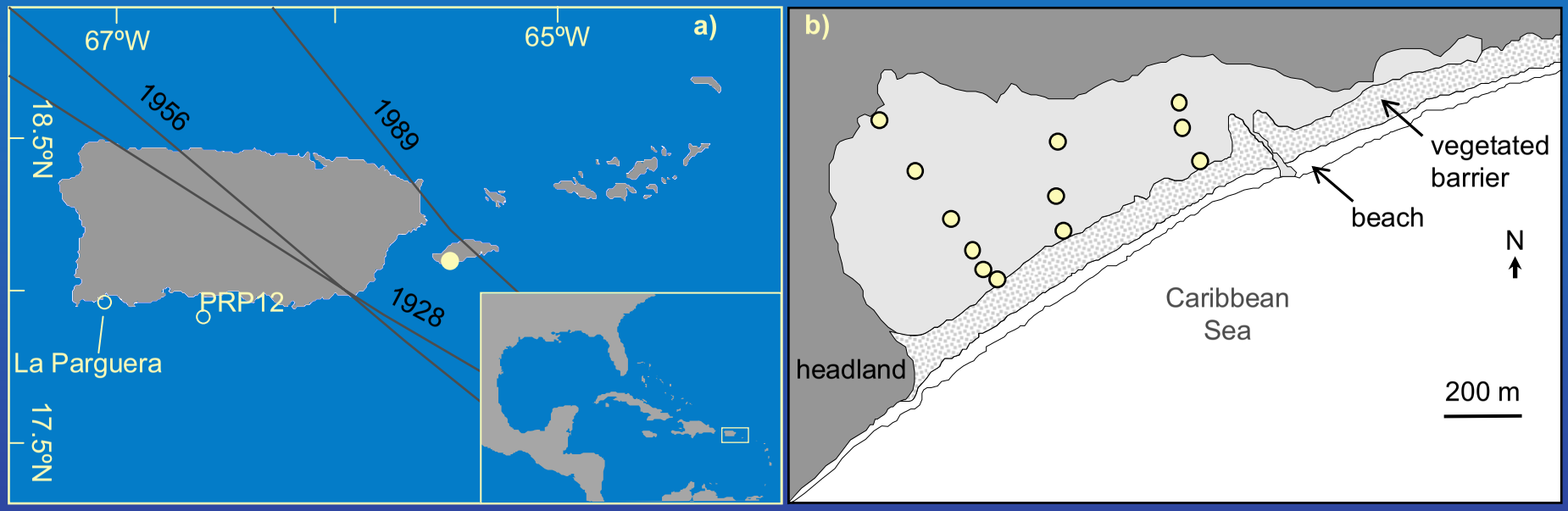
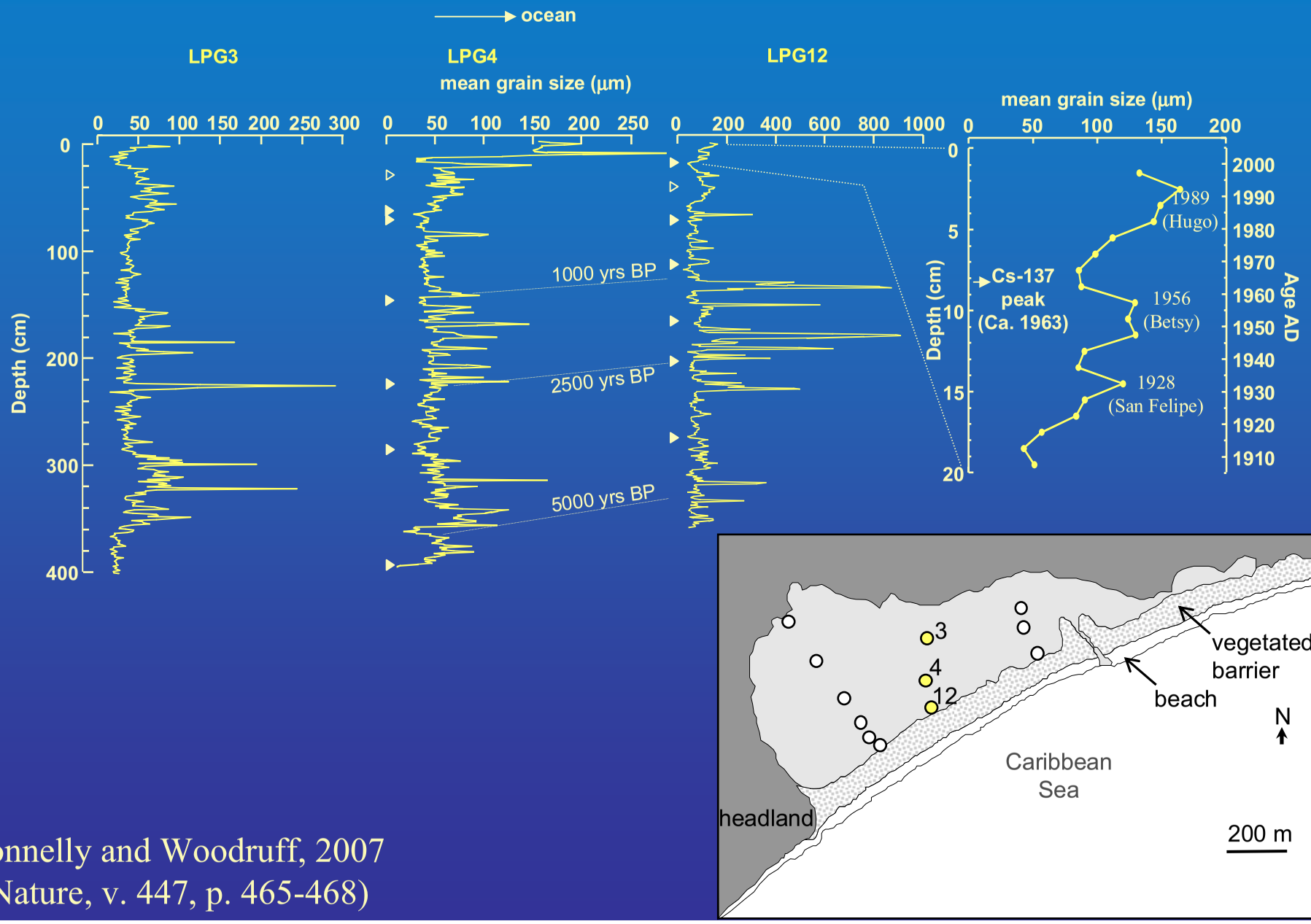
Intense Hurricane Strike Reconstruction, Vieques, Puerto Rico

Vieques, Puerto Rico



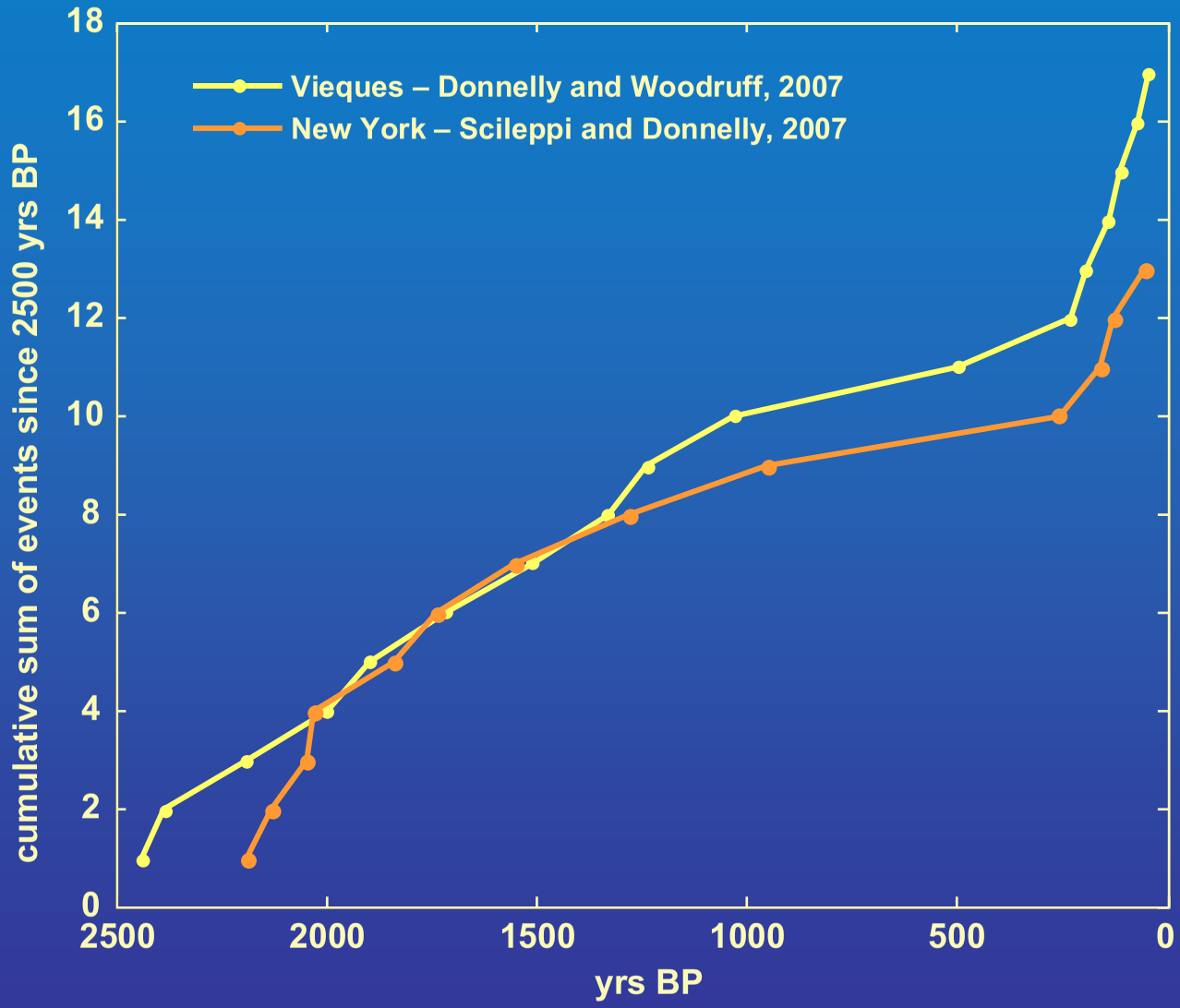
Donnelly and Woodruff, 2007
(Nature, v. 447, p. 465-468)

