- Model inundation depths from storm surge and significant wave height along the Texas coastline
- 1st deliverable required 2 days after landfall
- 2nd deliverable required 42 days after landfall
- Key locations require minimum 50m horizontal resolution

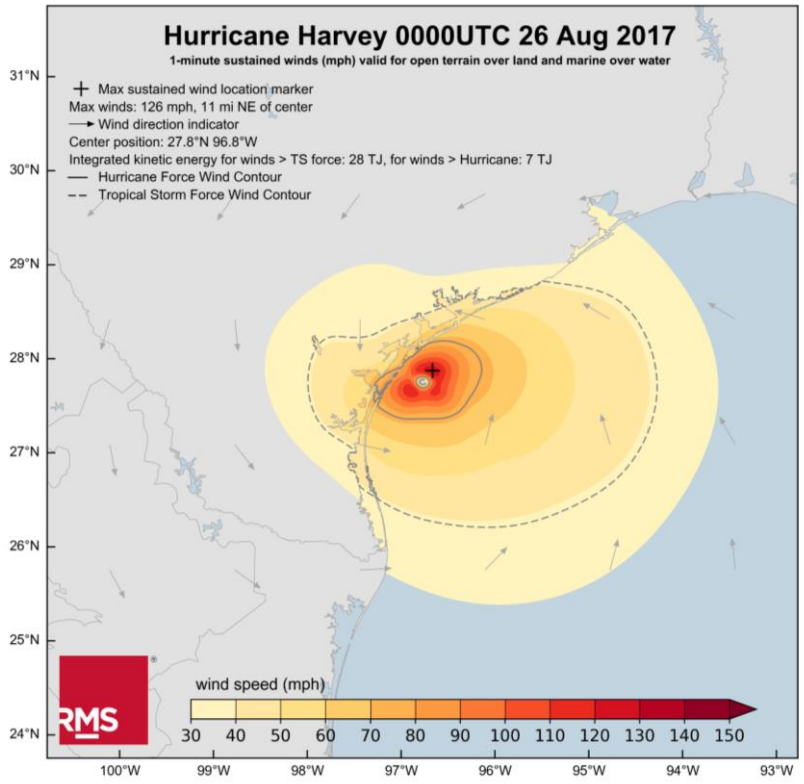


