

Science Panel Metrics Report

Margery Overton
Chair, Science Panel on Coastal Hazards

Science Panel on Coastal Hazards

Margery Overton, Chair	Department of Civil, Construction, and Environmental Engineering N.C. State University
Steven Benton	Division of Coastal Management (retired) Raleigh
William Cleary	Center for Marine Science University of North Carolina at Wilmington
Tom Jarrett, P.E.	U.S. Army Corps of Engineers (Retired)
Charles "Pete" Peterson	Institute of Marine Sciences University of North Carolina at Chapel Hill
David John Mallinson	East Carolina University
Stan Riggs	Department of Geology East Carolina University
Spencer Rogers	North Carolina Sea Grant Wilmington
Antonio B. Rodriguez	Institute of Marine Sciences University of North Carolina at Chapel Hill
Gregory Williams	U.S. Army Corps of Engineers Wilmington
William Birkemeier	Field Research Facility, ERDC/CHL US Army Corps of Engineers
Elizabeth Judge Sciaudone	N.C. State University
Robert S. Young	Department of Geosciences Western Carolina University

Major topics considered

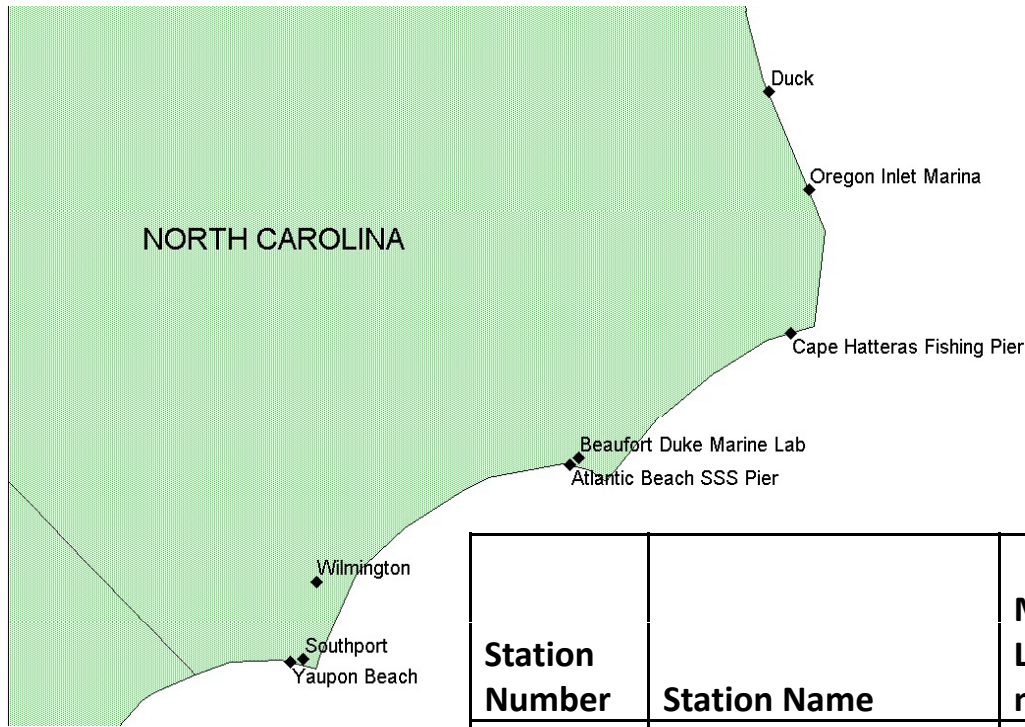
- Update of technology used to determine erosion rate
- Determination of innovative structures
- Sediment compatibility rules
- Inlet hazard delineation
- Inlet hazard rules
- Sea level rise
- Review of terminal groin study

