



STEVENS
INSTITUTE OF TECHNOLOGY
1870

Climate Change, Sea Level Rise and New Jersey Impacts

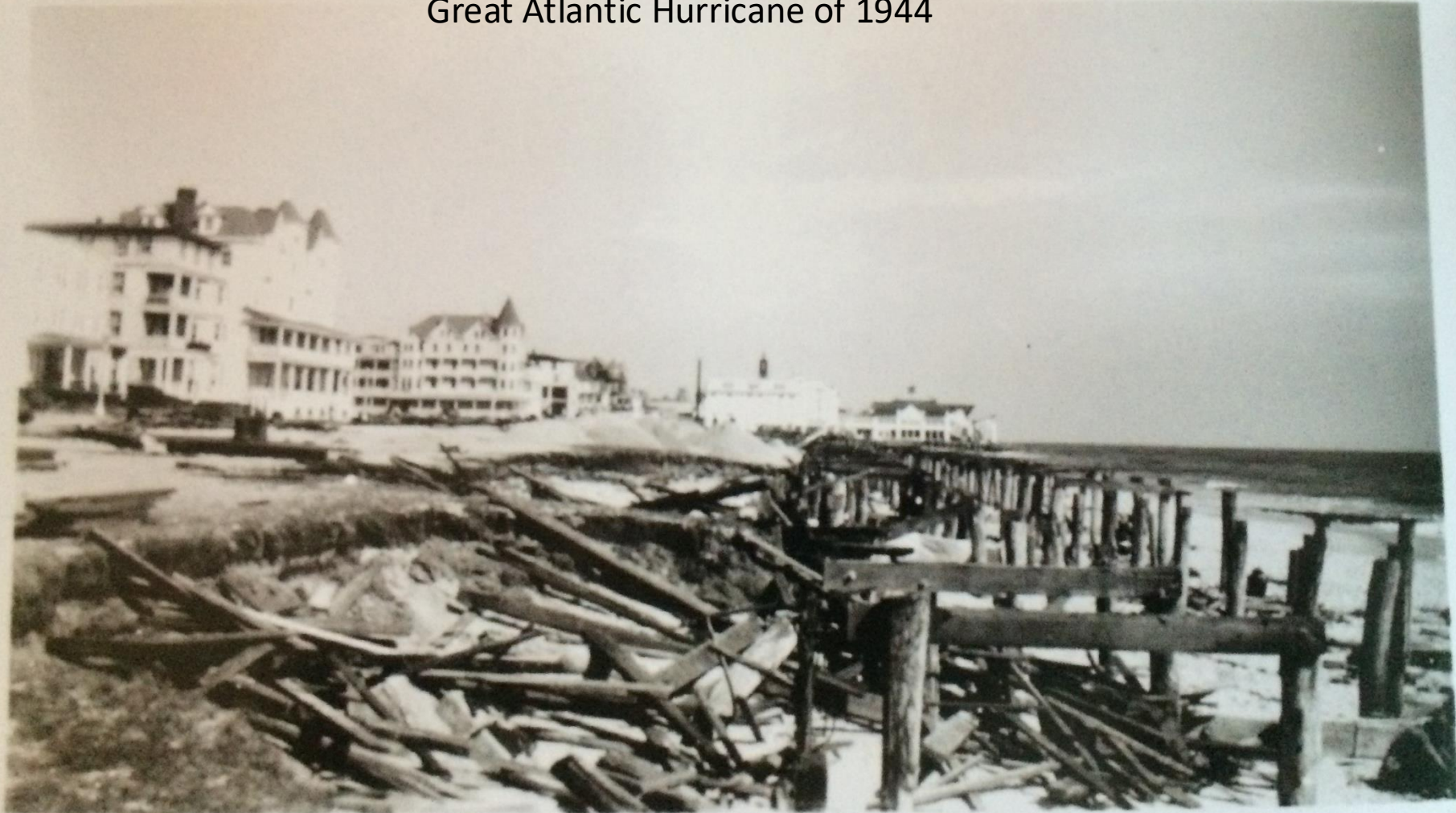
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Research Associate Professor