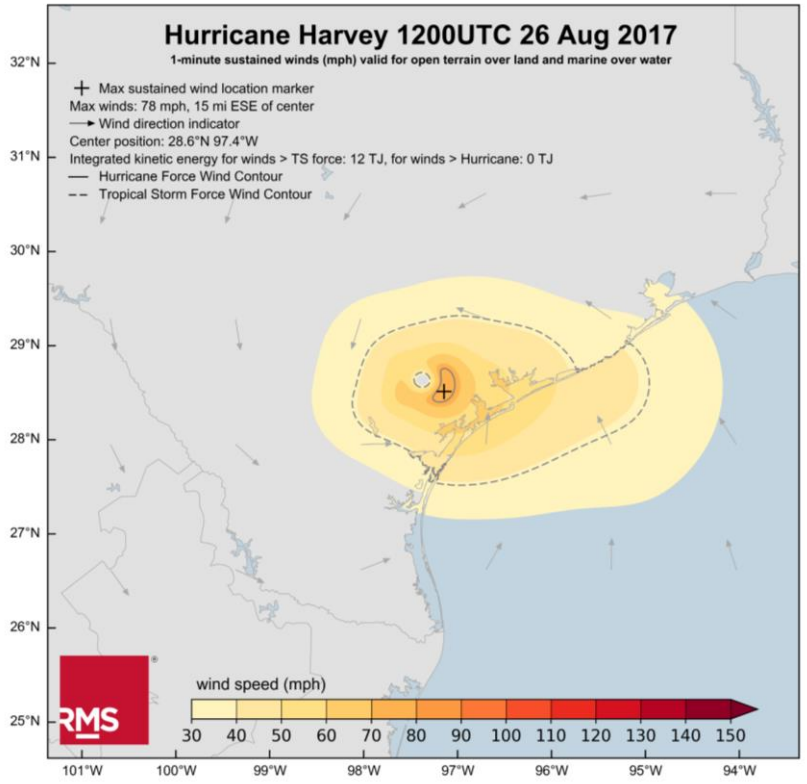
MODEL OVERVIEW



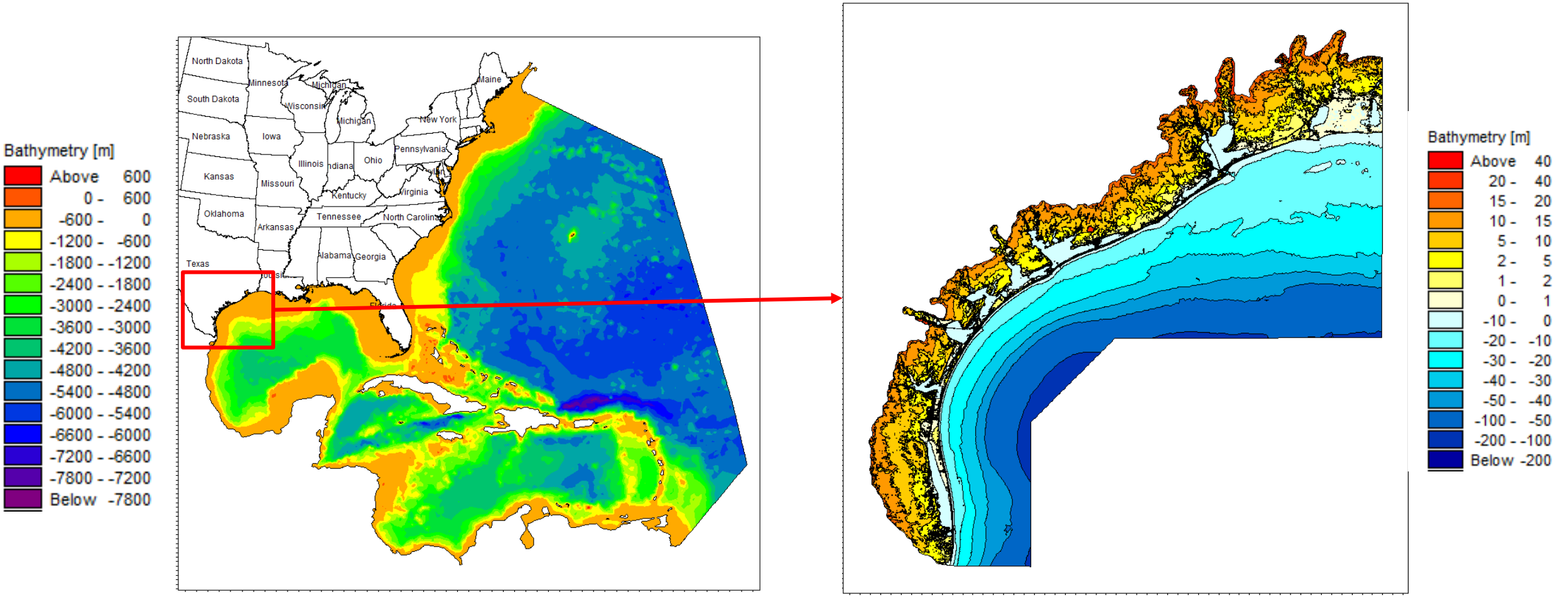
RMS HWIND



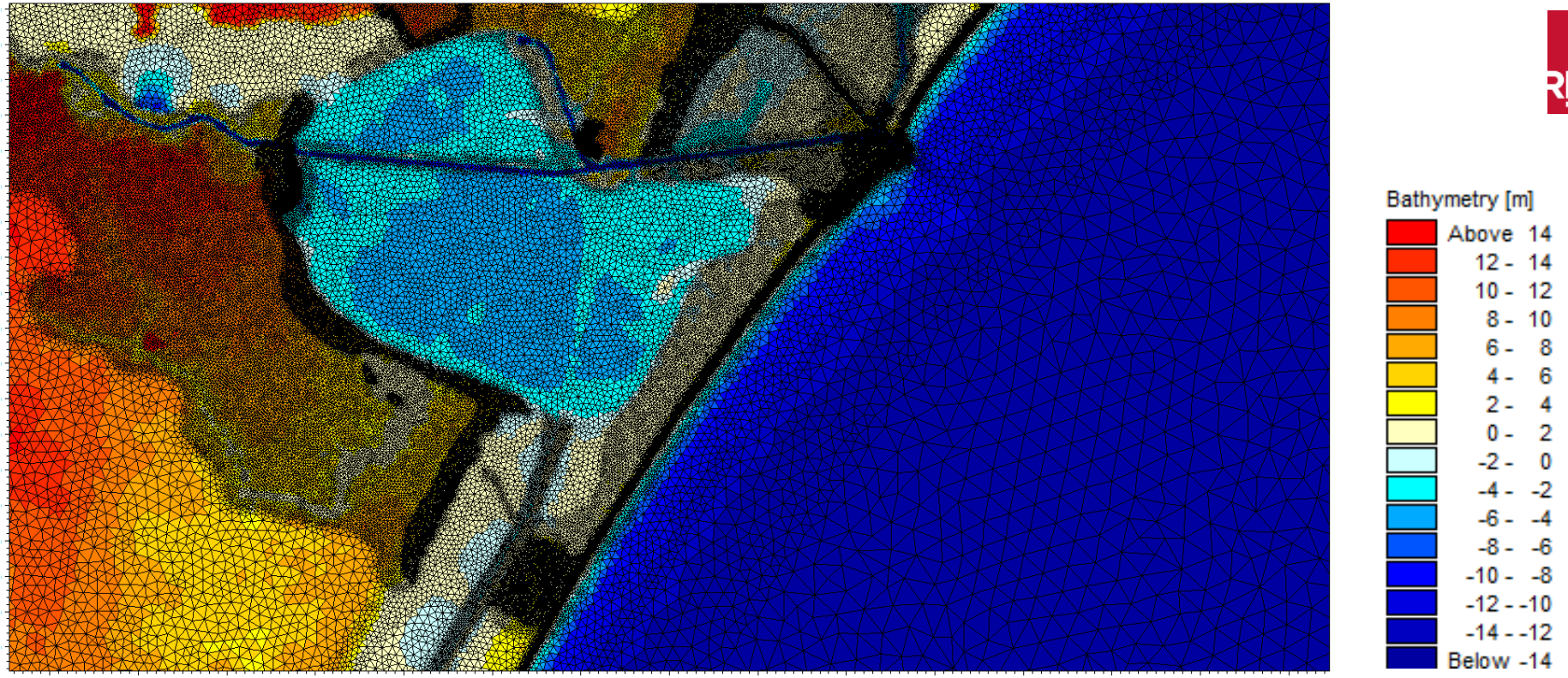




MESHES



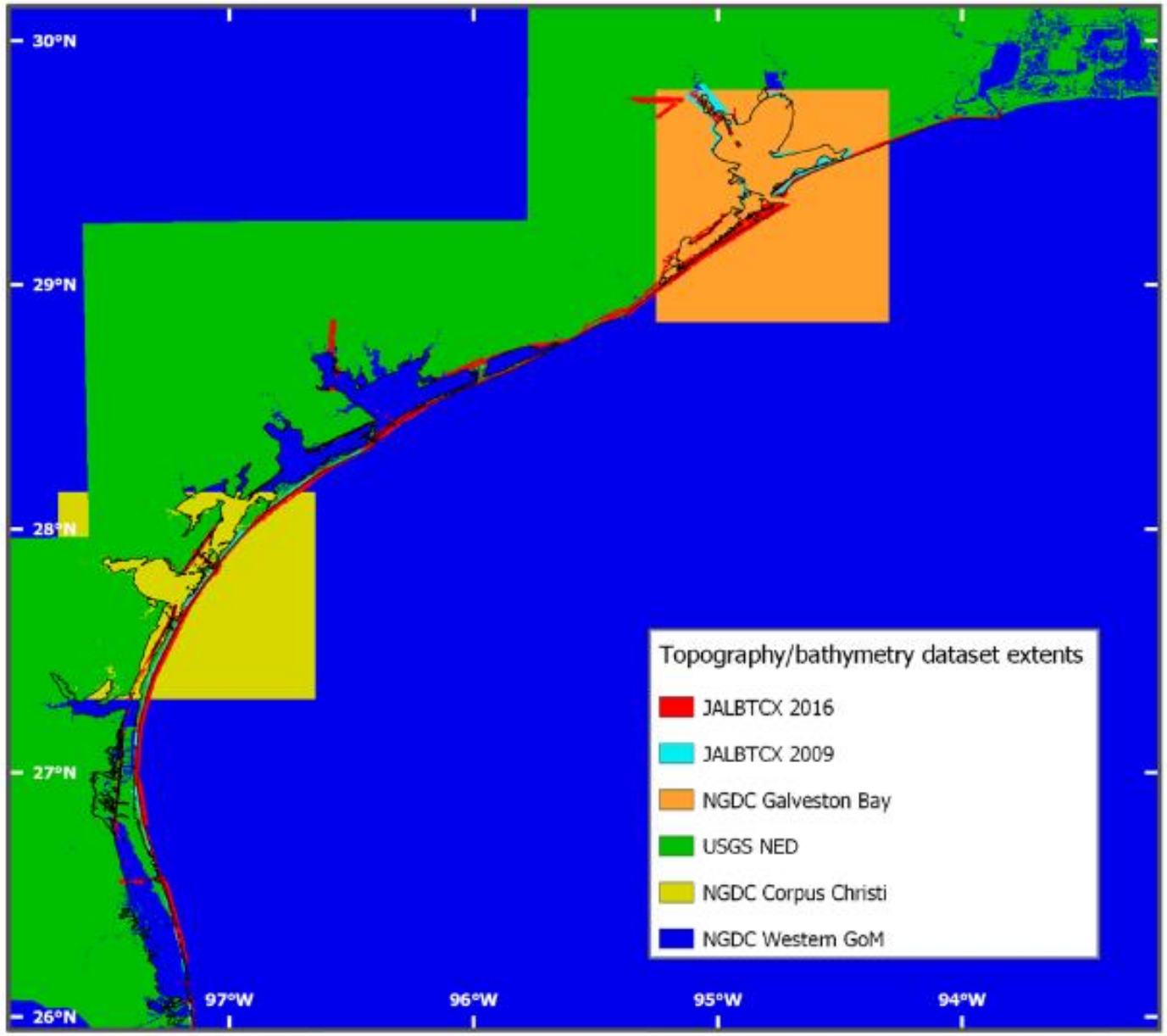
LOCAL MESH



- High resolution mesh developed to model inland inundation and wave impacts as accurately as possible
- Highest resolution is 50m – used to resolve important features such as canals, passages into bays or lagoons and sand dunes.
- Bathymetry data from various sources e.g. LIDAR, National Geophysical Data Center coastal DEMs and U.S. Geological Survey National elevation dataset

