

How is New Jersey's Climate Changing and What Should We Expect?

**Sustainable Jersey
Climate Change and Flooding Forum**

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& New Jersey State Climatologist
Rutgers University**

January 2013



Office of the NJ State Climatologist

Our mission:
Monitor
Understand
Inform

ONJSC

at Rutgers University

Office of the New Jersey State Climatologist · Rutgers University · 54 Joyce Kilmer Avenue · Lucy Stone Hall B224 · Piscataway, NJ 08854

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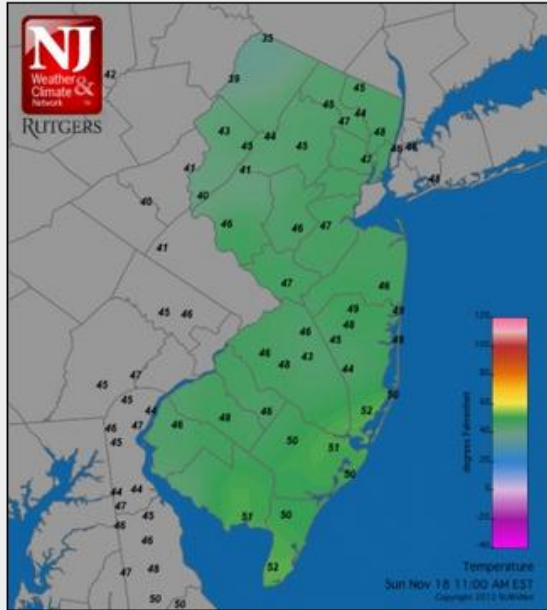
- Coastal Observations
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Latest from the NJWxNet




Latest temperatures across NJ appear in the above map. Click on the map or here, the [New Jersey Weather and Climate Network](#), for much more information.

Interested in becoming a volunteer weather observer? [Click here](#) to learn more about the CoCoRaHS Network!

Frequently Updated Climate Data

- [Monthly and Annual Statewide \(1895-Present\)](#)
- [Monthly Station](#)
- [Monthly Maps](#)
- [Winter 2012-2013 Snow Event Totals](#)

Latest News



Hurricane Sandy upon final approach to a southern NJ landfall on October 29. (MODIS satellite image courtesy of NASA)

