



Climate Institute

Panel 3

What does a changing climate mean for future vulnerability to natural or social systems and the relevance of this to densely populated coastal regions?

Identifying Vulnerability & Adaptive Capacity

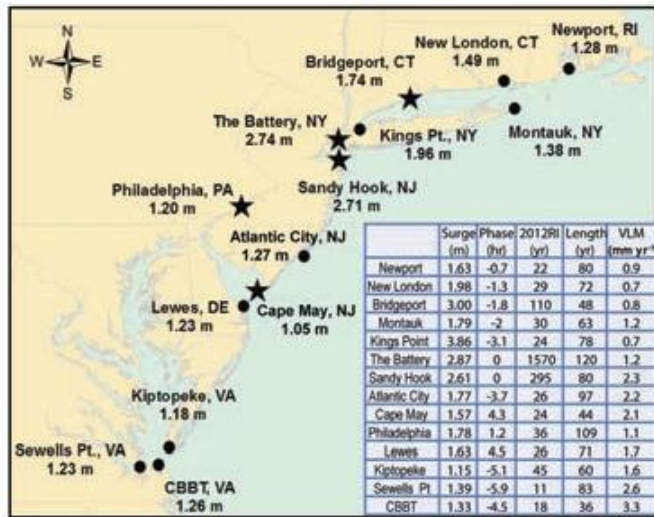
1 Meter Inundation

 Inundated Area

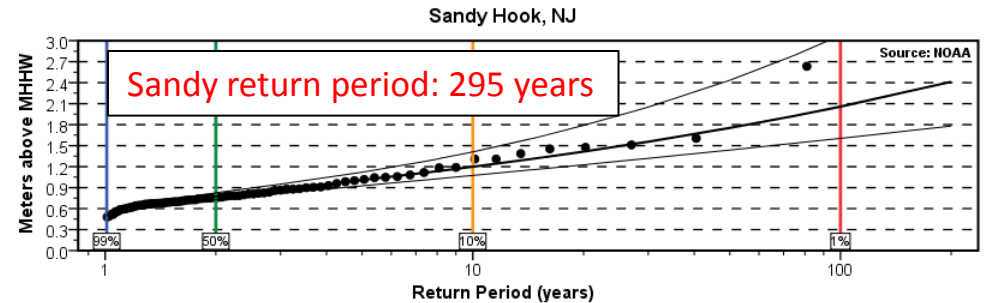
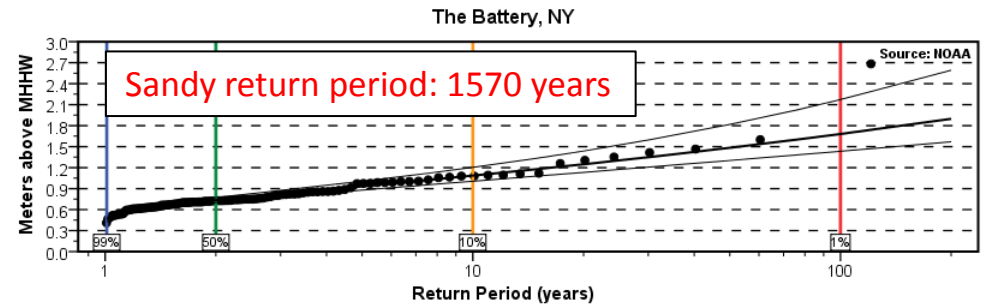
0 300 600 900 1,200 1,500 Kilometers
0 300 600 900 1,200 1,500 Miles

- Major problems in identifying and understanding vulnerability/adaptation:
 - IPCC uses definition of vulnerability as *exposure, sensitivity and adaptive capacity*, but our measures of the latter two indicators are still crude and not predictive.
 - Many studies are based on past or current adaptation, but future may be outside bounds of historical variability
 - Studies of climate analogues limited by socio-economic and cultural variability and specificity
 - Future policies/decisions may put people in pathway of oncoming CC, especially mitigation policies