Overview of Today's Topics

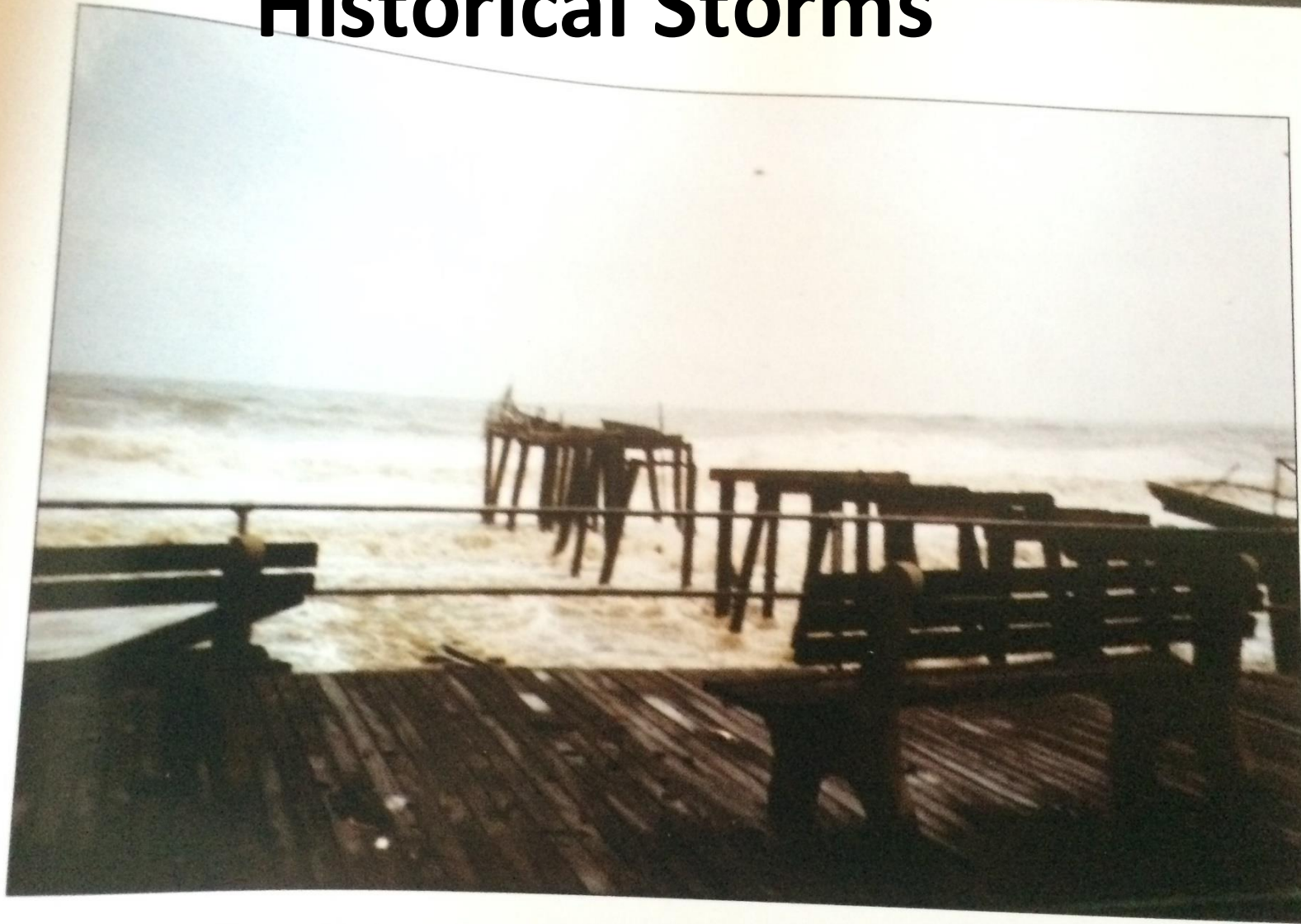
- Recap of some main points of prior presentations
 - Storms, beach erosion and extreme floods
 - Sea level rise – trends and sources
- Increasingly frequent coastal flooding
- Increasing rainfall, rain flooding
- Conclusions