Vieques, Puerto Rico – Grain Size

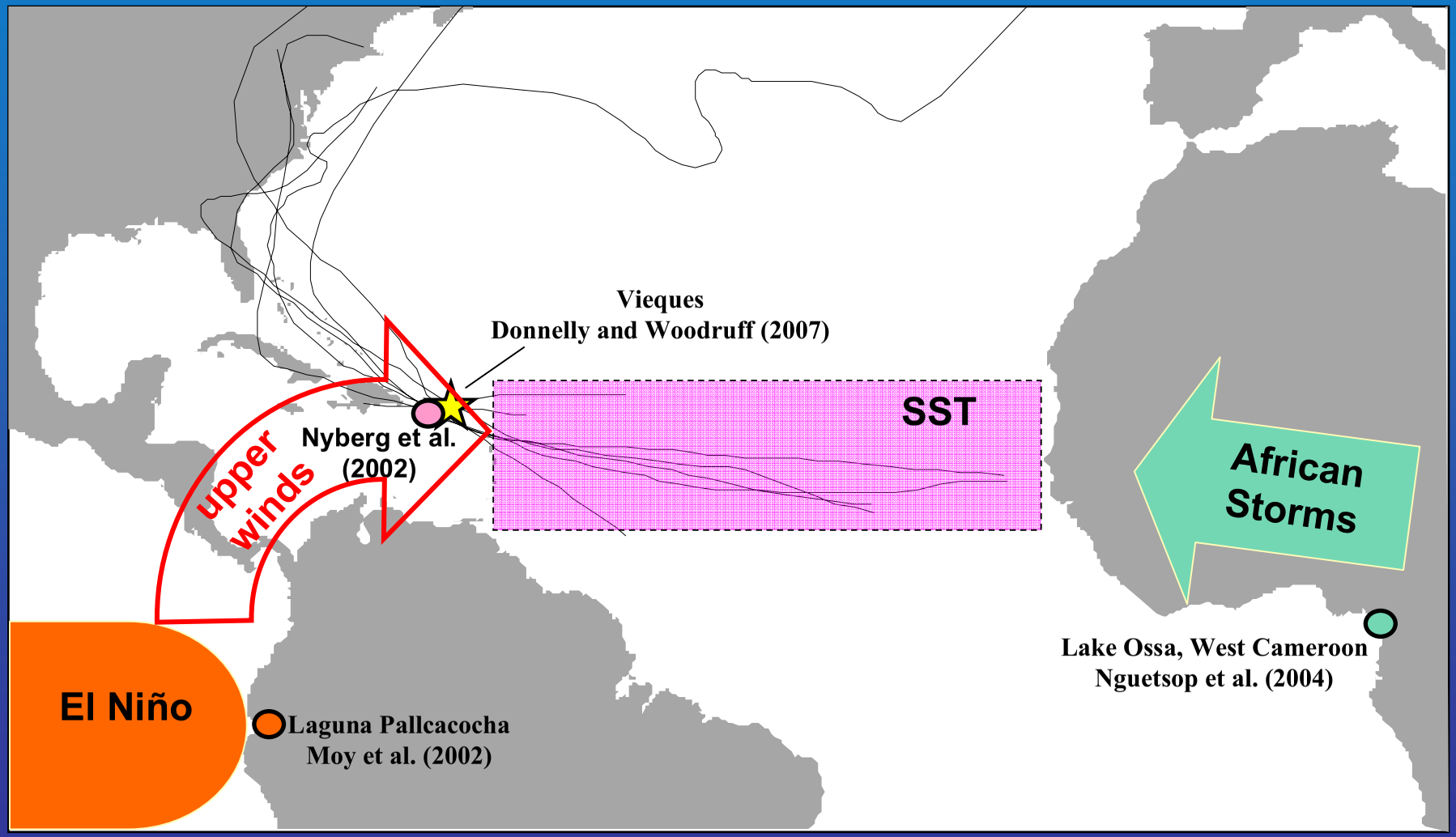


Donnelly and Woodruff, 2007
(Nature, v. 447, p. 465-468)

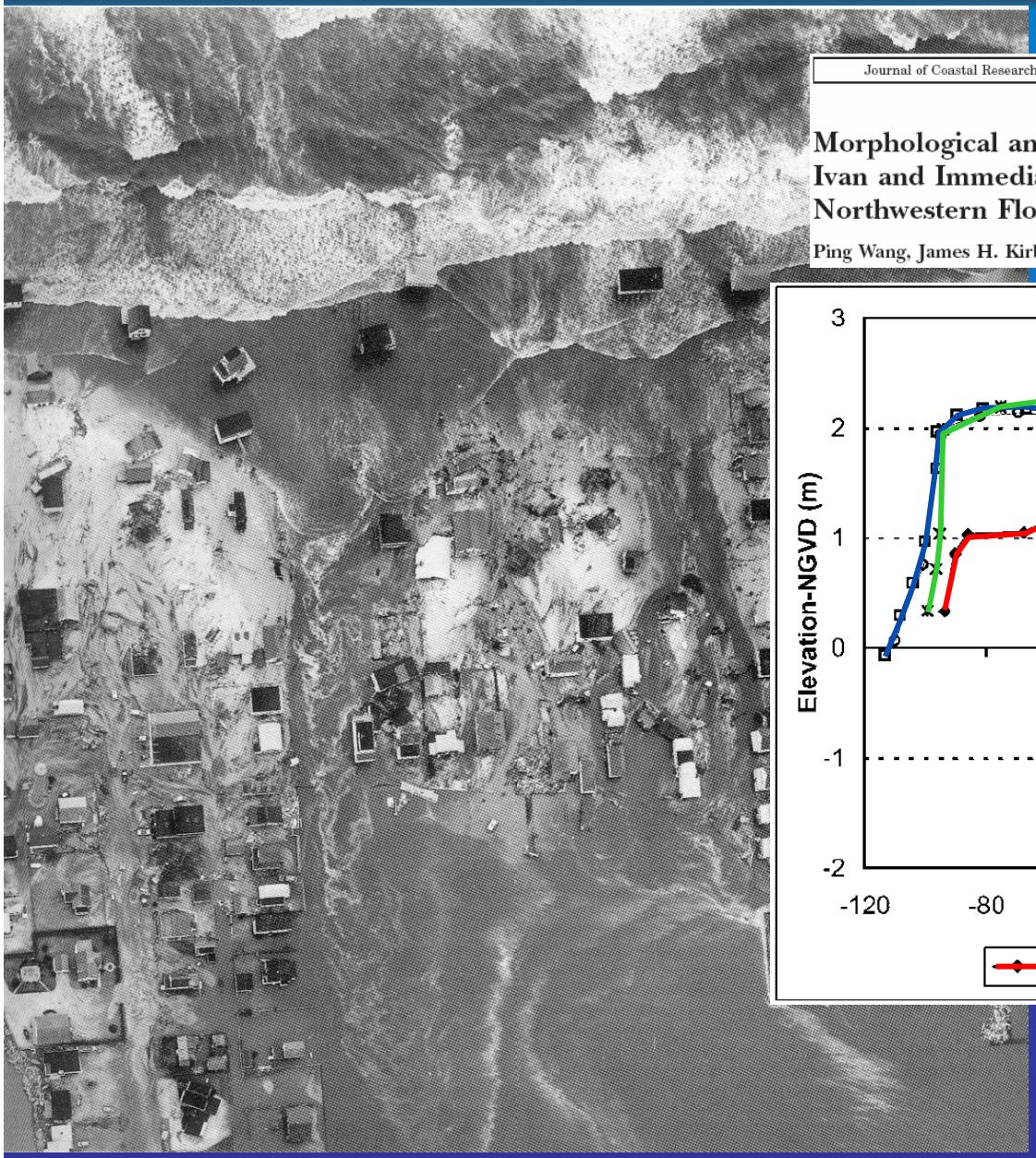
Vieques vs. New York paleo-storm reconstructions