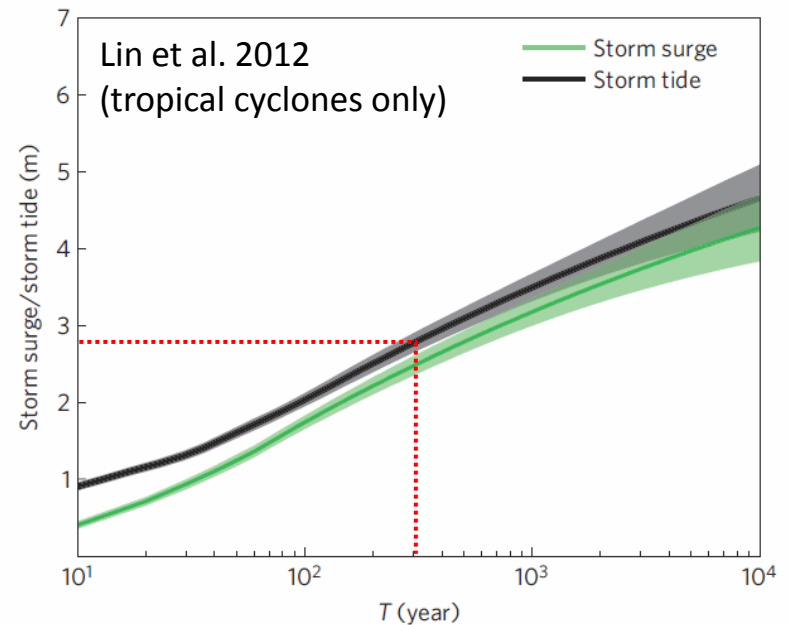
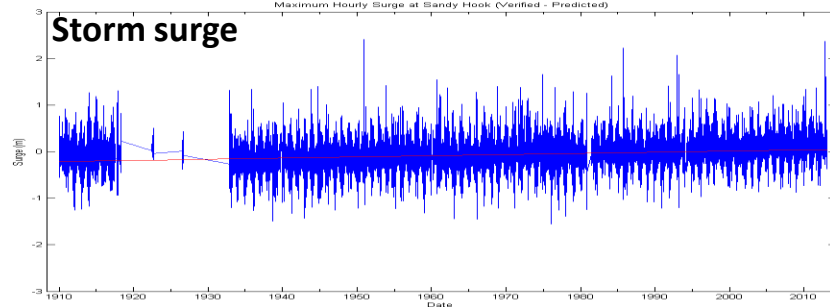
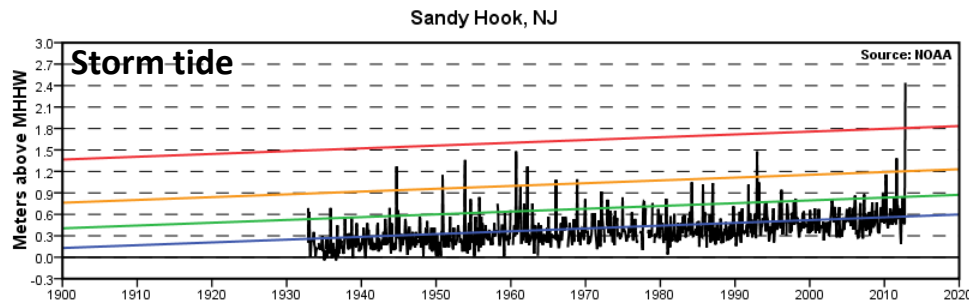
How unusual was Sandy?



Sandy storm tide levels (Sweet et al. 2013)