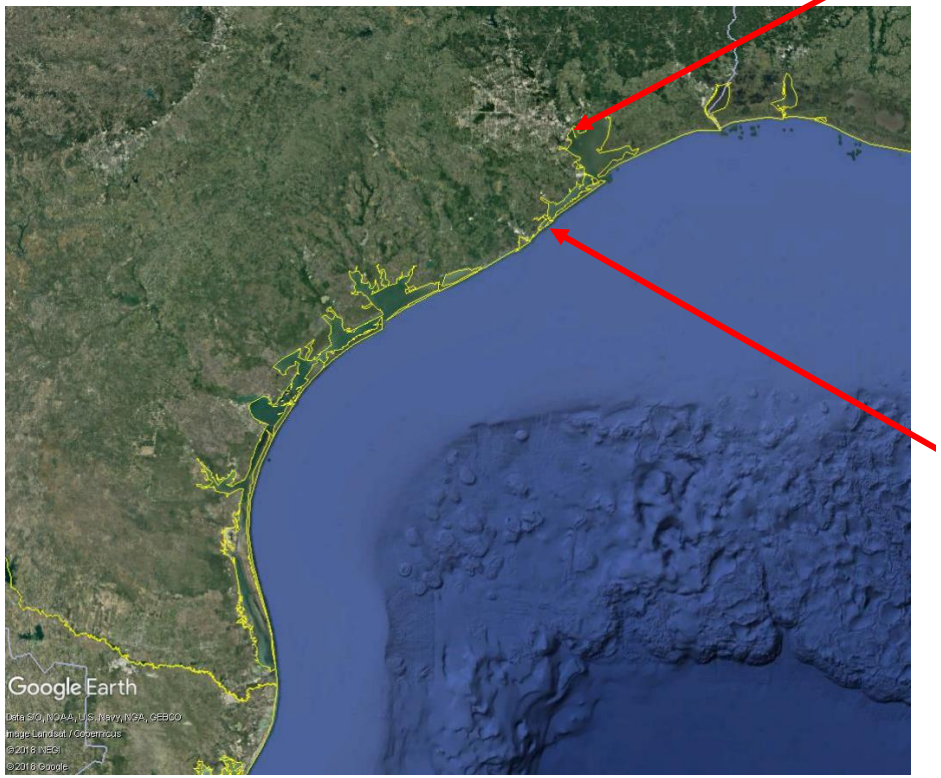
BATHYMETRY/TOPOGRAPHY

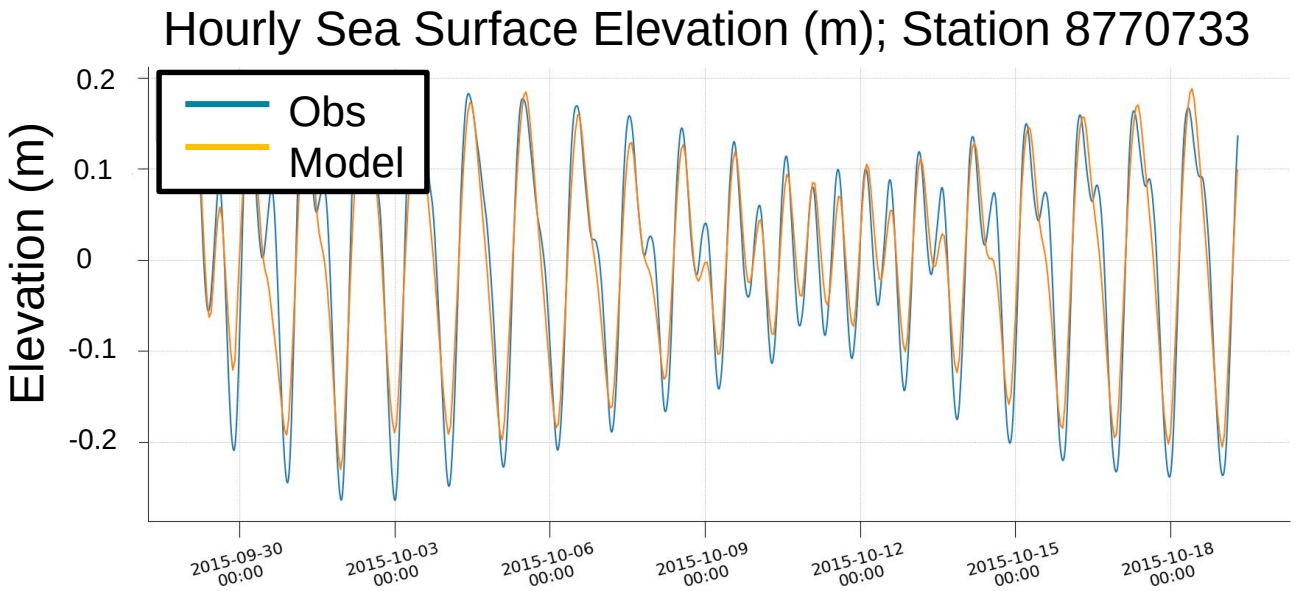
- Preference given to datasets based on accuracy, vintage and level of detail
- Manually add important features not captured using NOAA nautical charts e.g. Intra-Coastal Waterway