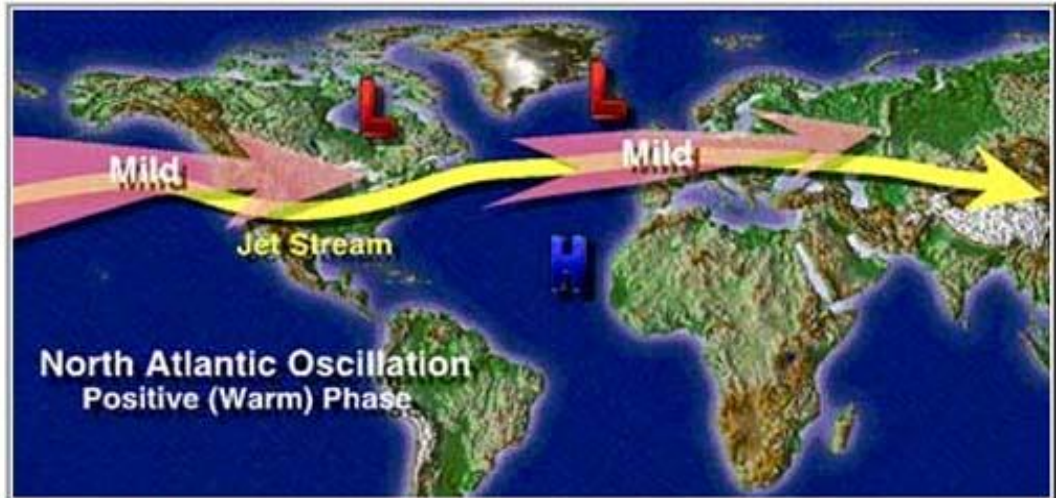
Sandy Strikes: October 2012 Report

NJclimate.org

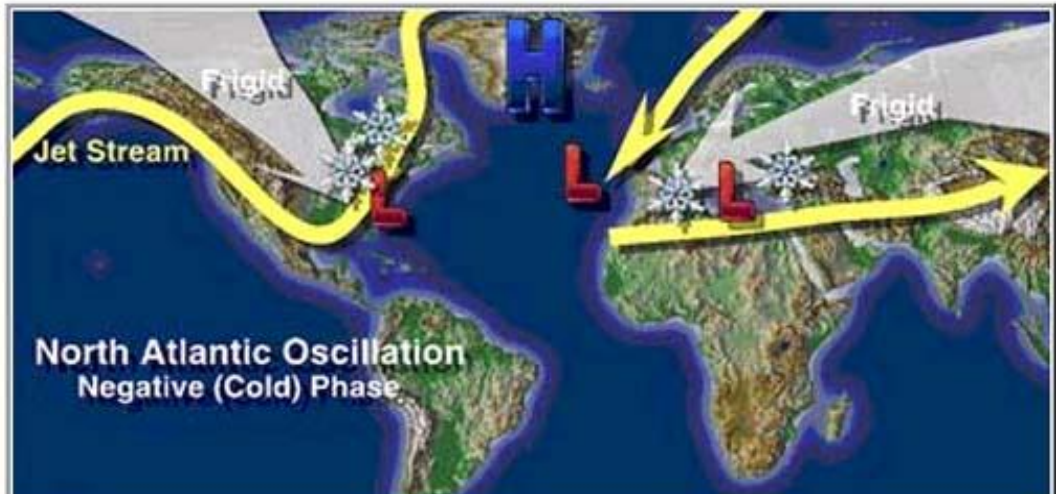


1. What drives our weather & climate?
2. NJ weather-climate: what a variety!
3. Is NJ's climate changing? If so, why?
4. What will the future bring?

Jet Stream: calm to chaos

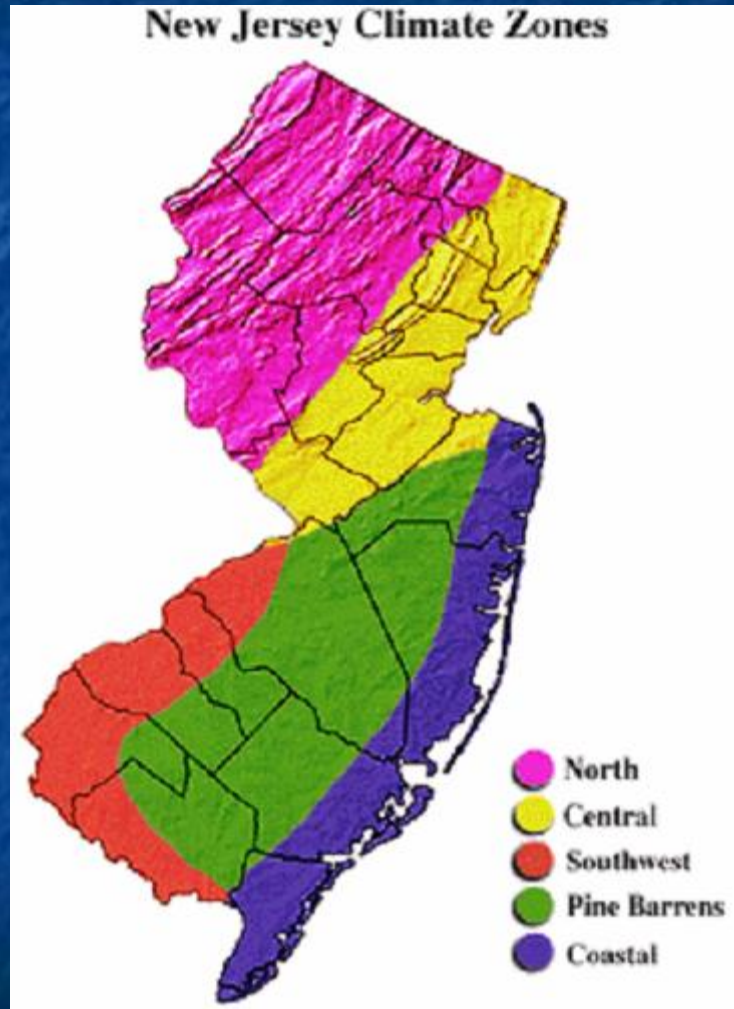


The positive (mild) mode of the NAO. This pattern produces the mildest weather in both the United States and Europe.