Controls on Hurricane Activity



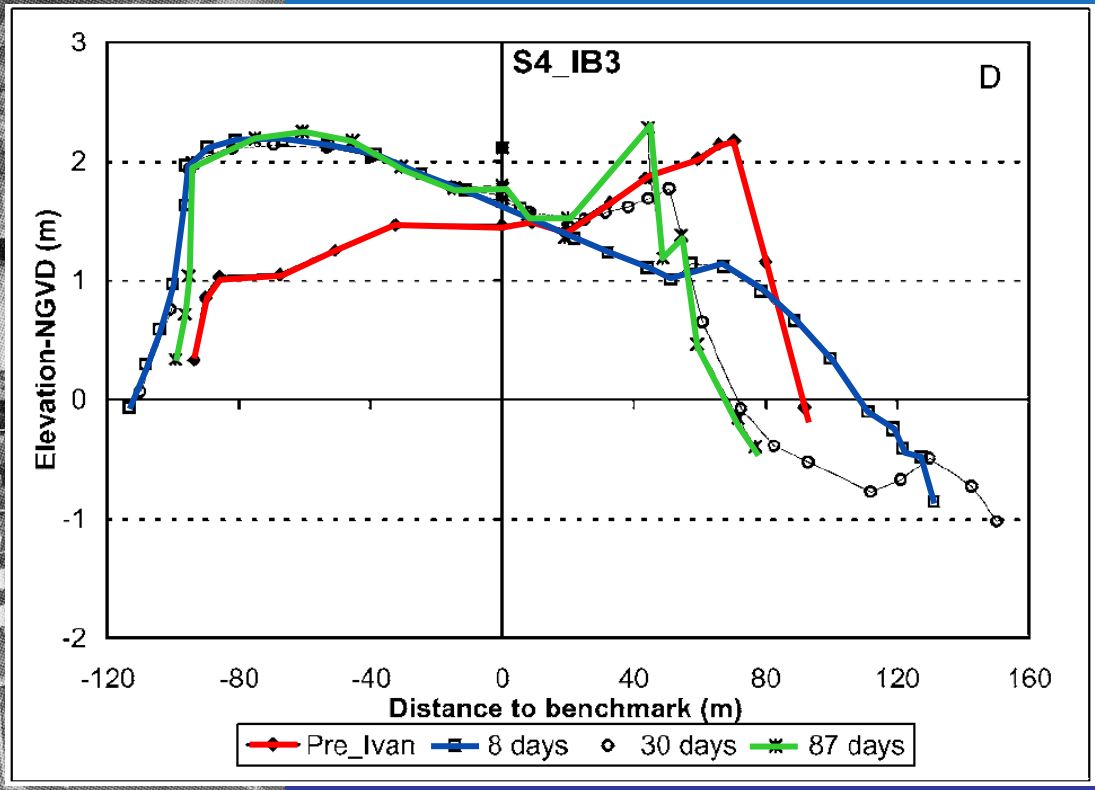
Impacts on coastal morpho-dynamics: how will landforms respond?



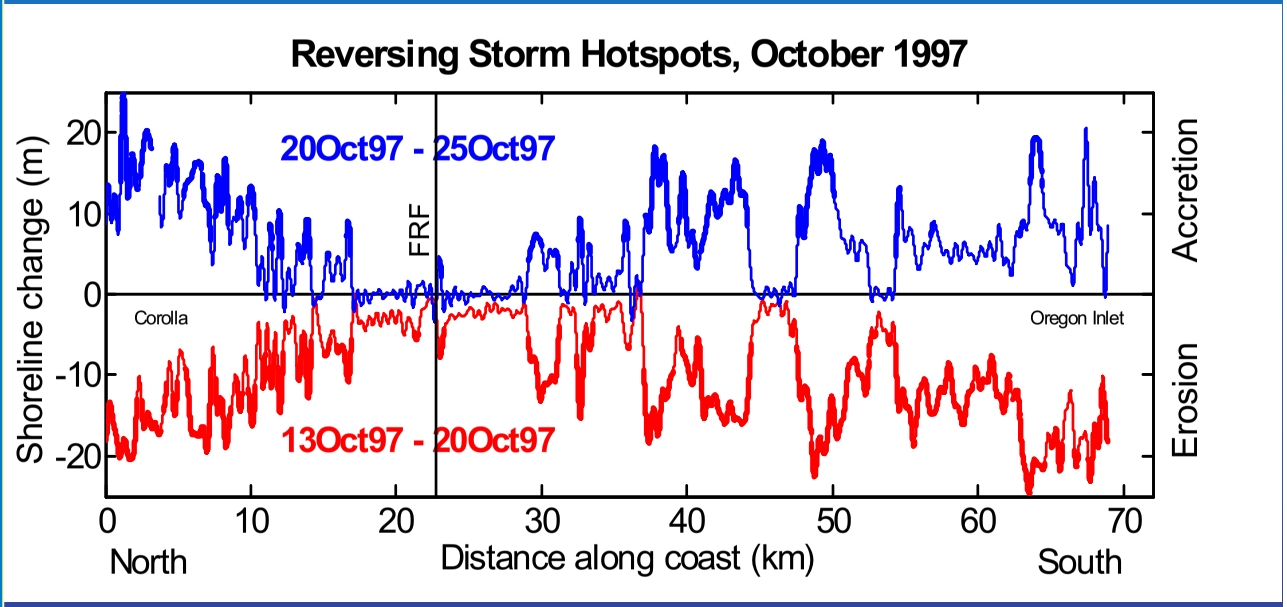
Journal of Coastal Research	22	6	1382–1402	West Palm Beach, Florida	November 2006

Morphological and Sedimentological Impacts of Hurricane Ivan and Immediate Poststorm Beach Recovery along the Northwestern Florida Barrier-Island Coasts

Ping Wang, James H. Kirby, Joseph D. Haber, Mark H. Horwitz, Paul O. Knorr, and Jennifer R. Krock