Historical Storms

Great Atlantic Hurricane of 1944



Historical Storms

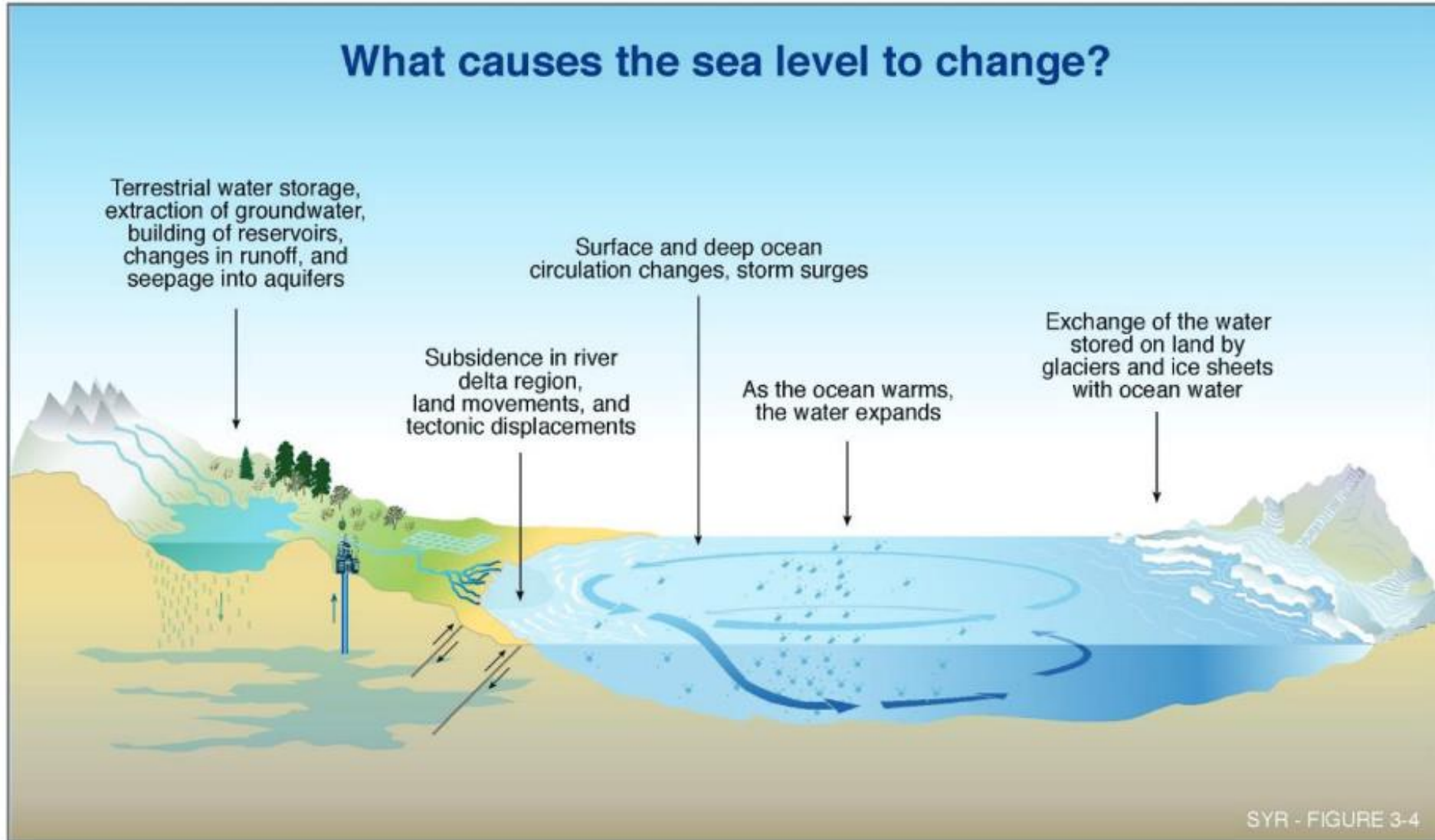


The Ocean Grove Fishing Pier was completely destroyed during the 1992 December Nor'easter.