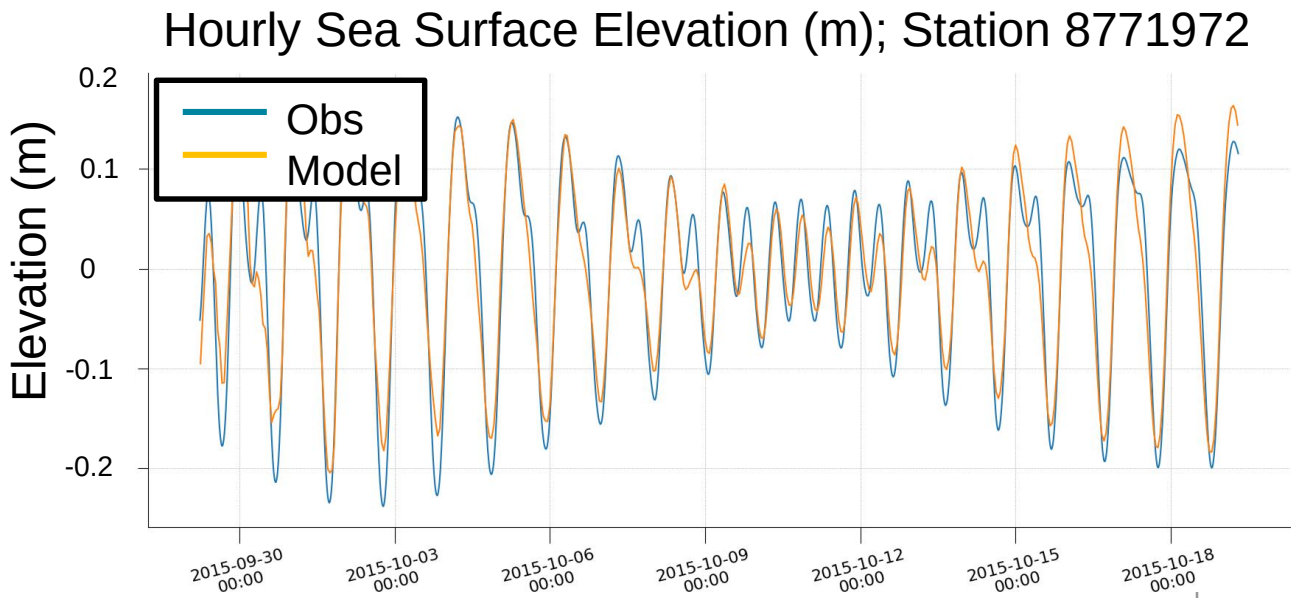


CALIBRATION

- First: minimise tidal water level errors at ocean-facing tide gauges
- Second: minimize errors in protected water bodies