The negative (cold) mode of the NAO. This pattern produces the harshest weather in both the United States and Europe.

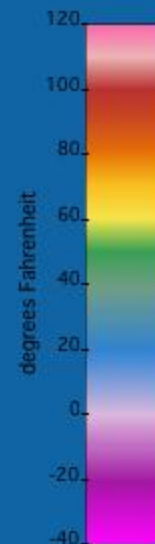
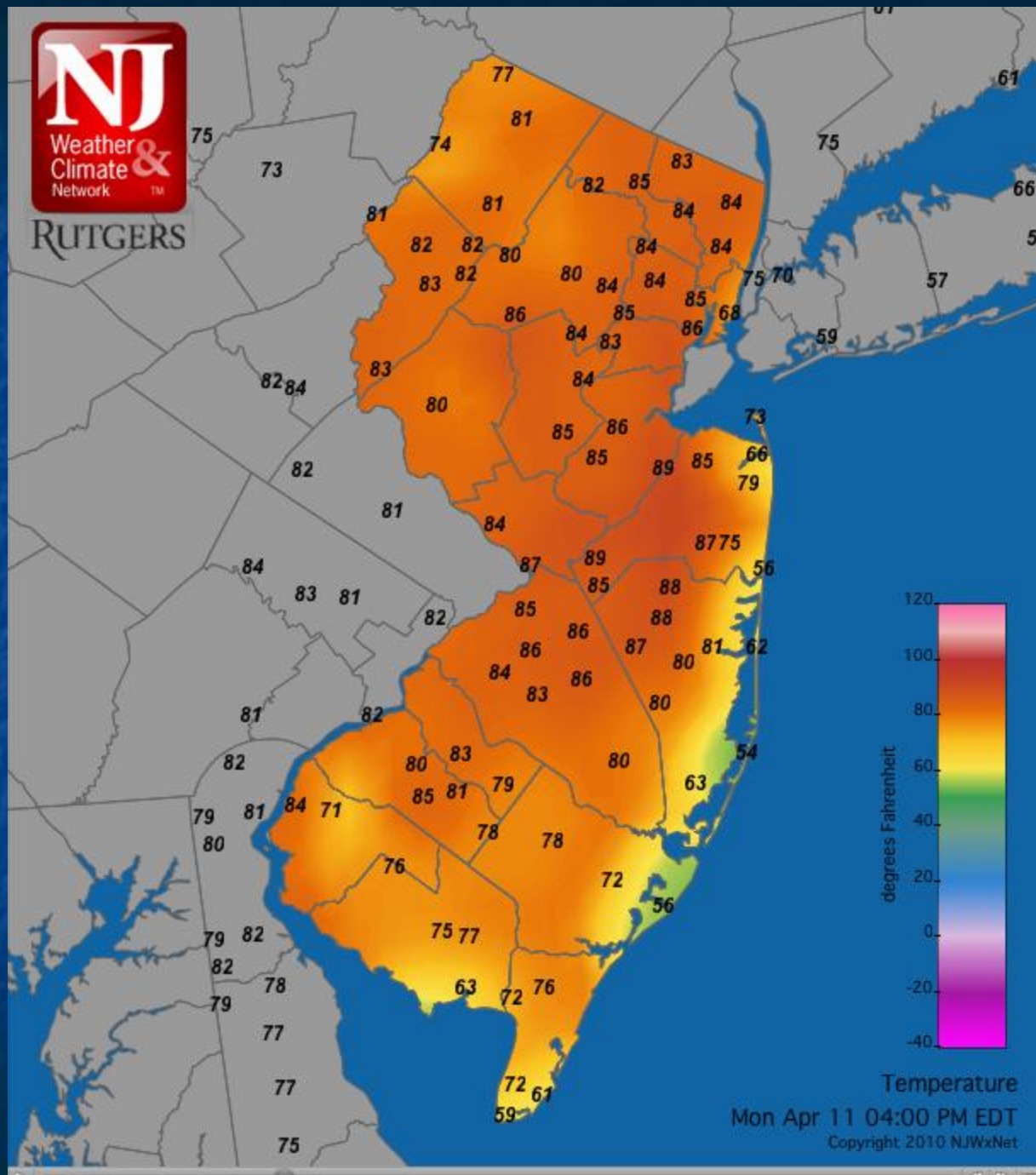
Diversity at home