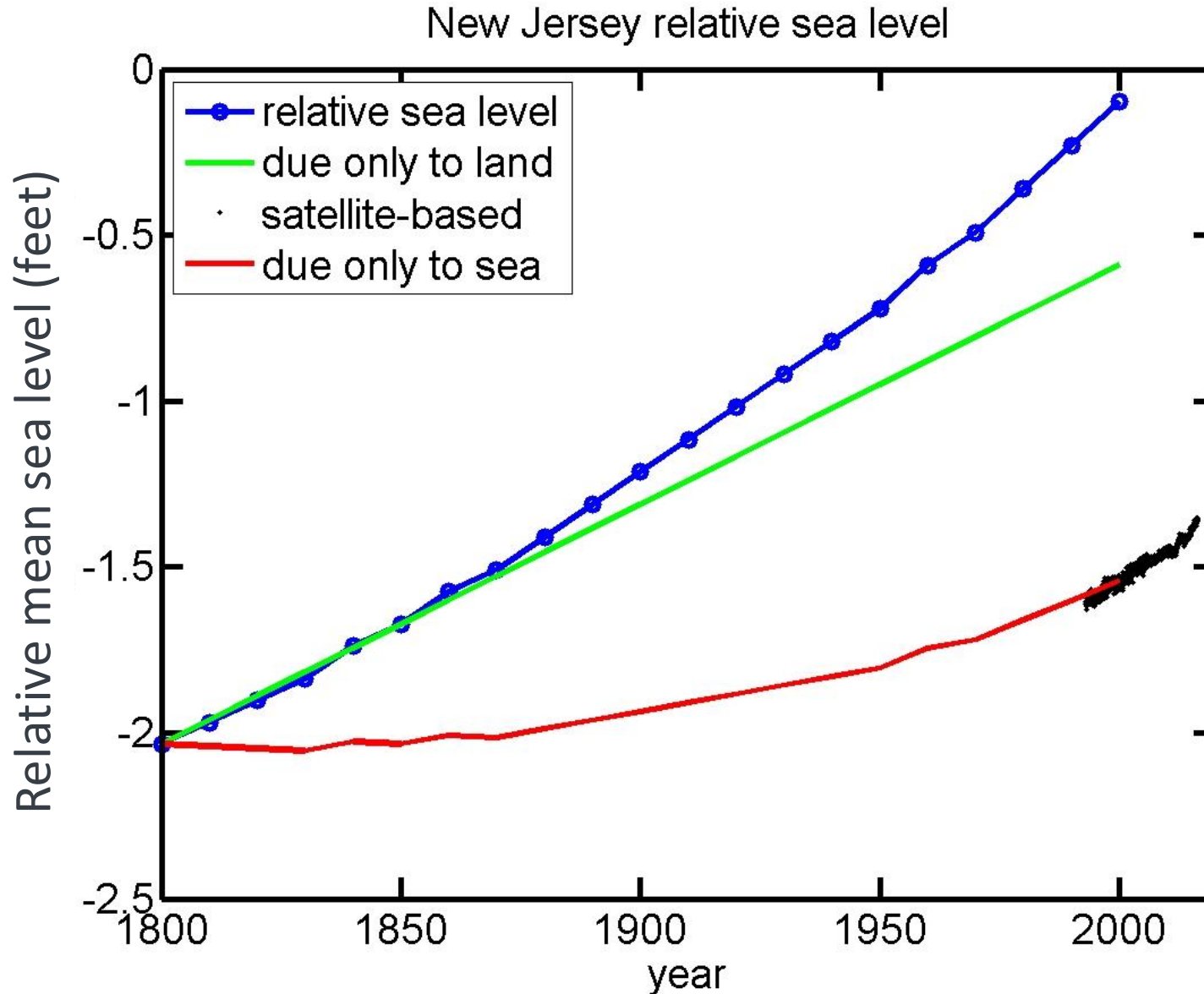
Take-Home Points on Storms and Erosion

- Hurricanes have become both more frequent and more intense in the North Atlantic in recent decades – reasons are still being studied
- However, there isn't any sign that New Jersey has reached a “new normal” or any abrupt change in storm surges
- We are better protected than we were in the 20th century
 - beach is an engineered structure (Corps of Engineers)
 - we have as much or more beach than at any time in over 100 years

What Causes Relative Sea Level Rise?