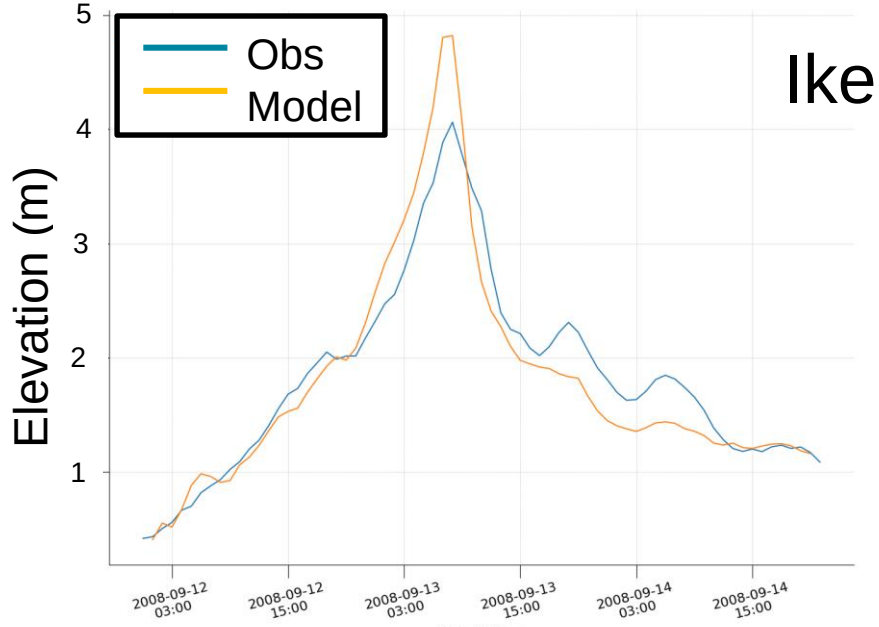




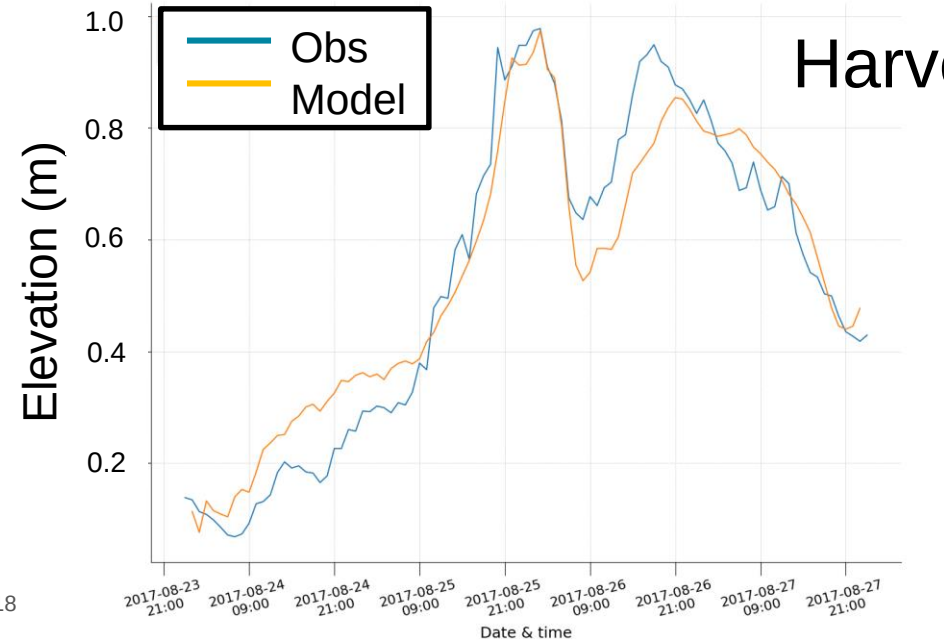
CALIBRATION

- Third: minimize errors at all gauge and high-water mark locations for historical storm events