Altitude
Latitude
Surface Conditions
Land-Water Contrasts



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2011

Temperature
Mon Apr 11 04:00 PM EDT
Copyright 2010 NJWxNet



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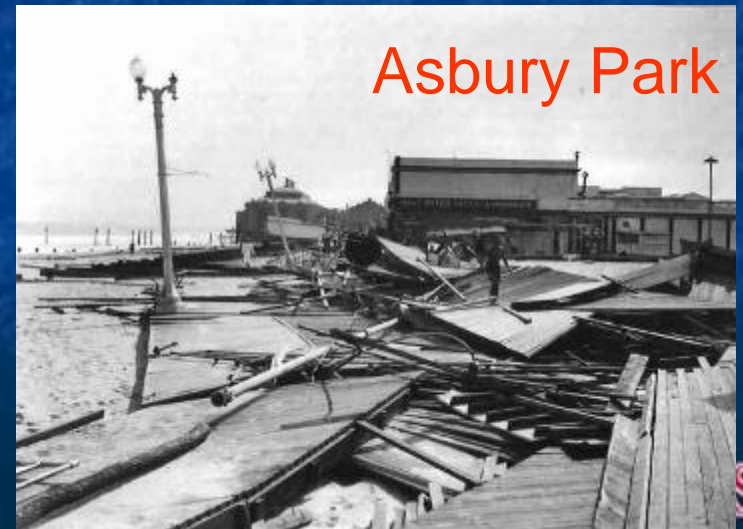
1944 Hurricane



Atlantic City



Harvey Cedars



Asbury Park

Nor'easter: March 1962



Harvey Cedars



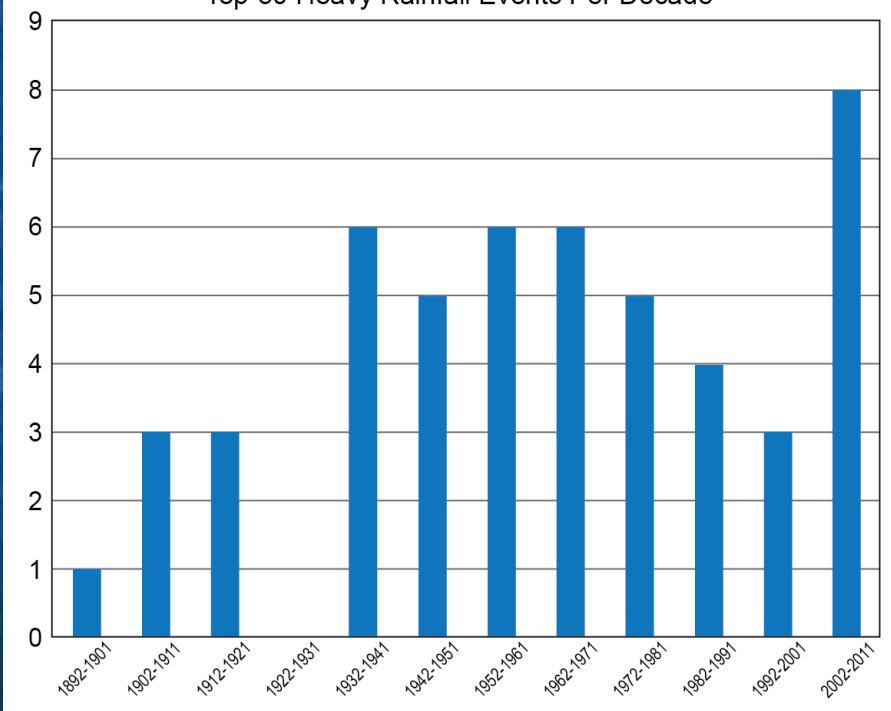
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A String of Extreme Conditions