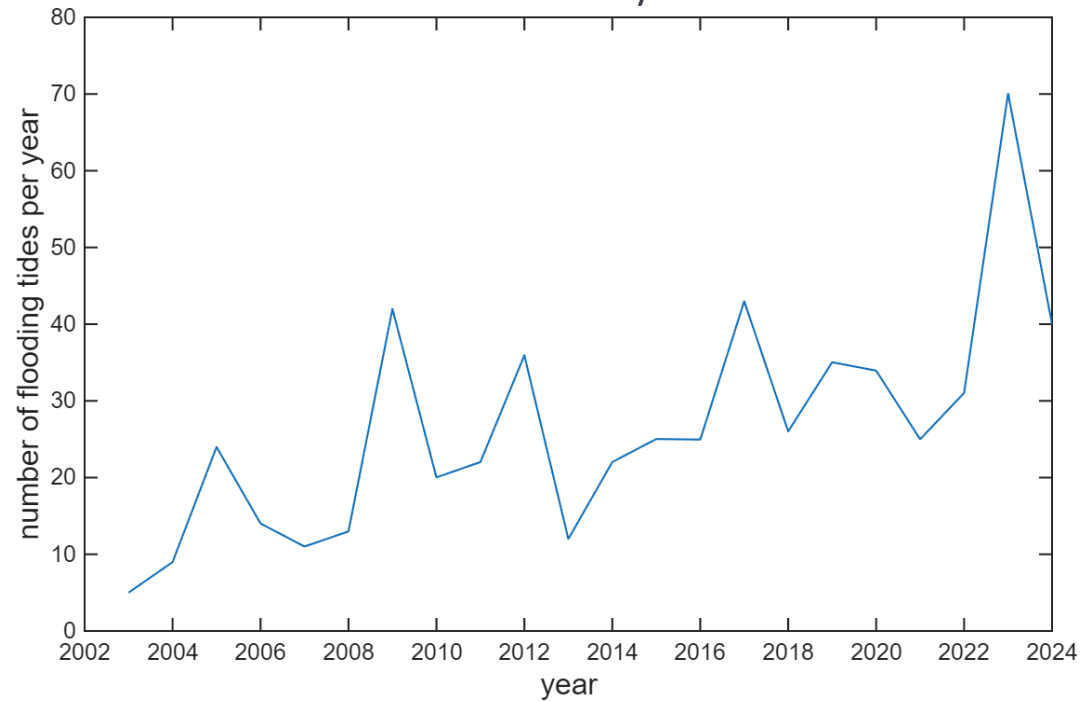


New Jersey – Past Relative Sea Level Rise

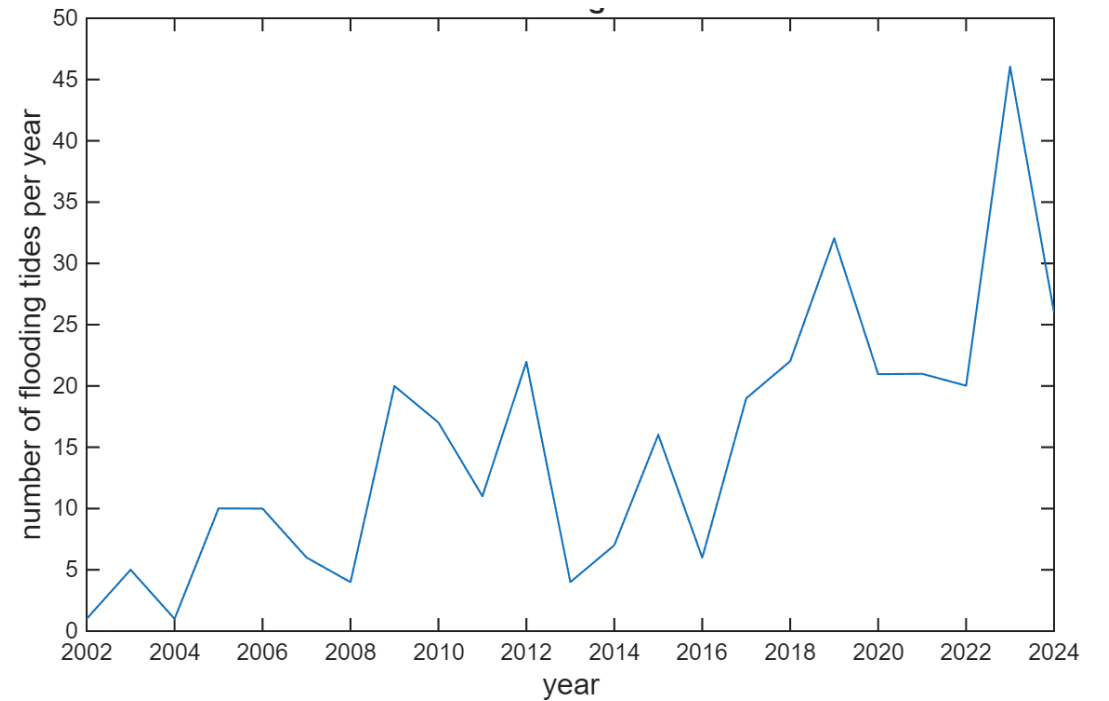


Minor Flood Frequency

Atlantic City



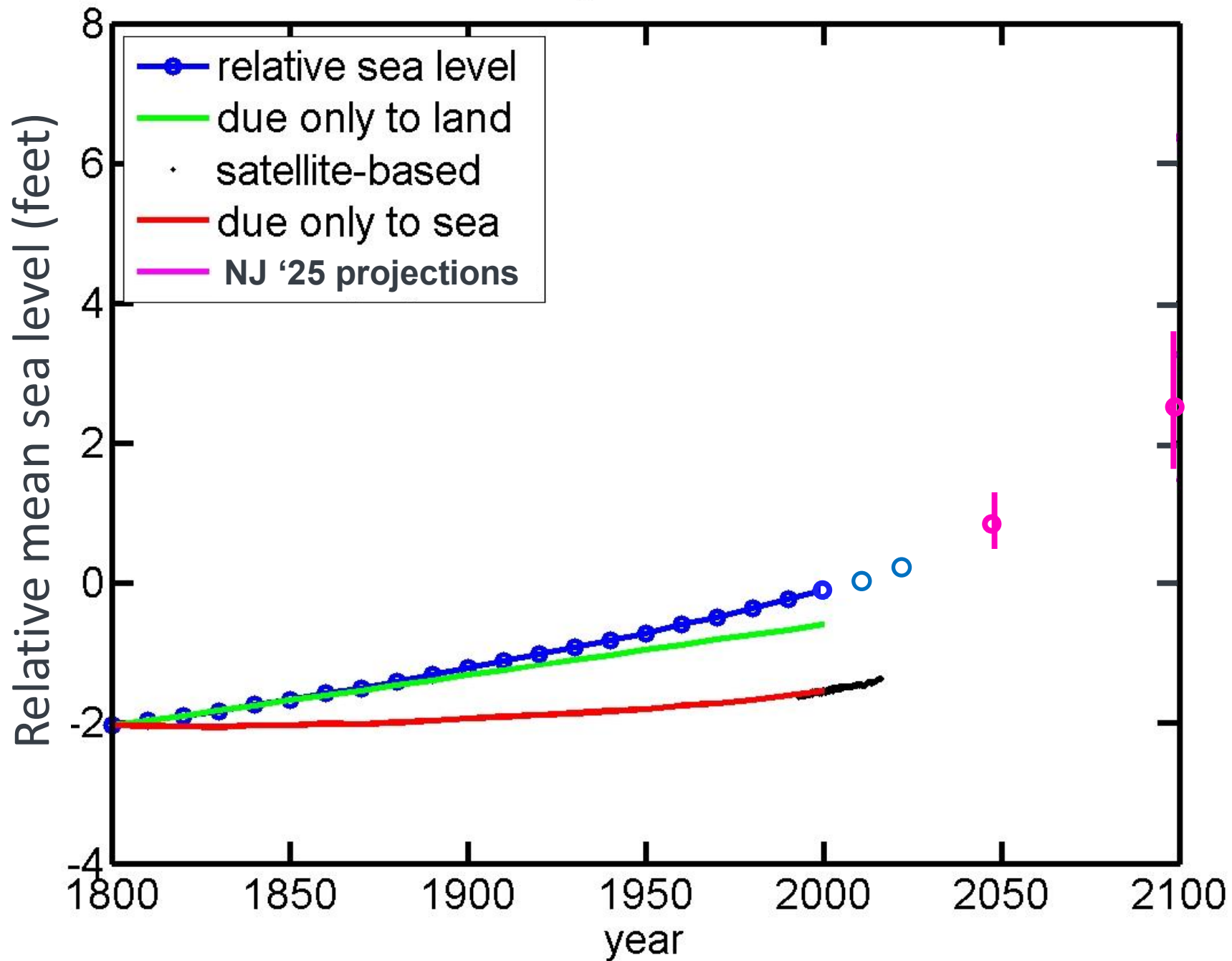
Northern Barnegat Bay (e.g. Bayhead, Normandy Beach)



Chronic flooding has become a big problem for Bayhead, Normandy Beach, Stafford Township and other bay communities.



New Jersey relative sea level



Our Future Waterfront?



Related Climate Projections/Topics

- The total volume of precipitation in heavy rain events has increased by roughly 60% across the Northeast from 1958 to 2021 (National Climate Assessment, 2022)
- There is “very high confidence” that “the rainfall rate within tropical cyclones [tropical storms, hurricanes] is increasing with global warming” (Kopp et al. 2025)