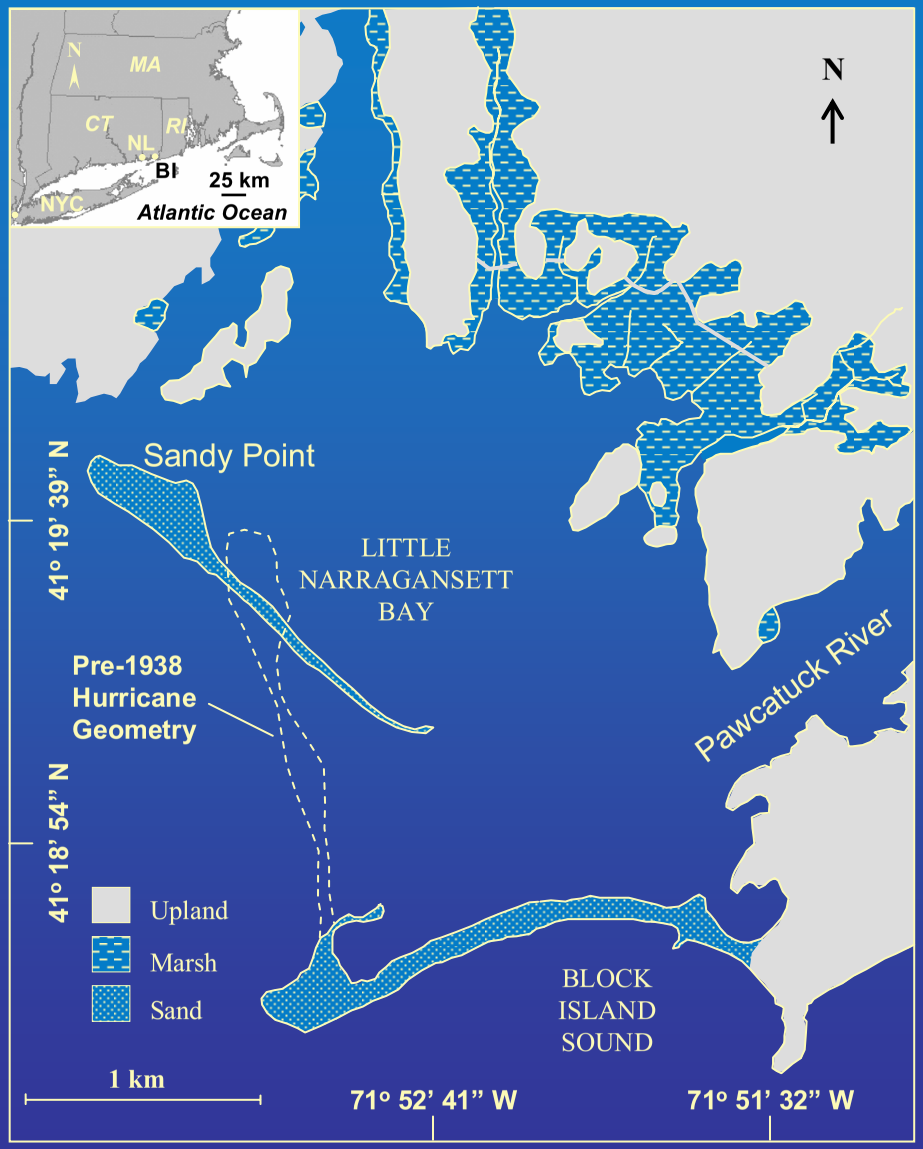


Storm erosion and recovery



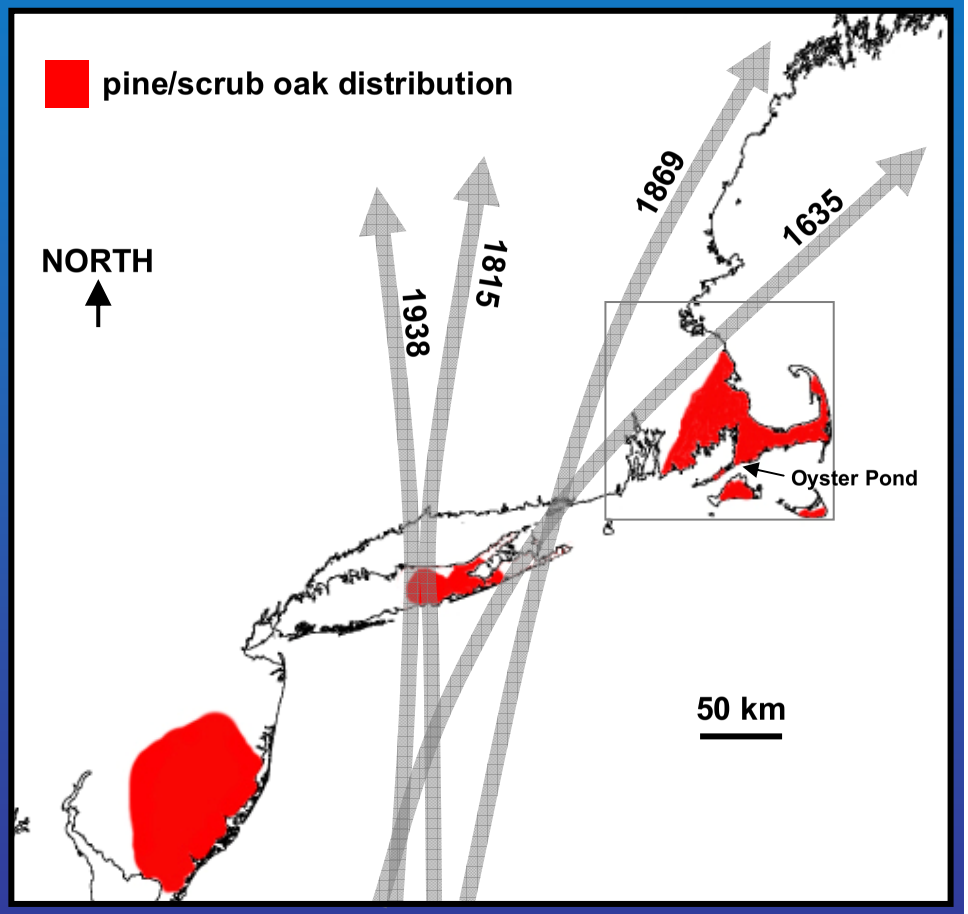
Figures from Jeff List, USGS

Dramatic shoreline change



Adapted from Warren and Niering 1993

Other landscape responses – Oyster Pond, MA



Population and wealth have substantially increased

Coastal population in the states impacted by the 1821 hurricane (MD, DE, NJ, NY, and CT) now exceeds 31 million

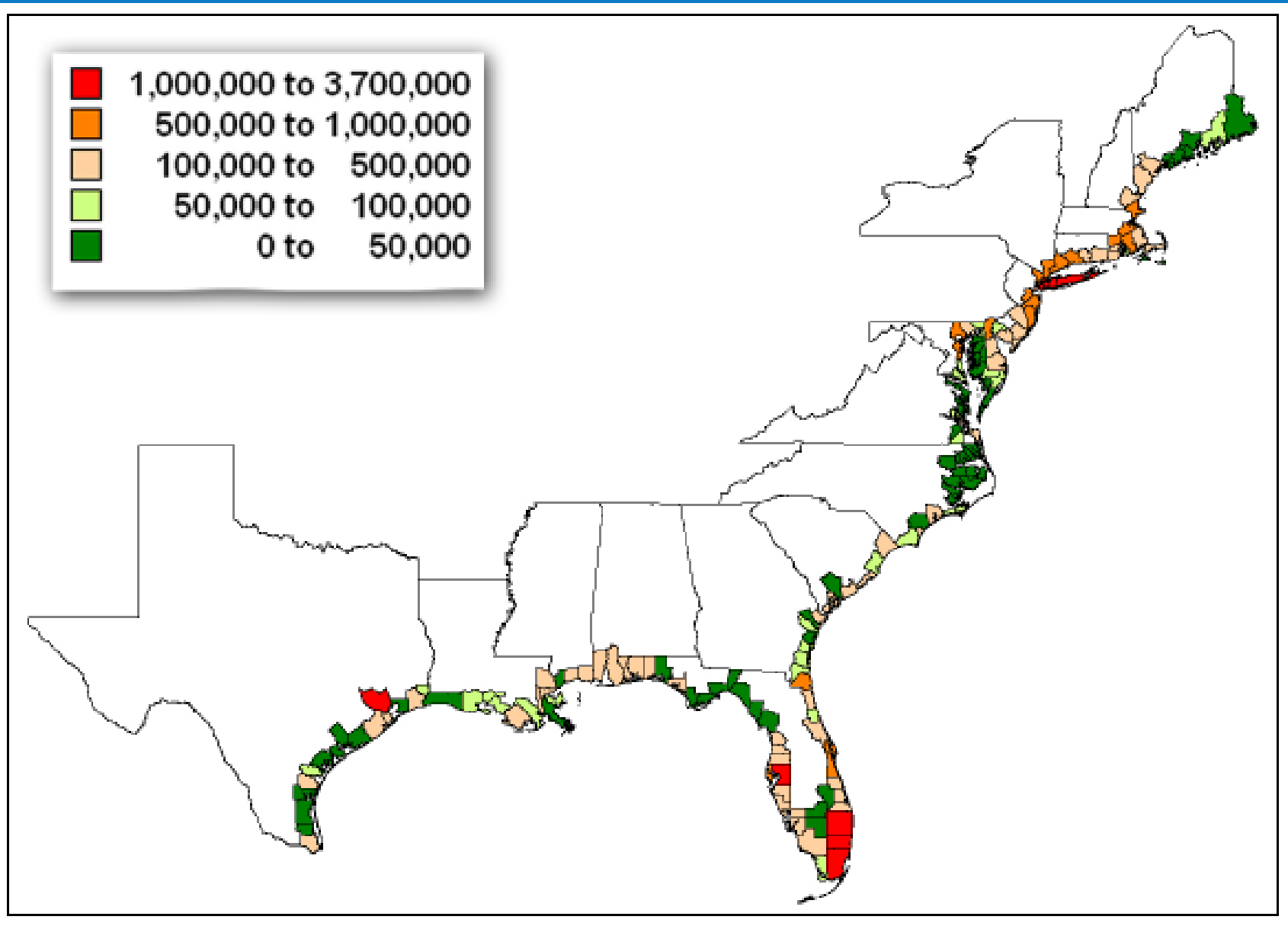
Insured coastal property is over 1 trillion dollars