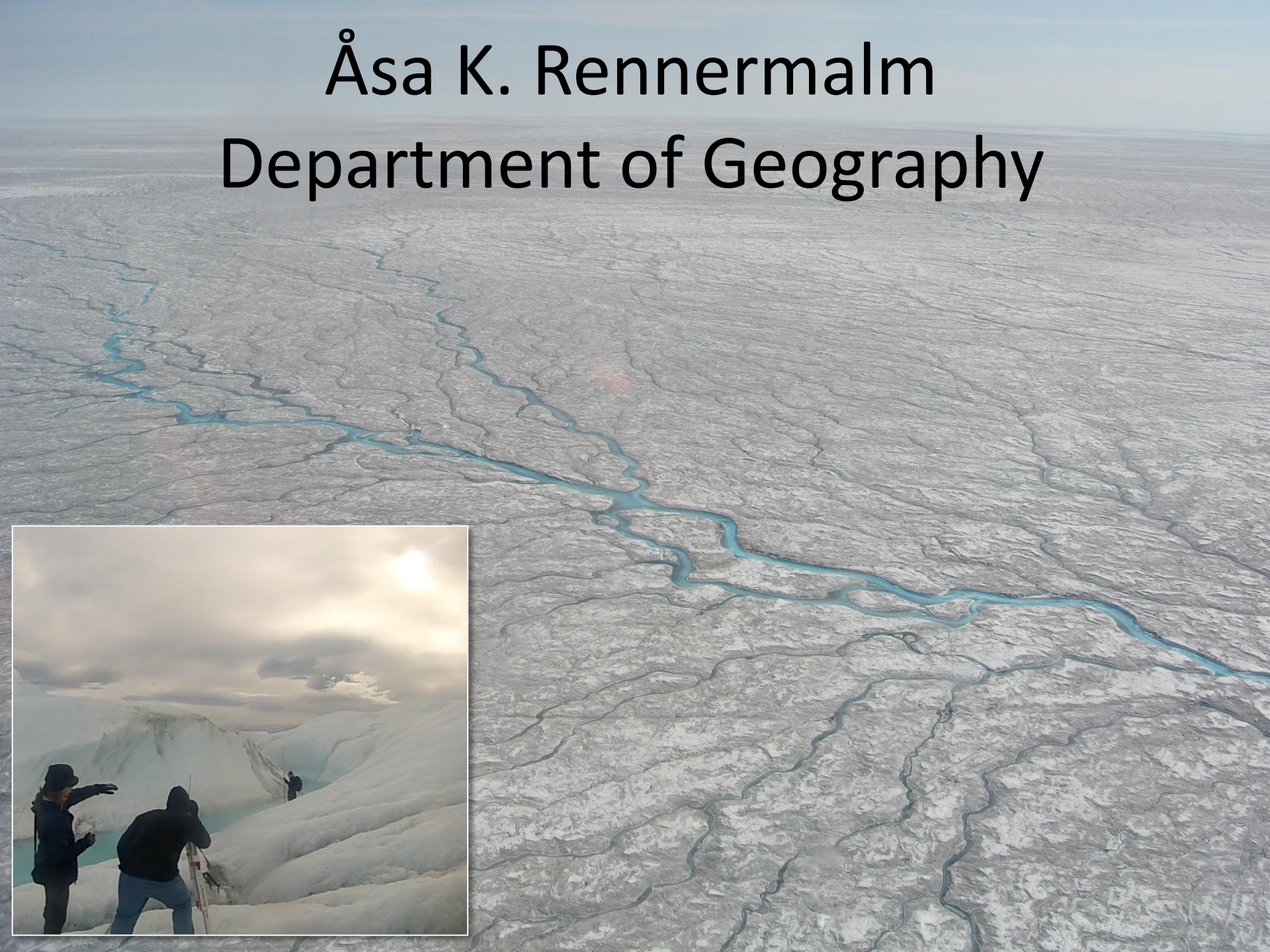


<http://tidesandcurrents.noaa.gov/est/>



Åsa K. Rennermalm

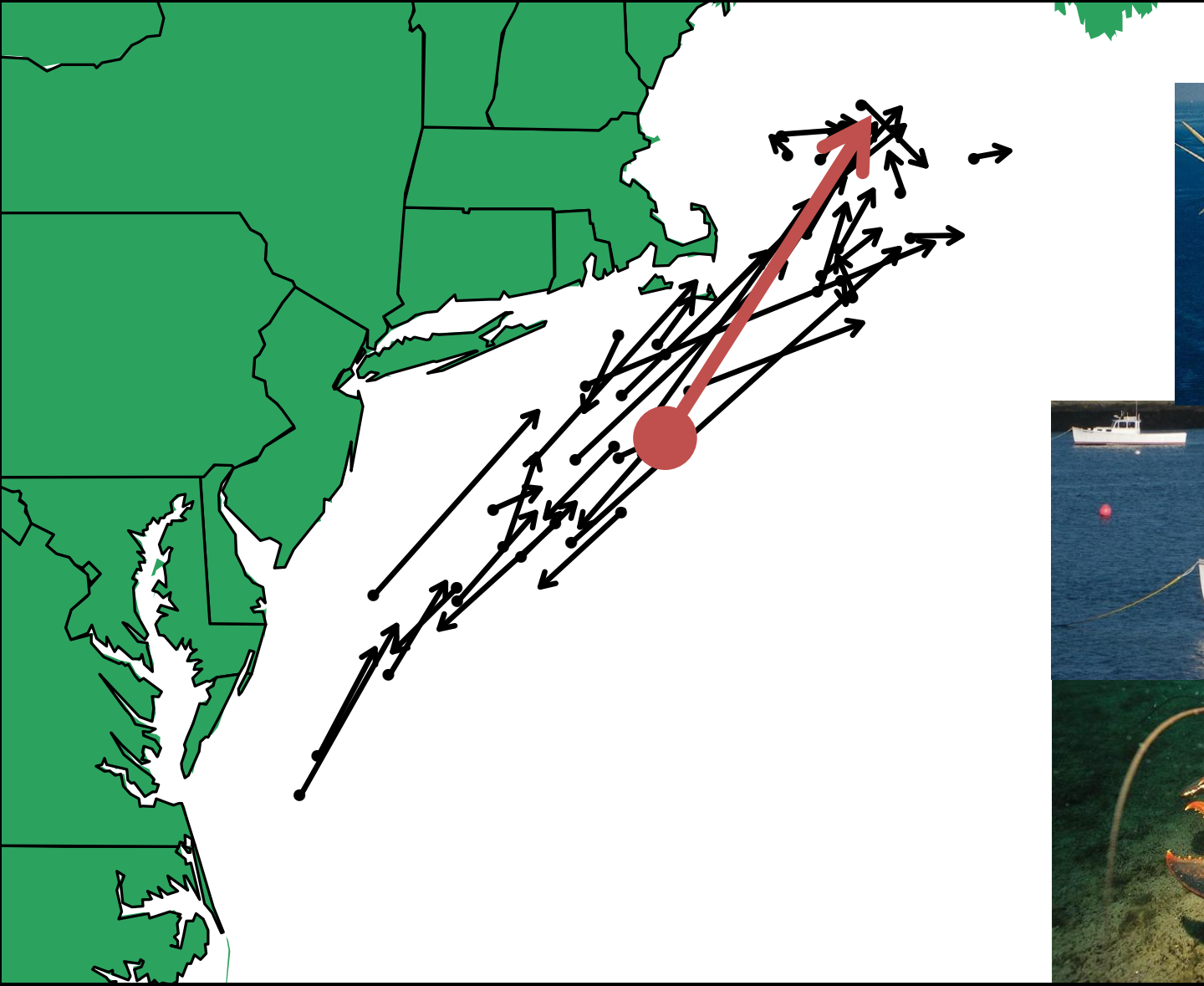
Department of Geography





bayside vulnerability

Fish and fisheries on the *move*