- The influence of sea level rise on groundwater levels is “an active area of research, and few studies have examined the vulnerability to groundwater flooding across New Jersey (Kopp et al. 2025)

For further reading on these topics:

Kopp, R. E. et al., New Jersey’s Rising Seas and Changing Coastal Storms: Report of the 2025 Science and Technical Advisory Panel. Rutgers, The State University of New Jersey. Prepared for the New Jersey Department of Environmental Protection. Trenton, New Jersey.



Future Sea Level Rise: Take-Home Points

- Sea level rise is accelerating and will cause severe problems with flooding and erosion
- The long-term picture is that:
 - Flooding will be more frequent
 - Beaches will be more and more difficult to maintain
 - Barrier islands and low-lying states are at a disadvantage; Ocean Grove is relatively better off due to our land elevation
- We can improve the long-term picture by stopping global warming

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Extra Slides

Solutions to Climate Change

- Need to rapidly decarbonize within decades
 - Replace gas, oil coal with wind, solar, nuclear
 - Electrify cars, heating
- NJ and NY have aggressive plans but we need a national (and global) movement
- Individually you can
 - Let your politicians know this is a priority
 - Learn your own carbon budget and commit to reducing it (e.g. fly less/stay longer; sign up for green energy; eat less meat; bike or train instead of driving)