Other participants

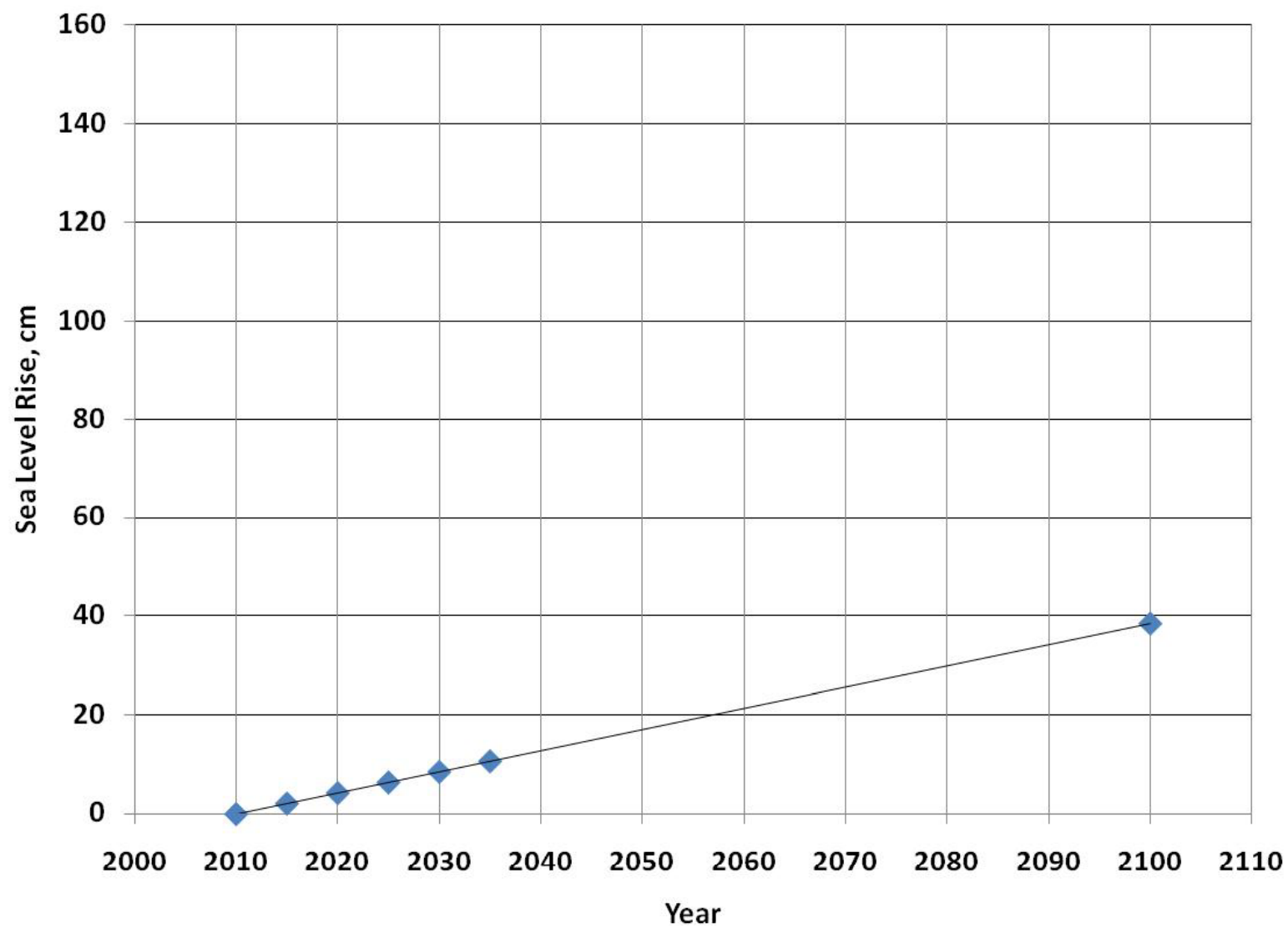
- **Mark Brinson, Dept Biology, ECU**
- **Martin Posey, Dept Biology and Marine Biology, UNCW**
- **Anne Deaton, Division of Marine Fisheries**
- **Carolyn Currin, Center for Coastal Habitats and Fisheries Research**
- **Reide Corbett, East Carolina University Geology**