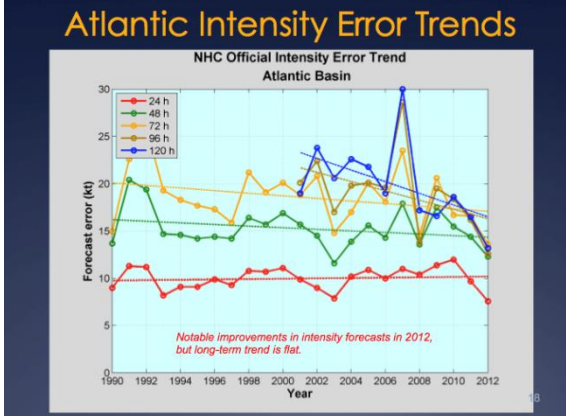
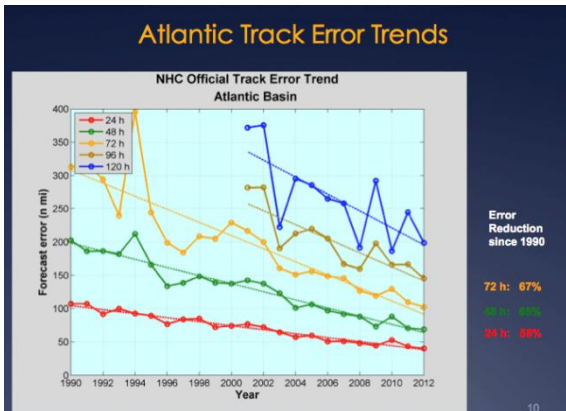
Insular Caribbean: 180 people/km²

- Regional exposure
- Coastal settlements and infrastructure
- Small islands, Small islands developing states
- Social vulnerability
- Economic vulnerability