Hourly Sea Surface Elevation (m); Station 8770570

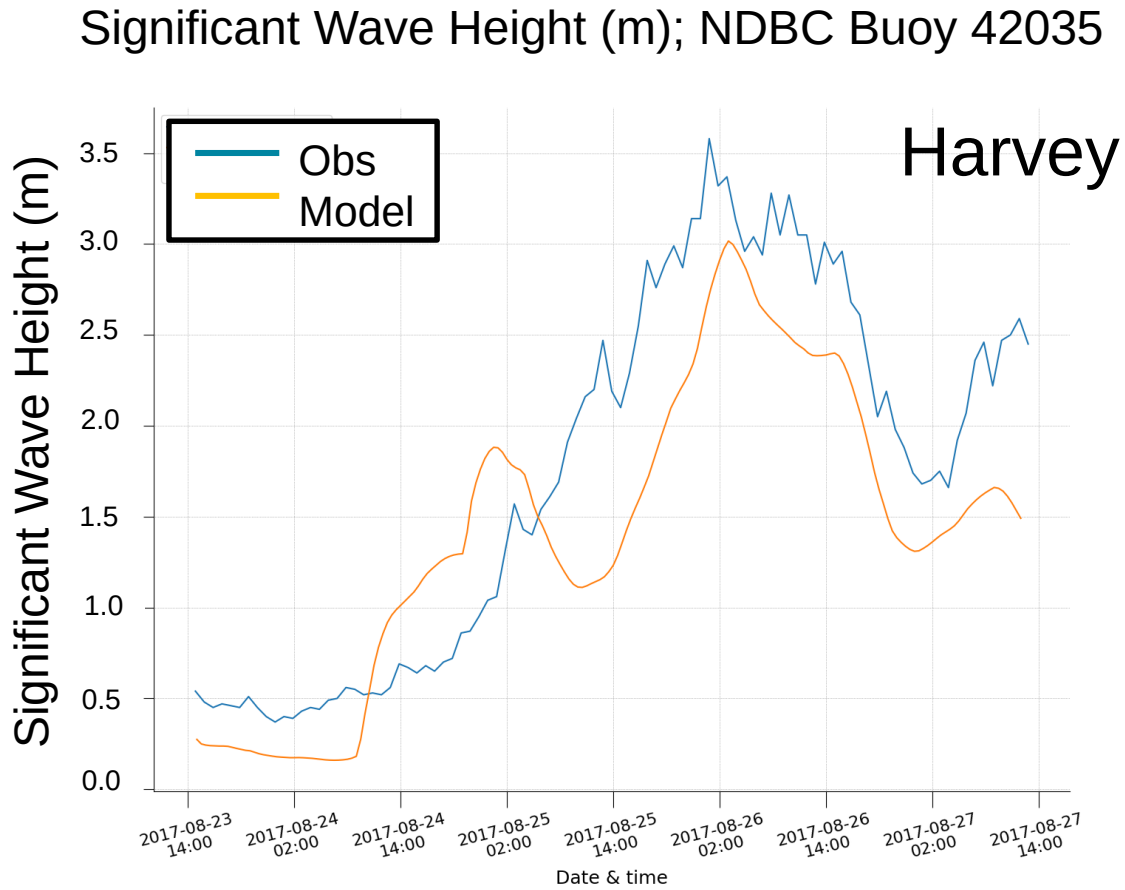


Hourly Sea Surface Elevation (m); Station 8773701



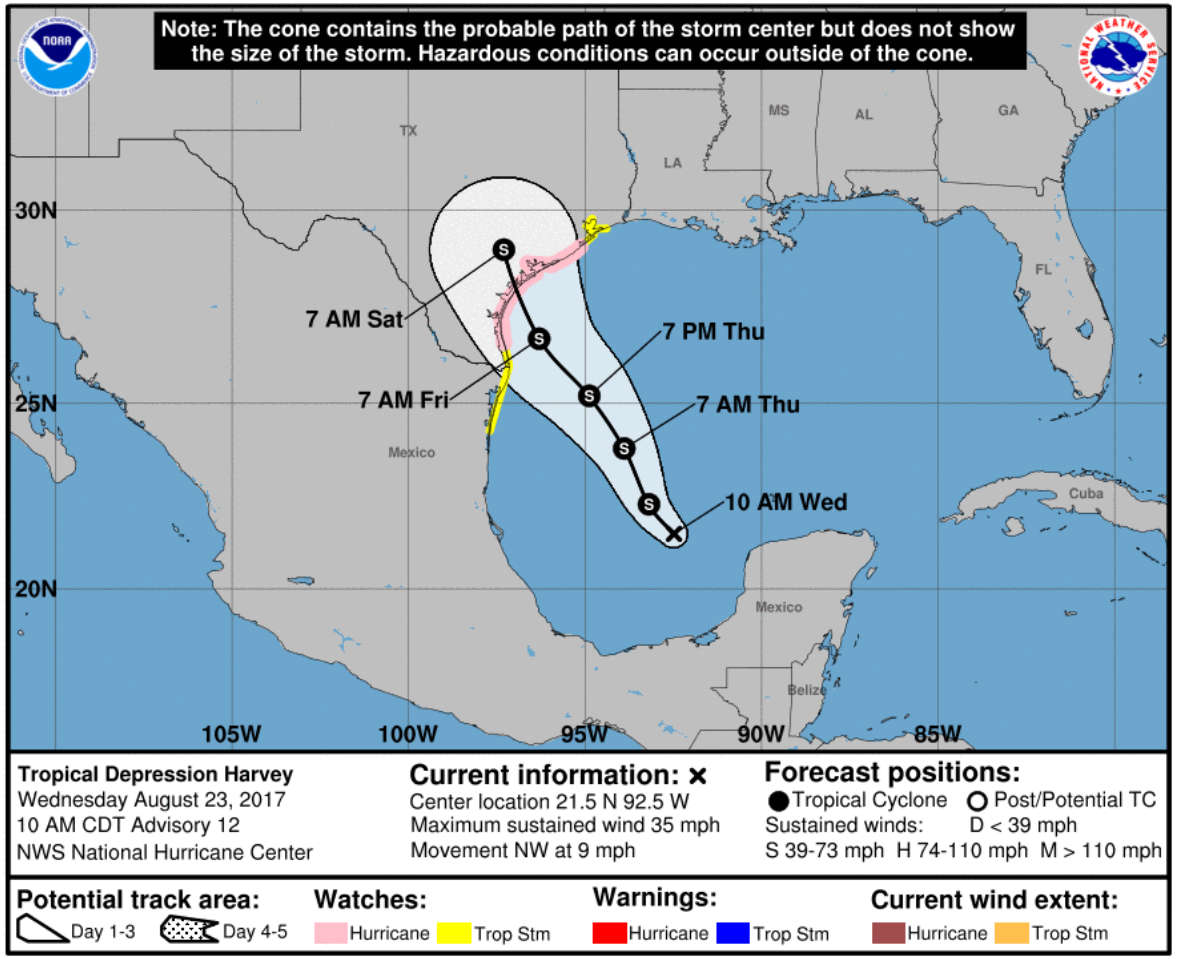
CALIBRATION

- Fourth: minimize errors in the wave model



DURING AN EVENT

- Storm enters the region
- We monitor the event and produce forecasts prior to landfall (using different lower-res model)
- Given that the storm is strong enough to cause significant damage along the Texas coastline in the form of slab claims:
- At landfall:
  - Launch the regional model (with several days spin-up)
  - Launch the local model
  - Launch the wave model
  - Produce error analysis and statistics



AFTER AN EVENT

- Collection of observational surge and wave data
  - Including USGS Rapid Deployment Gauges, High Water Mark Surveys and NDBC wave buoys
- New LIDAR DEM data collected
  - Update model mesh incorporating new data
- Update inputs, parameters and model settings as required to re-run the models to provide the best estimate of water depth and significant wave height in region of interest.

ABOUT RMS

RMS is the world's leading provider of products, services, and expertise for the quantification and management of catastrophe risk. More than 400 leading insurers, reinsurers, trading companies, and other financial institutions rely on RMS models to quantify, manage, and transfer risk. As an established provider of risk modeling to companies across all market segments, RMS provides solutions that can be trusted as reliable benchmarks for strategic pricing, risk management, and risk transfer decisions.