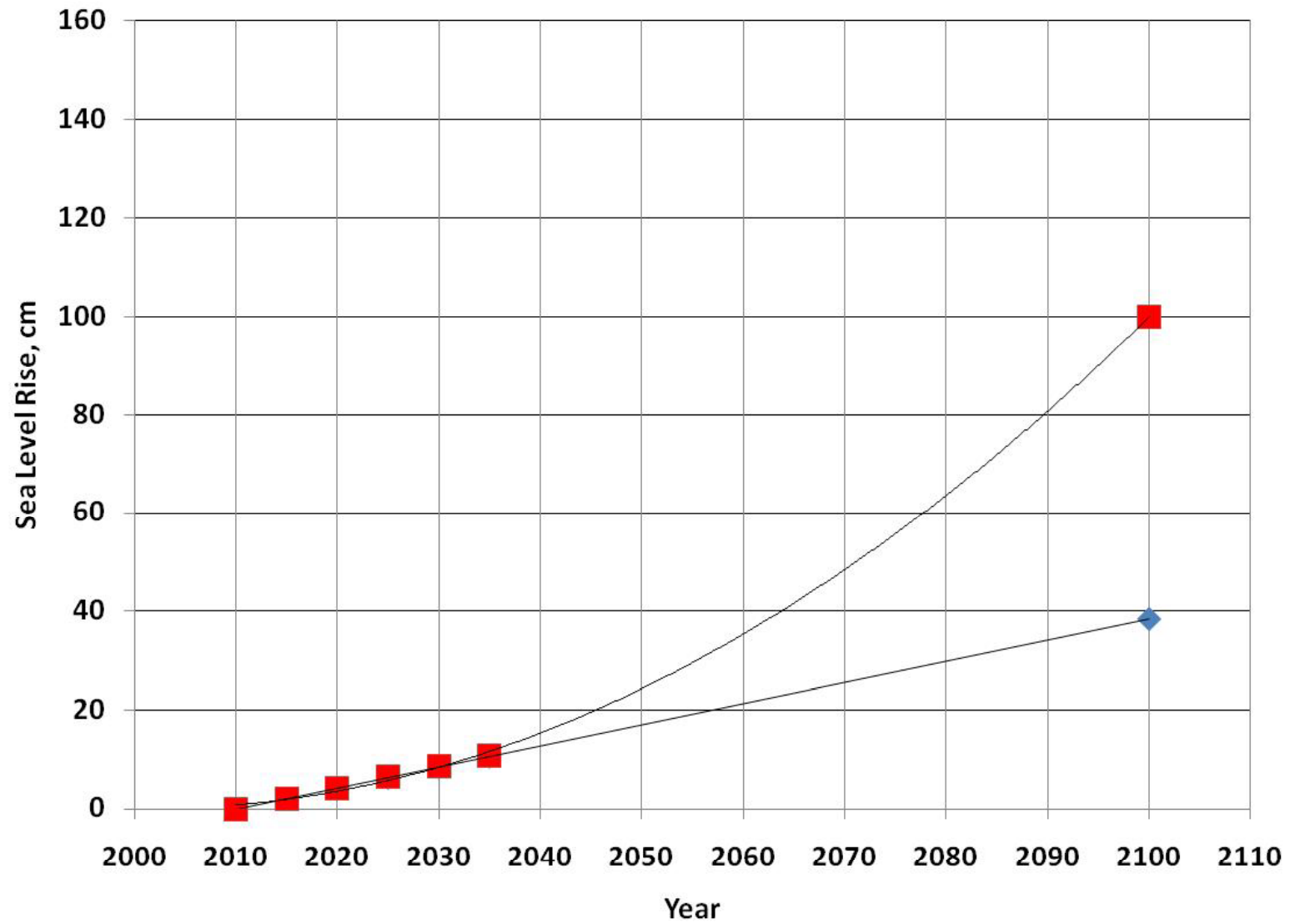
Literature Considered

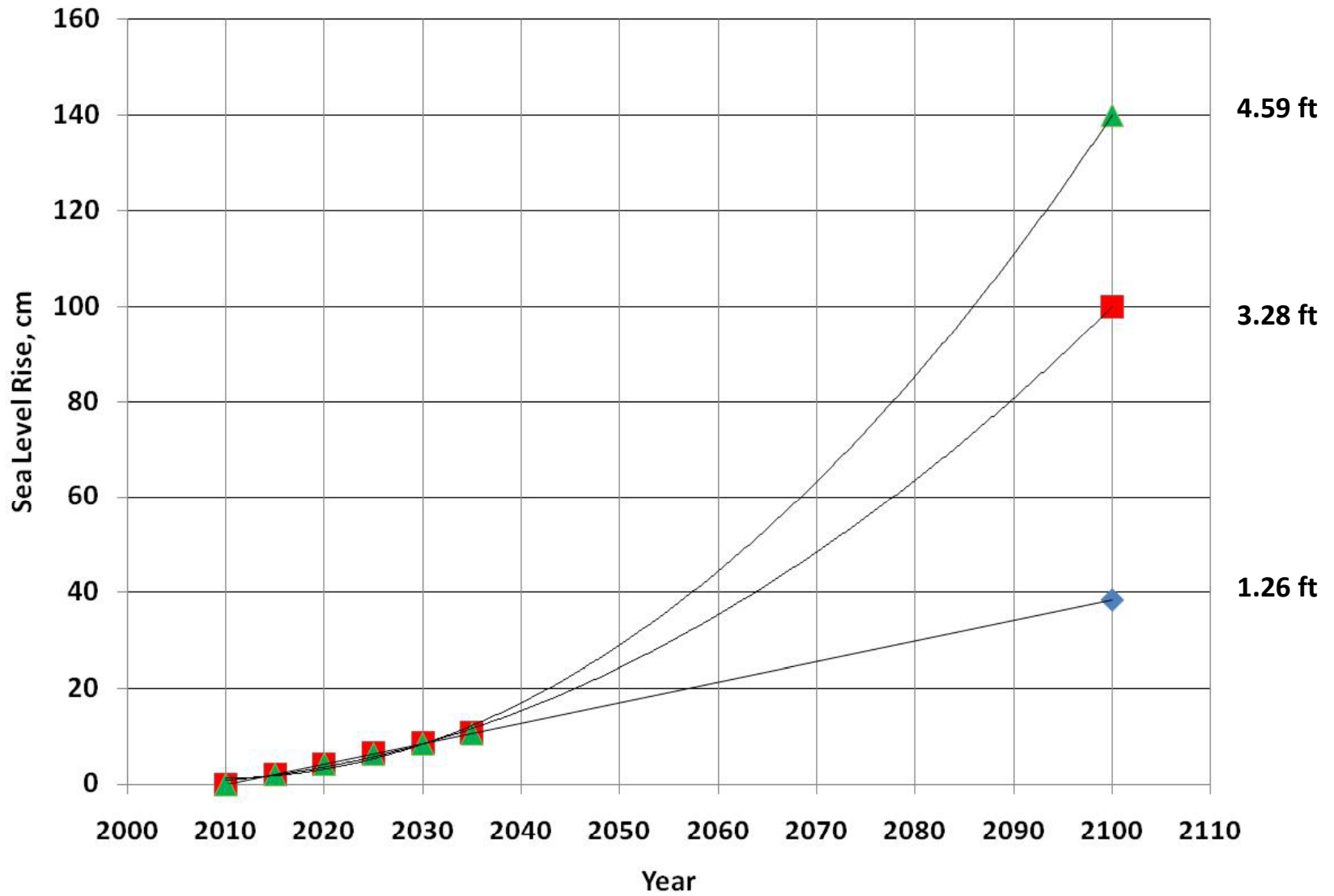
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Station Number	Station Name	Mean Sea-Level Trend mm/yr	Mean Sea-Level Trend ft/century	Period of Data
8651370	Duck	4.27 ± 0.74	1.40 ± 0.24	1978-2002 (24)
8652587	Oregon Inlet Marina	2.55 ± 1.21	0.84 ± 0.40	1977-1980 (3) 1994-2002 (8)
8654400	Cape Hatteras	3.46 ± 0.75	1.13 ± 0.25	1978-2002 (4)
8656483	Beaufort	3.20 ± 0.54	1.05 ± 0.18	1973-2002 (29)
8656590	Atlantic Beach	2.48 ± 1.99	0.81 ± 0.65	1977-1983 (6) 1998-2000 (2)
8658120	Wilmington	2.12 ± 0.23	0.70 ± 0.07	1935-2002 (67)
8659084	Southport	2.04 ± 0.25	0.67 ± 0.08	1933-1954 (20) 1976-1988 (12)
8659182	Yaupon Beach	2.92 ± 0.77	0.96 ± 0.25	1977-1978 (1) 1996-1997 (1))