Photo: Atlantic City Convention & Visitors Authority

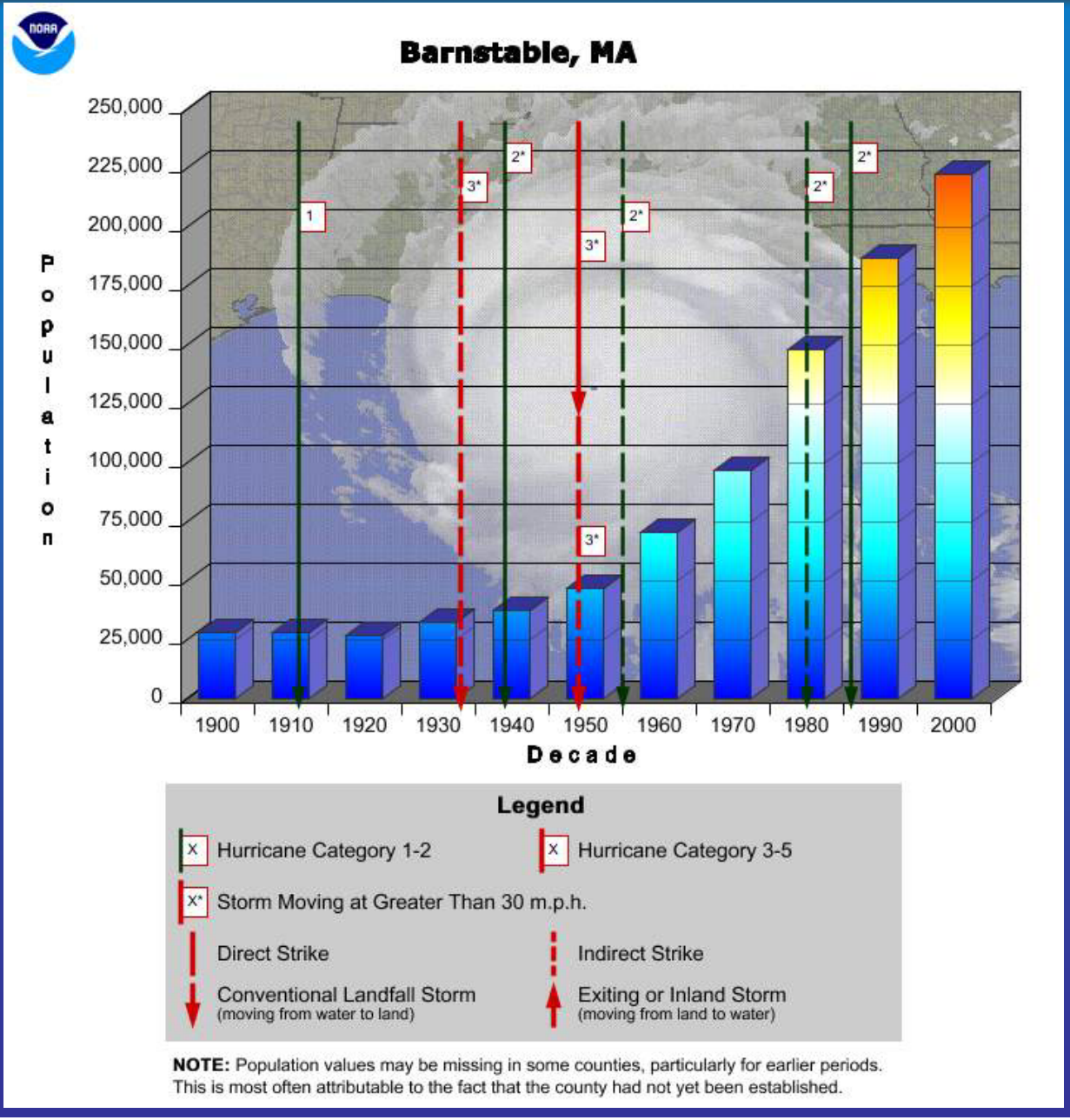
Rockaway Beach, NY

Ocean City, Maryland

2005 coastal county population

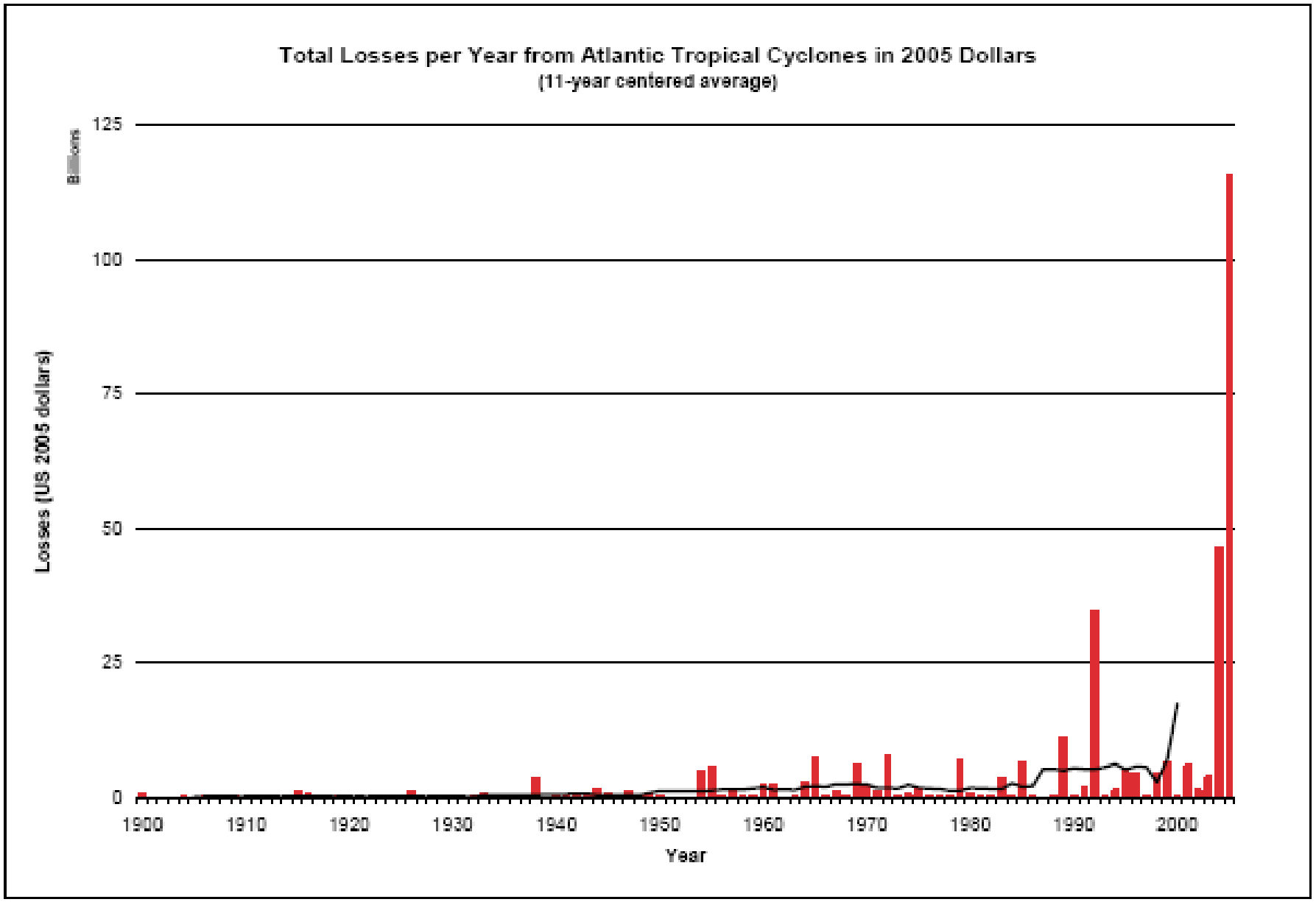


Cape Cod Population Increases

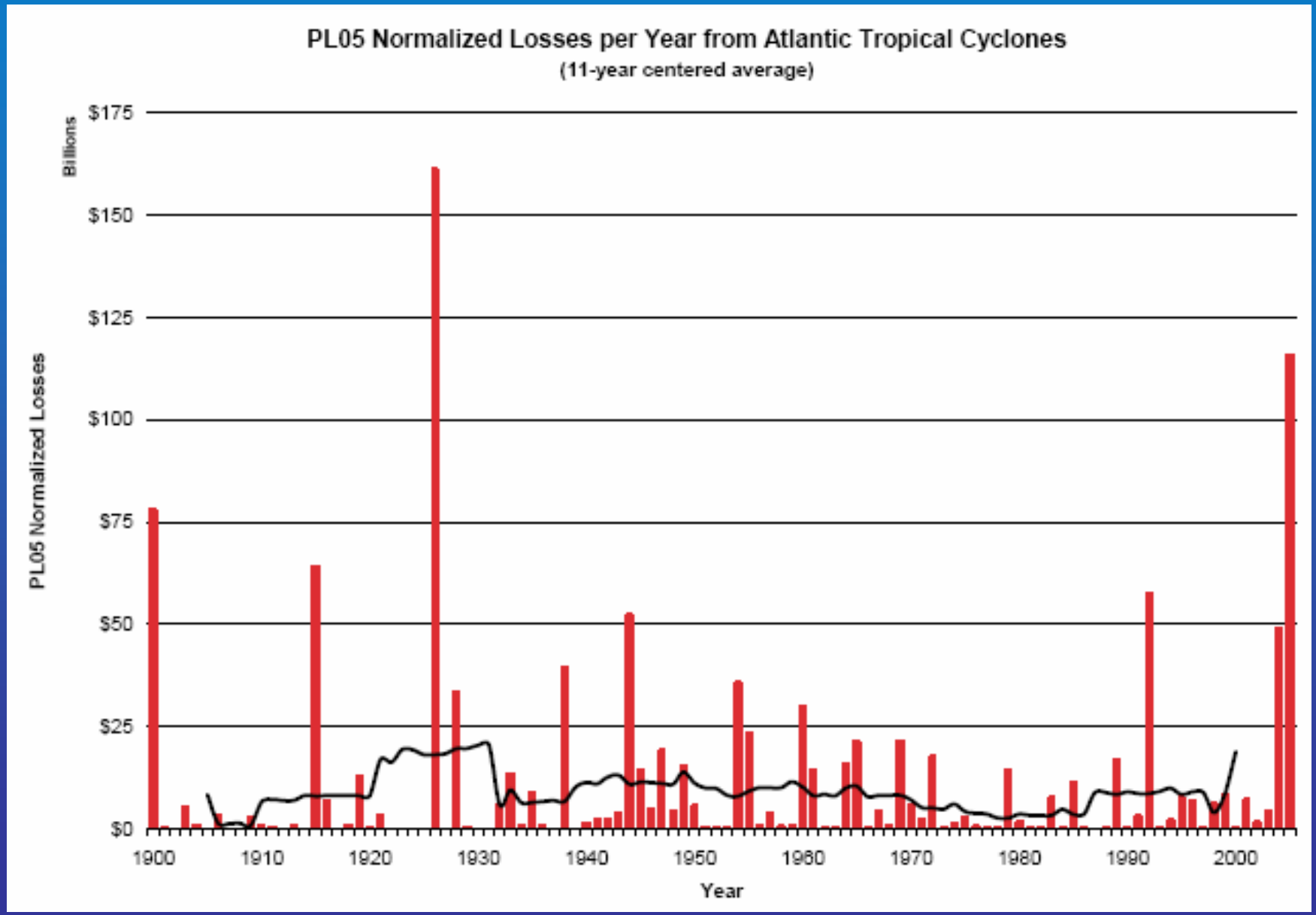


NOTE: Population values may be missing in some counties, particularly