Sandy is the latest in a line of recent NJ weather & climate extremes:

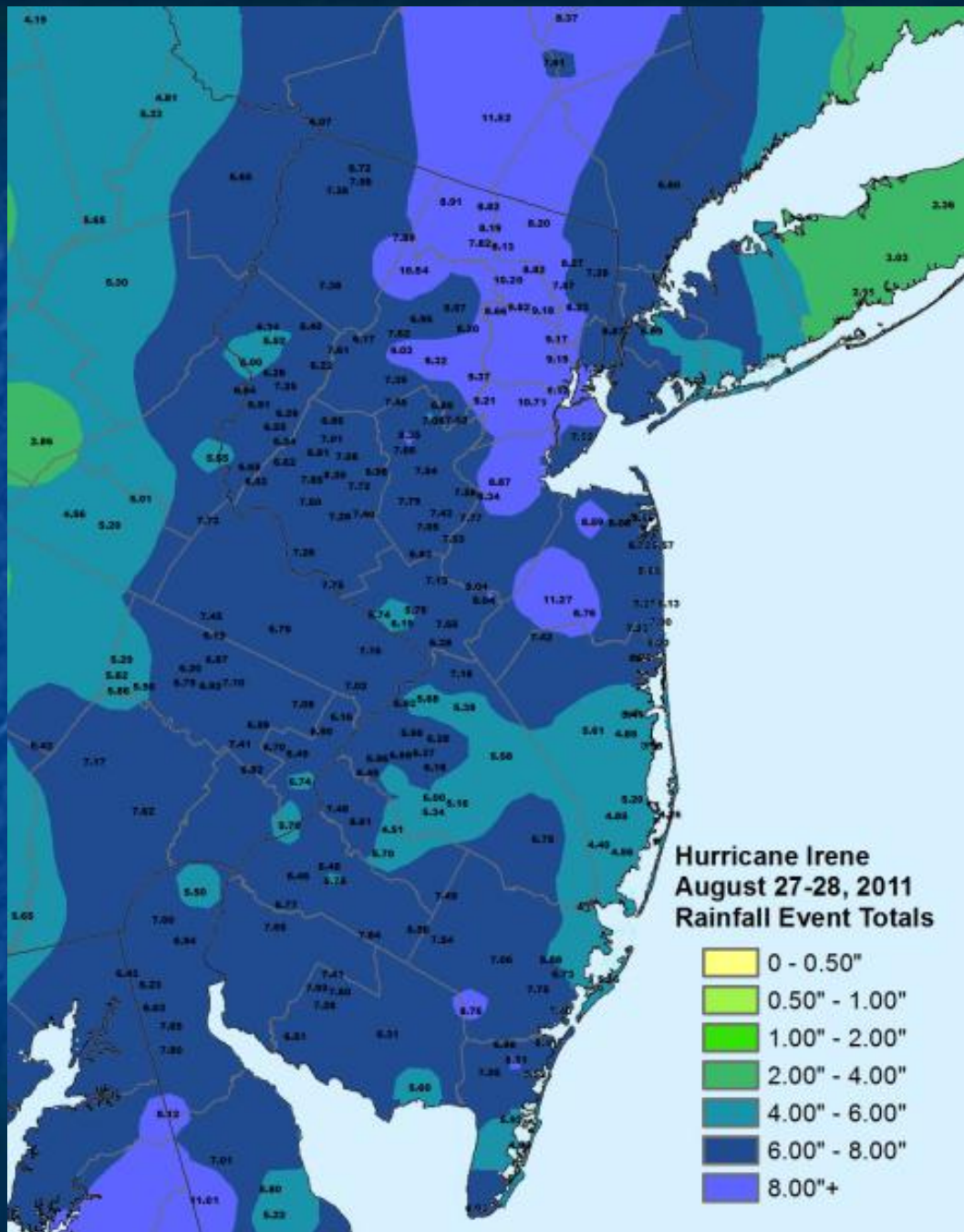
- Major floods in 1999, 2004, 2005, 2006, 2007, 2010, 2011
- Snowiest February (2010), January (2011), October (2011)
- 8 of 10 warmest summers (1895-present) since 1999
- 37 of 51 months with below average precipitation: Jul 1998–Sep 2002