Sea Level Rise Monitoring

- To justify actions that may become necessary if sea level accelerates, it is recommended that the long-term tidal observations be maintained and new stations added to the long-term record to provide better geographic coverage of our coast.
- The state should insure that our existing tide stations are maintained for the future and that new, better-distributed water level gauges are maintained or installed to develop long-term records.
- Existing short-term gauges should be considered for conversion and funding support to long-term operations, to establish multiple decades for each station.
- New water level gauges should be installed for a comprehensive geographic coverage.
- Continued investment in geospatial topo/bathy data to capture the dynamics of the coast and to document change is needed.

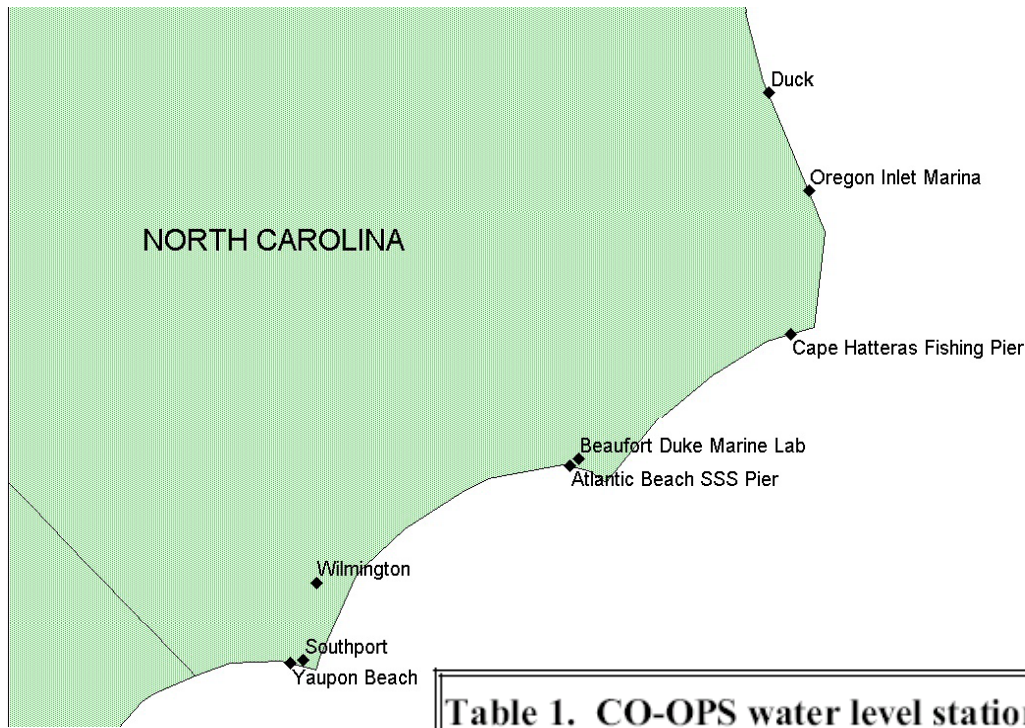


Table 1. CO-OPS water level stations in North Carolina with data spanning over 20 years

Station Number	Station Name	Periods of Data	1983-2001 MSL relative to NAVD 88 (meters)
8651370	Duck	1978-2002	-0.128
8652587	Oregon Inlet Marina	1977-1980, 1994-2002	-0.026
8654400	Cape Hatteras	1978-2002	-0.135
8656483	Beaufort	1973-2002	N/A
8656590	Atlantic Beach	1977-1983, 1998-2000	N/A
8658120	Wilmington	1935-2002	0.01
8659084	Southport	1933-1954, 1976-1988	-0.141
8659182	Yaupon Beach	1977-1978, 1996-1997	N/A

When's the next meeting?