for earlier periods. This is most often attributable to the fact that the county had not yet been established.

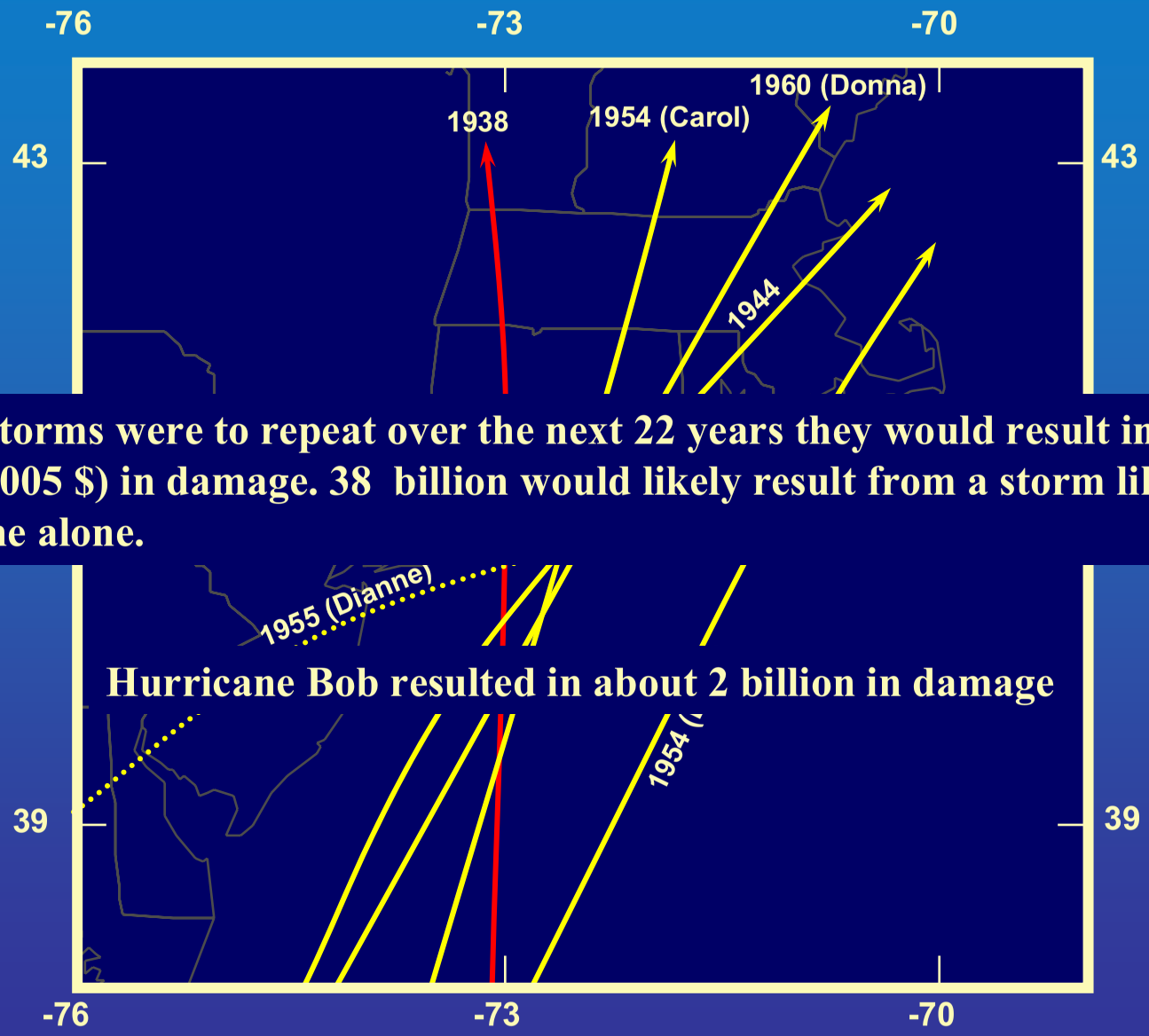
Total hurricane losses since 1900 AD



What would losses be if these storms stuck today?



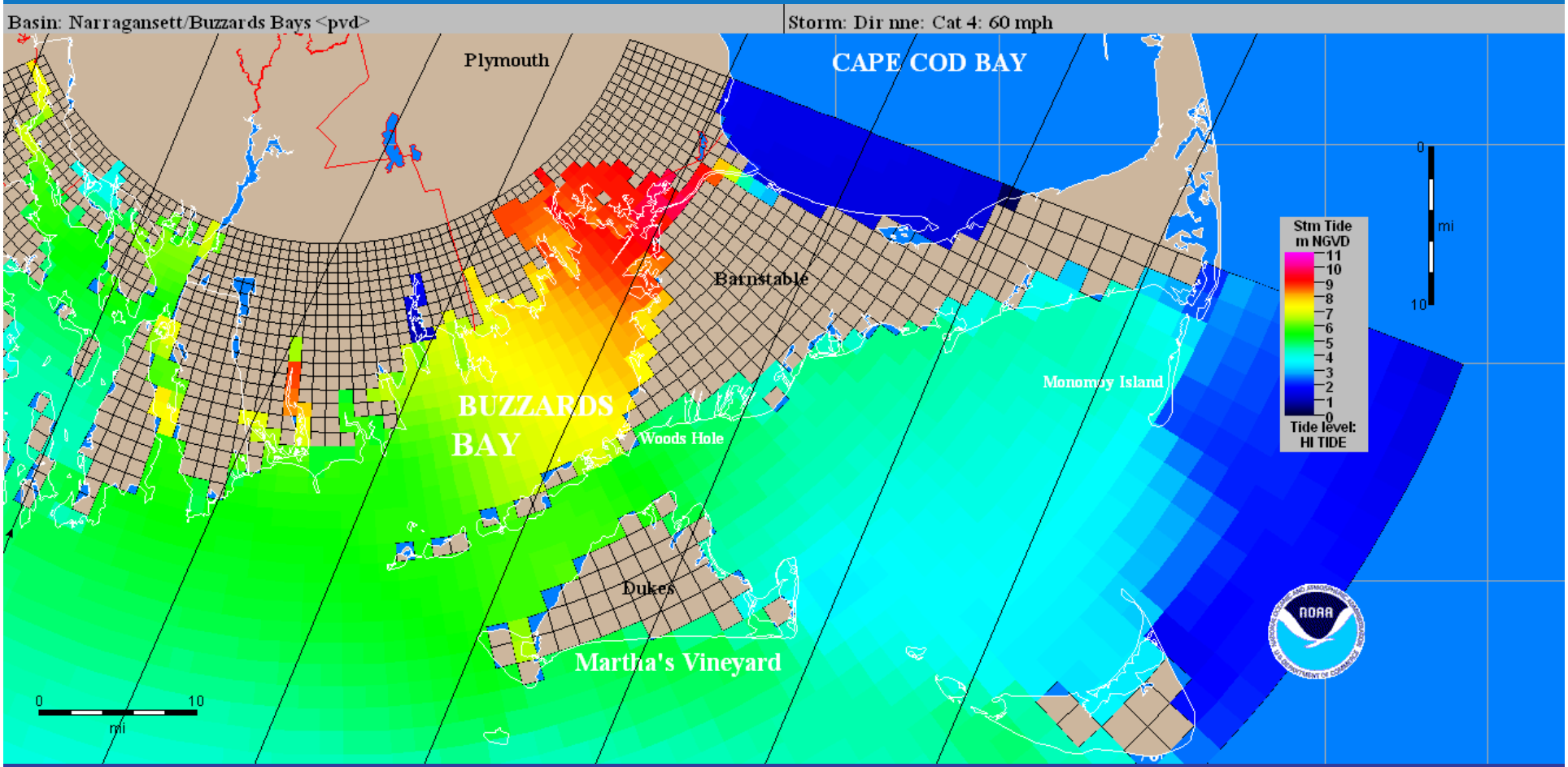
Tropical cyclone strikes in New England 1938-1960



