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Coastal Ocean Observations, Risk Modeling and Reinsurance

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Blue Planet Symposium

Agenda

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- Risk Modeling
  - Anatomy of a Risk Model
  - More and Better Data = Better Risk Models
  - Everyone Wins
- Climate Variability and Change
  - Quantitative Understanding
  - Useful Prediction

Anatomy of a Risk Model

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- Enables a probabilistic understanding of disaster impact

- Thousands of years of synthetic history
  - How often does a cat 5 hurricane hit Morehead City, NC?
  - How much damage occurs?
  - How often do we have 4 hurricane landfalls in Florida during a single year?
  - How does ENSO change all of that?

- Three components
  - Physical hazard
    - Hurricanes: Wind, rain, flood and waves
    - Winter storms, tornadoes, hail, derechos, rain-induced floods, earthquakes, wildfire, terrorism, cyber attacks, …, …, … and …
  - Vulnerability
    - Structure, contents, livability, business operations, etc.
  - Financial impact

- Accuracy is important

Data Improves Physical Hazard Models

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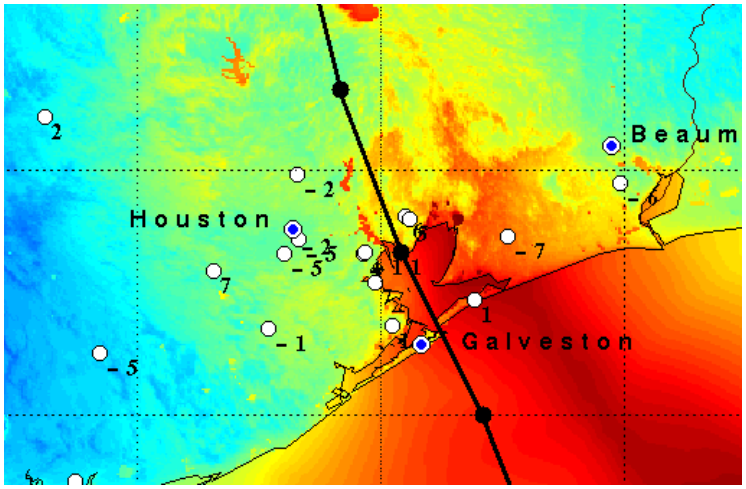
- How often do cat 5s happen in NC?
  - Long, high-quality data records are essential
- How rapidly do winds decrease in the near-shore region?
  - High quality wind measurements near the coast
  - Hardened
  - Good meta-data
- How do wind gusts vary in different physical environments?
  - Gusts do most of the damage
  - Fields are different from cities

Ike (2008)



Data Improves Event Recreation

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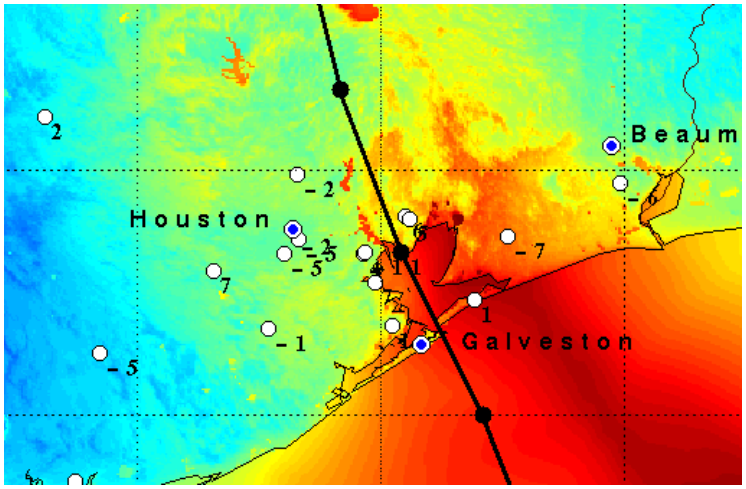
- Near real-time damage assessment and response
  - How much damage occurred?
  - Where?
- Long-term model improvement
  - Hazard
  - Vulnerability

Ike (2008)



Data Improves Vulnerability Assessment

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- Converting wind / water to damage
- Vulnerability curves are very steep
  - 10% change in wind ~ 100% change in damage
- Algorithms developed based on
  - Regression: *Observed* damage vs. *modeled* wind
  - Engineering judgment
- Small changes in modeled wind lead to large changes in perceived vulnerability
  - Accurate winds are essential…
    …so data are essential

Many Winners with Better Models

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- Industry
  - More realistic assessment of risk
- Communities and Homeowners
  - Better community planning
  - More effective building codes
  - Most effective investments for homeowners
    - Shutters vs. shingles?
- Everyone
  - Quantitative assessment of climate change impact

Climate Forecasting

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- ENSO, NAO, MJO, PDO, AMV and other climate variability
  - All impact the likelihood of natural disasters
- Difficult to leverage this knowledge due to short forecast lead times
- Better ocean observation / monitoring will (hopefully) contribute to improved long-range forecasting

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