- Determinants of vulnerability
- Adaptation
- Adaptive capacity → Resilience

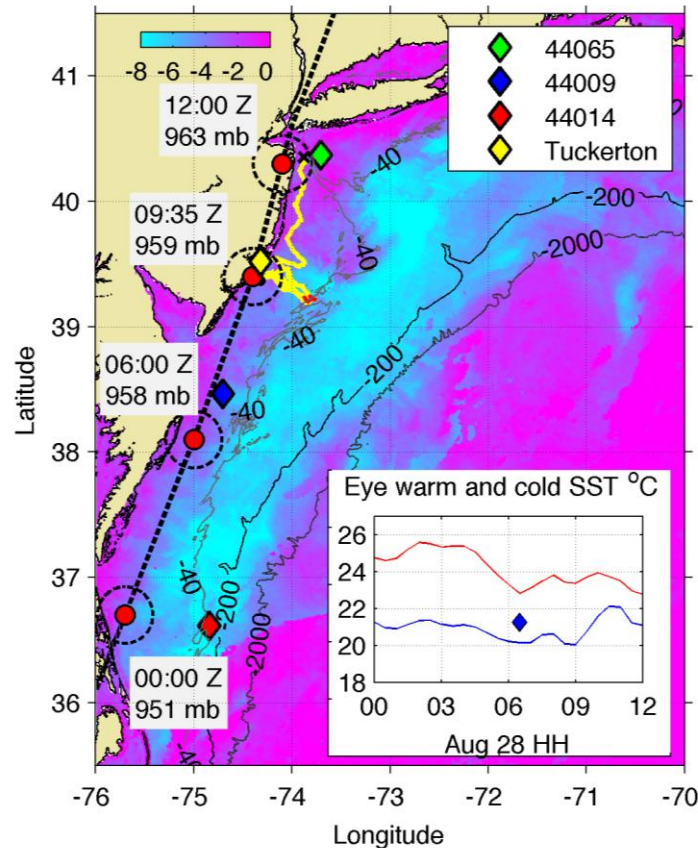
Hurricane Intensity Prediction: Important of the ocean

Despite great improvement in predicting Hurricane track
There has been little or no improvement in Hurricane intensity



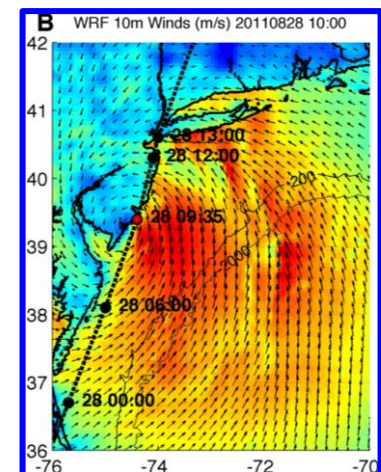
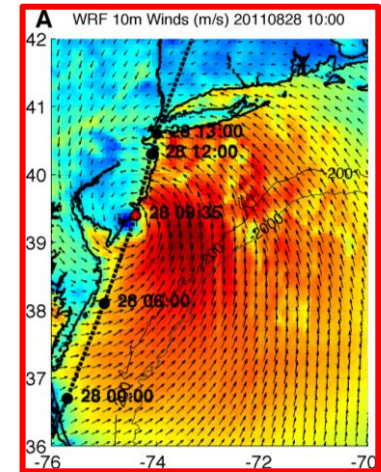
We do not use an accurate realization of the ocean in the hurricane models

(A) AVHRR+Sport SST Composite 8/31 - 8/26



Temperature difference of what was used in the model and what is observed after the storm

Using a realistic ocean improves the hurricane intensity forecast



RMS error decreases by a factor of ~4

Urban Planning for Climate Events

Fred S. Roberts (froberts@dimacs.rutgers.edu)

- Mathematics of Planet Earth – planet-wide activity 2013 & beyond
 - Workshop: Urban Planning for Climate Events, Sept. 2013
 - Workshop: Sustainable Human Environments, April 23-25, 2014 (RU)
 - Workshop: Global Change, May 19-21, 2014 (UC Berkeley)
- Climate Change as a Homeland Security Problem
 - Storms and natural disasters; heat events; spread of disease to new places; conflicts over clean water & water suitable for agriculture; conflicts over land if sea levels rise
- Urban Planning for Climate Events: How can we use mathematical modeling, simulation, data, and algorithmic tools of risk assessment to plan for the future?
 - Subway flooding; power plant location; locating utility lines; setting up supply chains
 - Planning evacuations for floods, hurricanes, heat events; investing in mitigation
 - Planning to bring systems back up after an event
 - Role of data science: June 2013 workshop: Hurricane Sandy – post-event data
 - Smart cities (real-time information)