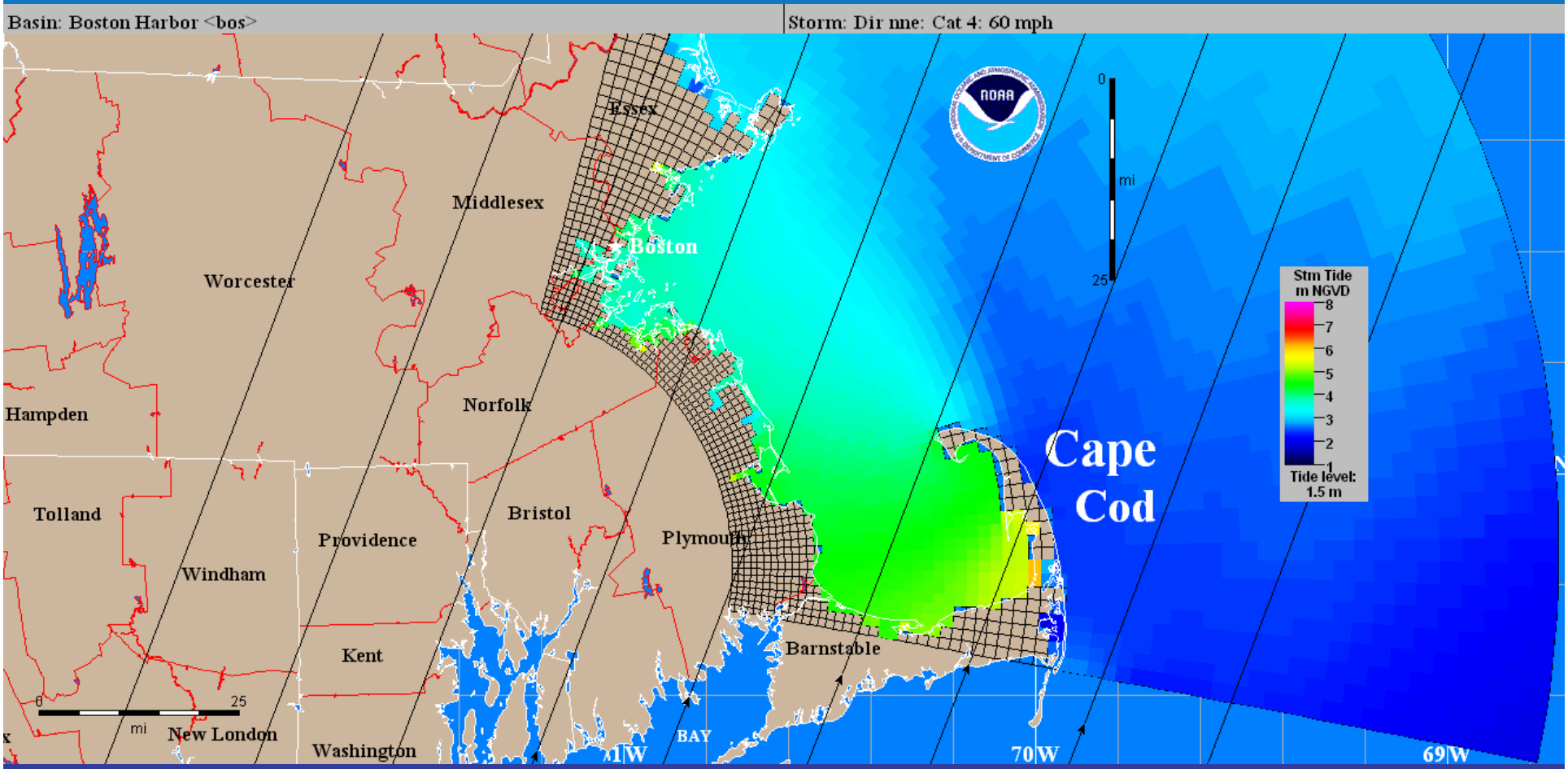
If these storms were to repeat over the next 22 years they would result in about 100 billion (2005 $) in damage. 38 billion would likely result from a storm like the 1938 Hurricane alone.

Hurricane Bob resulted in about 2 billion in damage

Worst case scenario – south shore

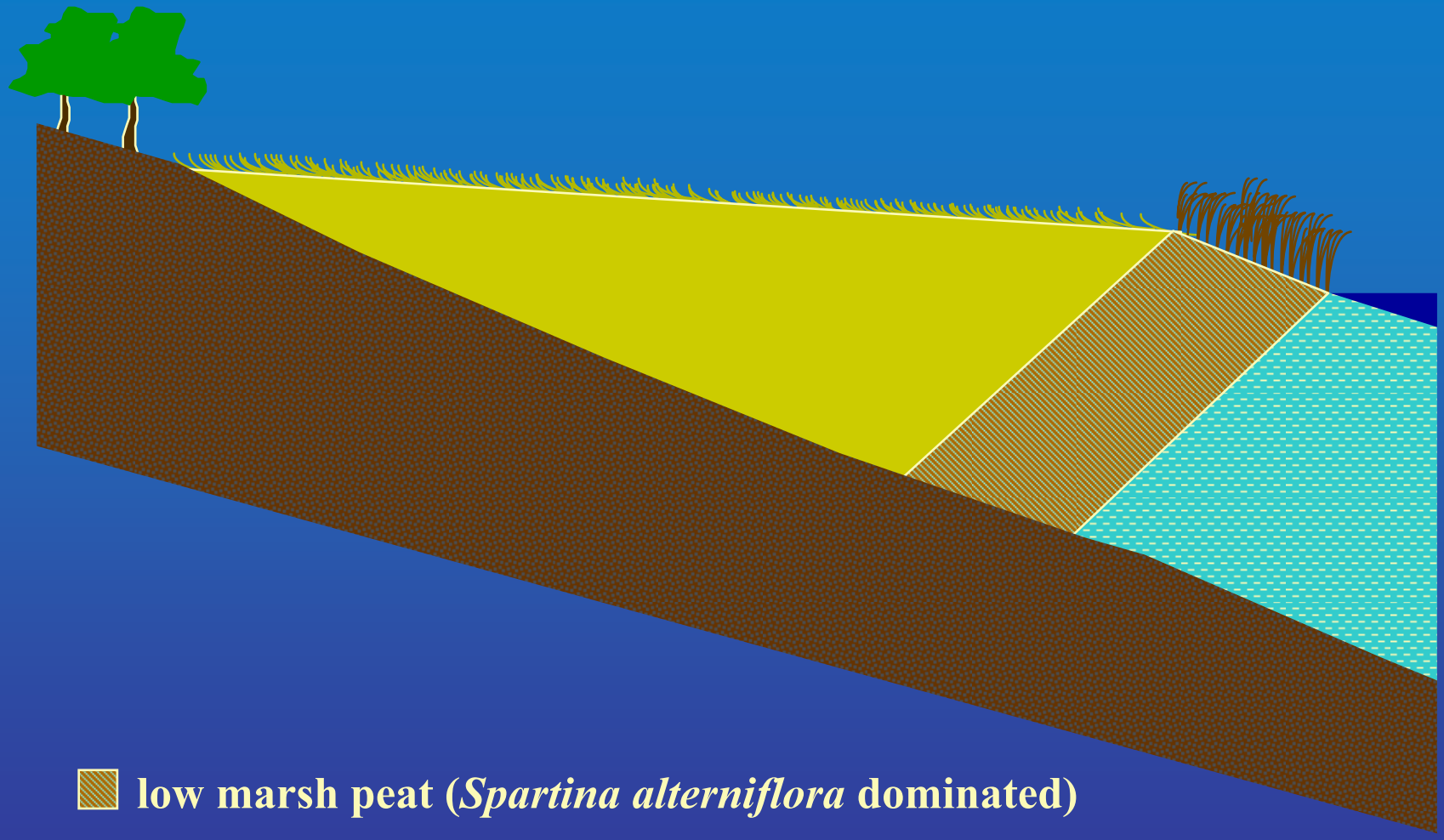


Worst case scenario – Cape Cod Bay



Conceptual Model of New England Salt Marsh Development

after Redfield (1972)