- Predicting sea level rise in North Carolina for the next century is now and will be for an extended period, an inexact exact science. Immediate actions should be guided by what we know best, the historical sea level and storm records with reasonable safety factors.
- With improvements in data collection, climate science and modeling, sea level decadal to century-scale predictions should improve in the future.
- The Panel recommends a general reassessment of the planning predictions every five years or more frequently should any significant breakthroughs develop.

NC DCM Coastal Construction Setback

- Use aerial photography
- Two dates
- > 50 yr time interval
- Baseline assumption 2 ft/yr (0.6 m/yr) horizontal loss
- Program has approximately a 30 yr history
- Established rates in early 1980's and updated three times, 1986, 1992, 1998



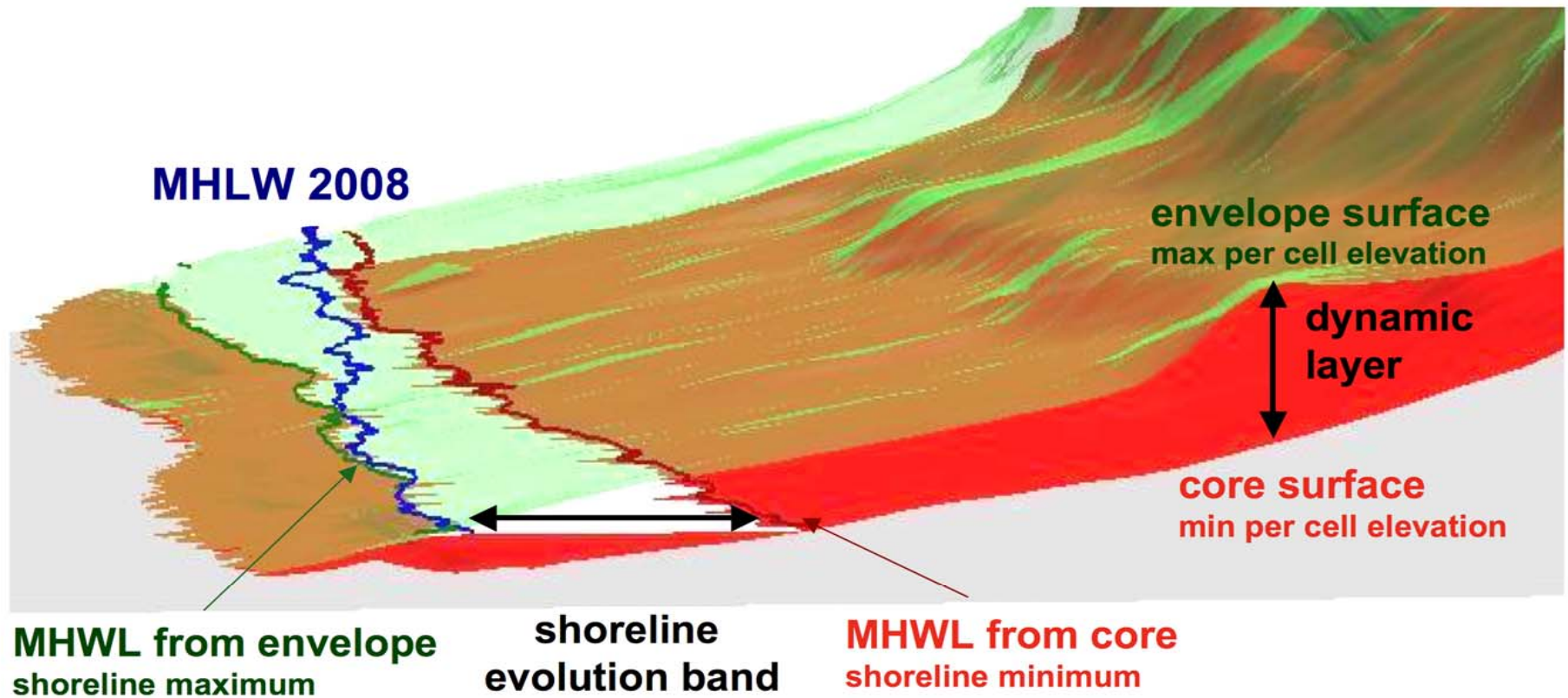
Communicated and implemented using spatially averaged, blocked factors on orthophoto base maps.