Top-50 Heavy Rainfall Events Per Decade



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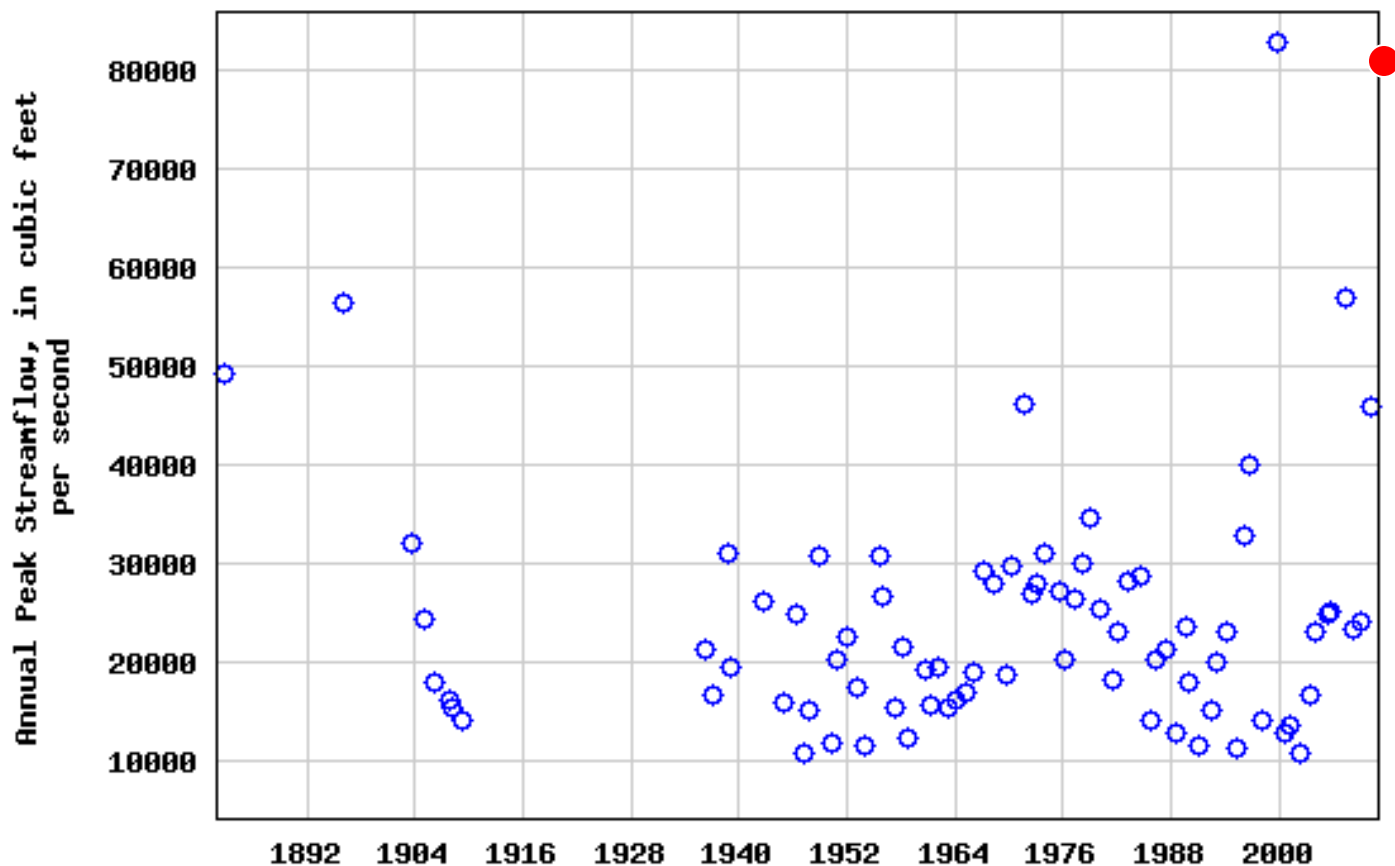
Irene rainfall: station observations