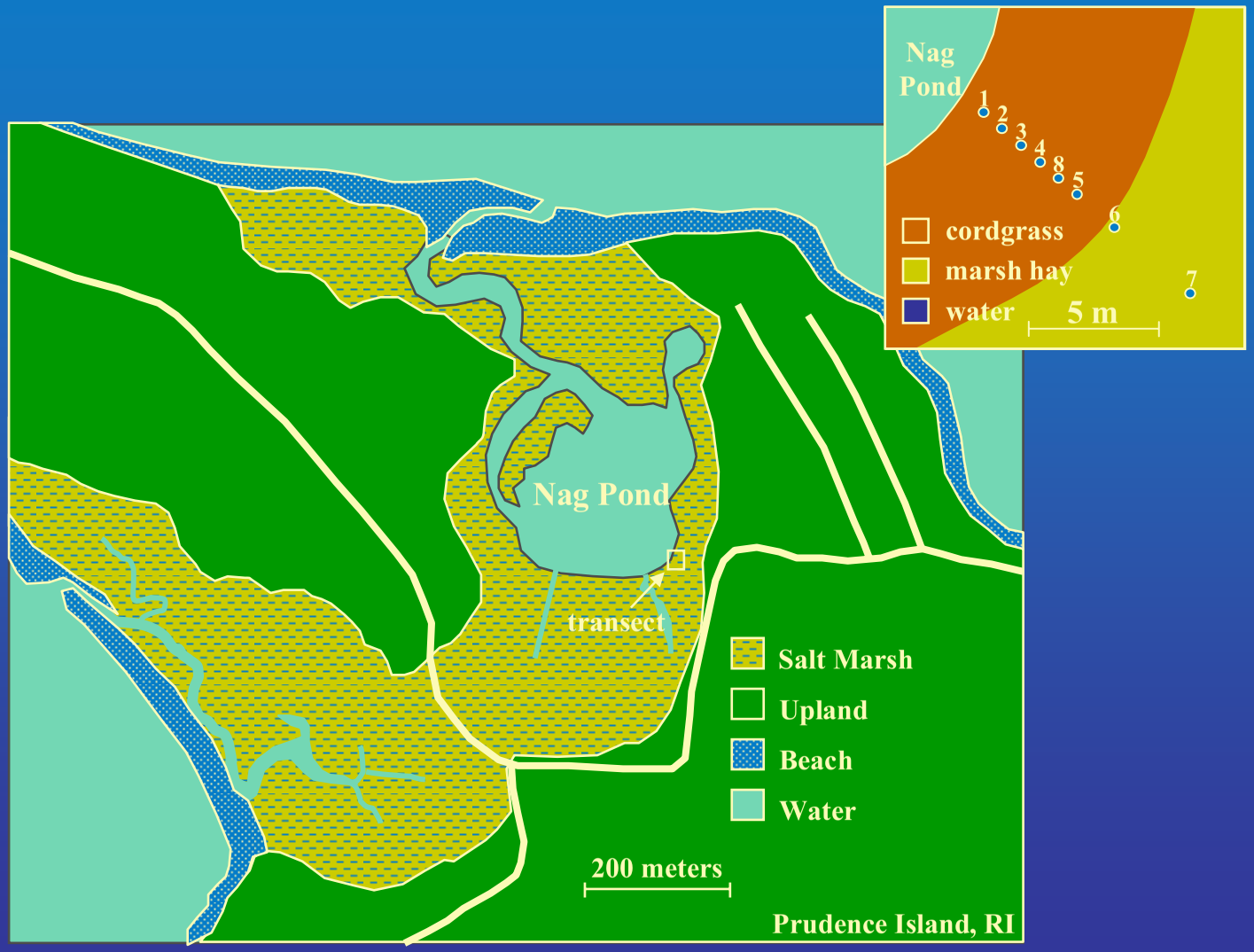
low marsh peat (*Spartina alterniflora* dominated)

high marsh peat (*Spartina patens* dominated)

sand or mud flat

basement

Vegetation Response to accelerated SLR



Vegetation Response to accelerated SLR

Distance (m)

14 12 10 8 6 4 2 0

1963
1954
1900

7 6 5 8 4 3 2 1

Depth (cm)

0 50 100 150 200 250

740 ±30

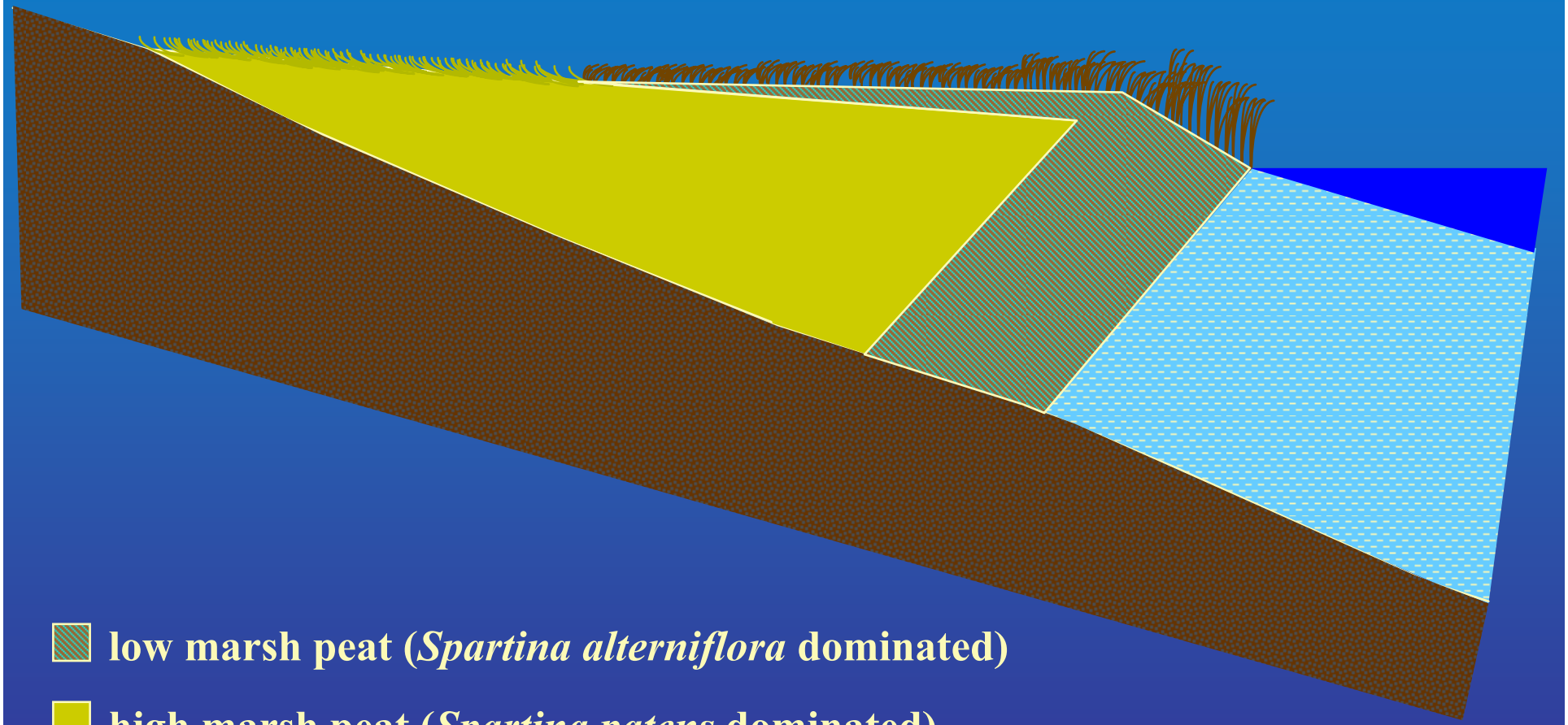
1870s

2450 ±35

high marsh peat
low marsh peat
basal sand

Donnelly and Bertness, 2001 (PNAS, v. 98, p. 14218-14223)

The Redfield model with a recent twist



low marsh peat (*Spartina alterniflora* dominated)

high marsh peat (*Spartina patens* dominated)

sand or mud flat

basement gravel and sand

Thank You!

More information can be found at:
http://www.whoi.edu/science/GG/coastal/index.html