Challenge

- **Plan for a vertical rise of 1 m (or a low of 0.4 m to a high of 1.4 m) by 2100**
- **At a rate of 4.27 mm/yr for the first 25 years**
- **But that could, for example, accelerate at 0.0286 cm/yr² resulting in a rate of 23 mm/yr 2100**
- **While investing in data collection and analysis of water level and topographic and bathymetric surfaces**
- **In order to review this recommendation every 5 years because it can all change**

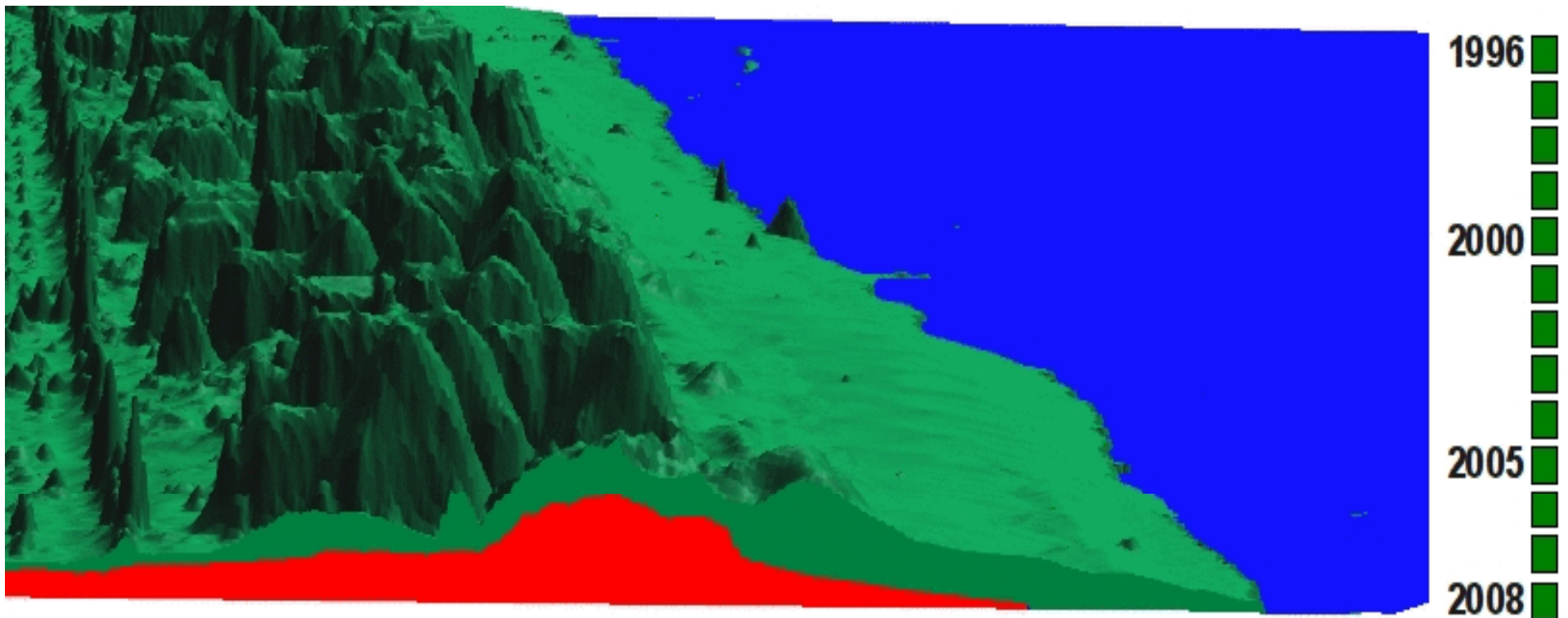
Challenge

In complex three dimensional world



Challenge

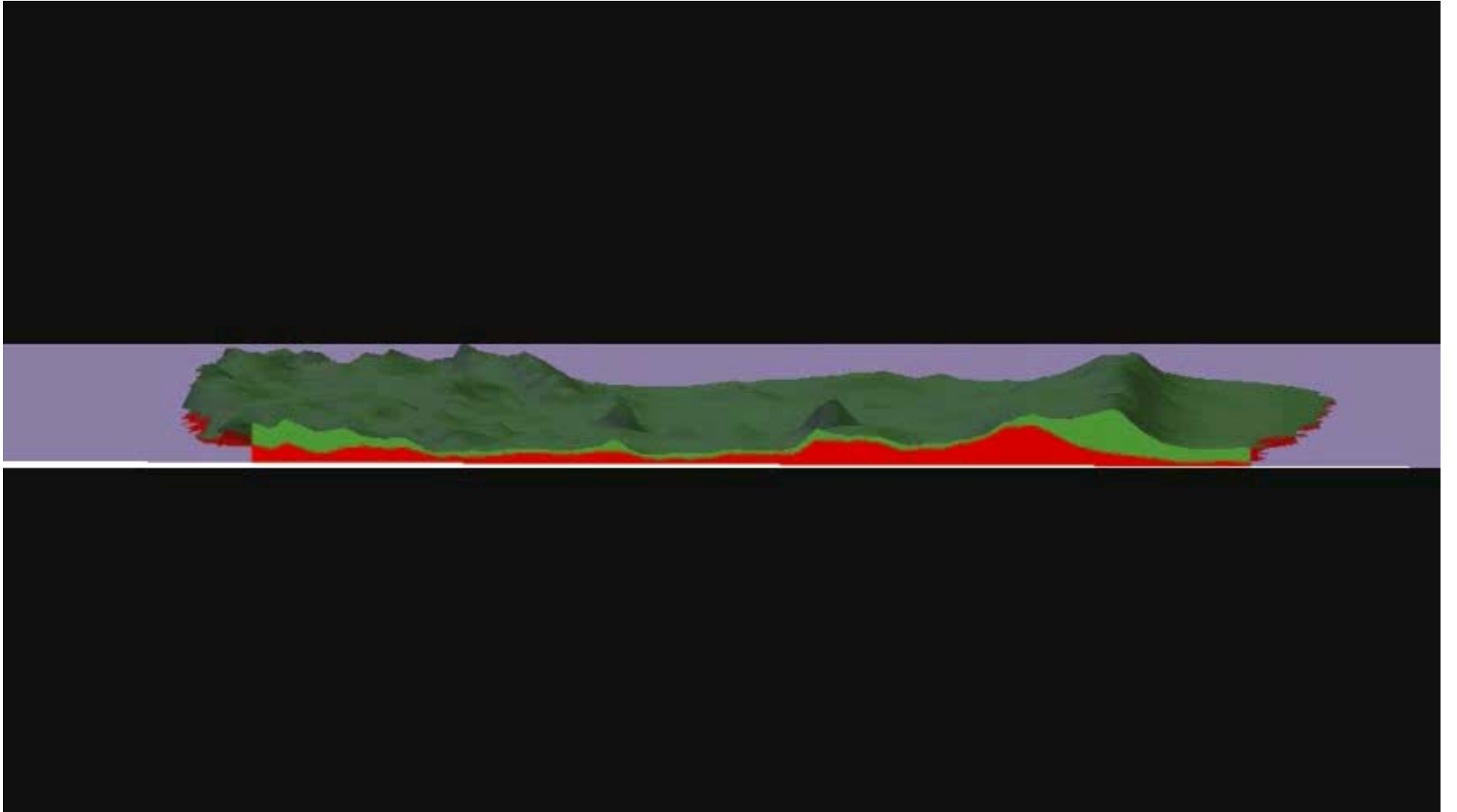
that is constantly changing



The **core** and **envelope** surfaces bound terrain evolution within the study period and define a **3D dynamic layer**

animation by Eric Hardin

Helena Mitsova, NCSU



Maximum and Minimum Surfaces – Core Volume