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USGS 01403060 Raritan River below Calco Dam at Bound Brook NJ





Kinnelon, NJ



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Manville, NJ

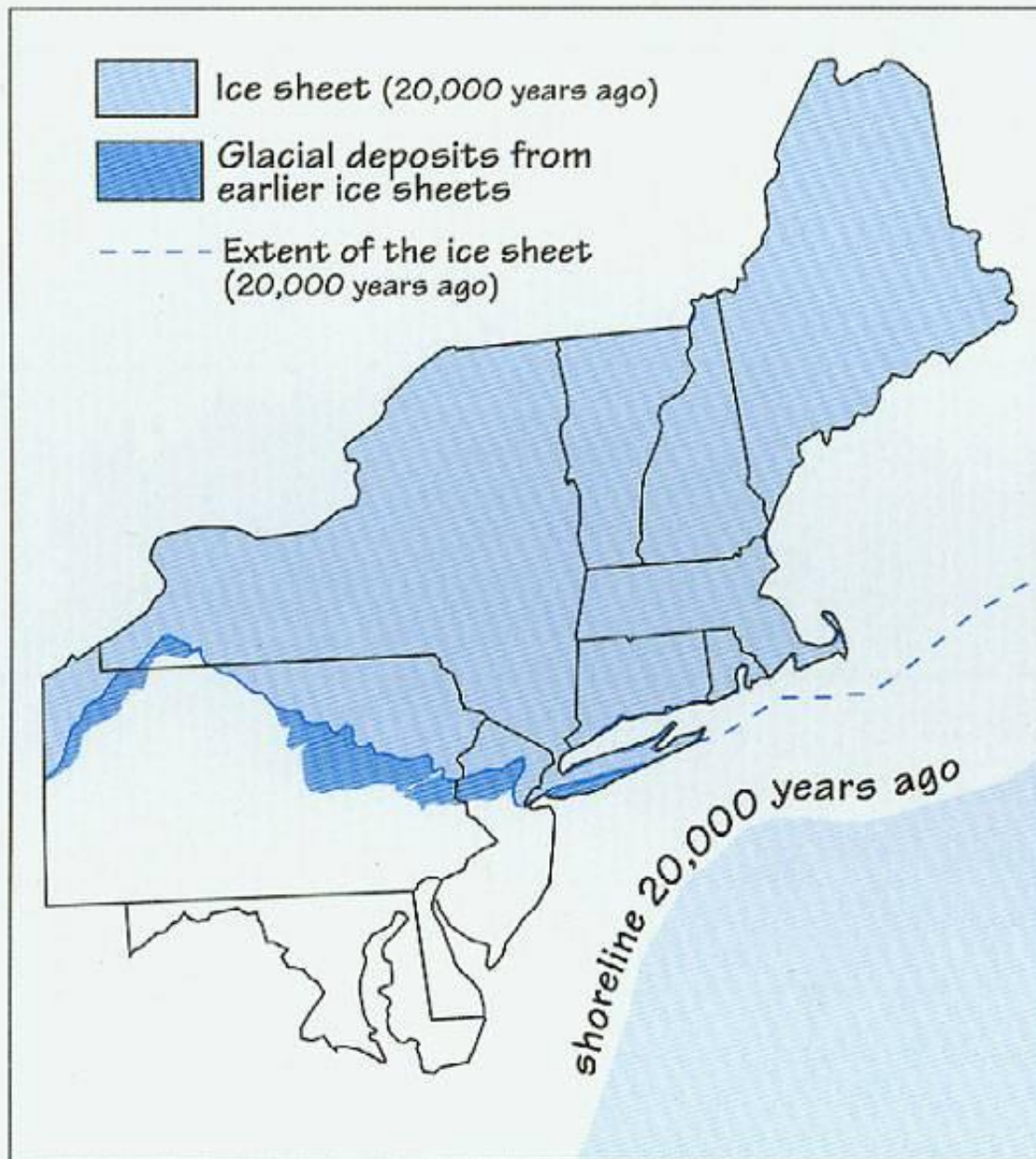


October 29, 2011 snow storm



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Climate past

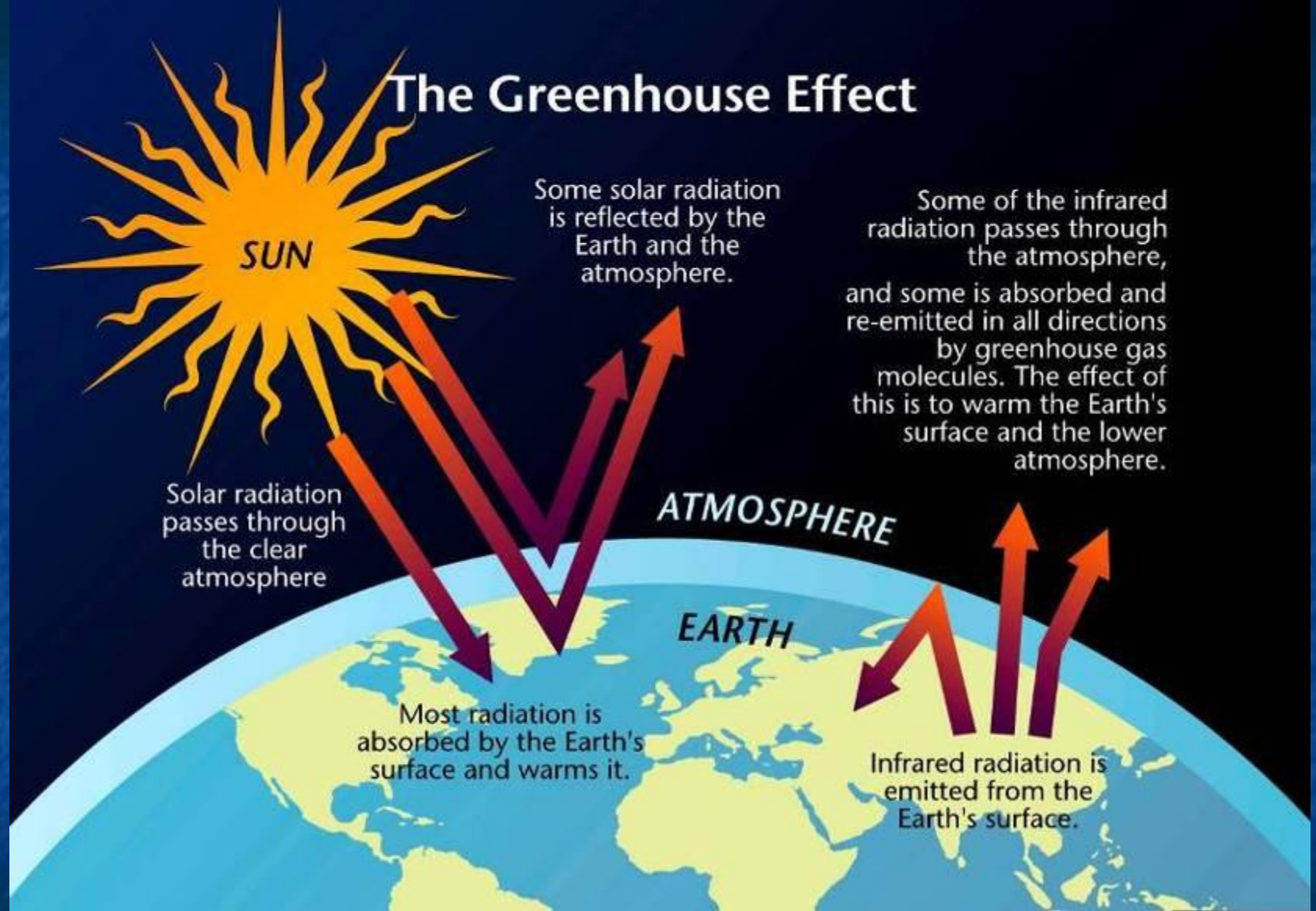


Is climate presently changing in NJ & elsewhere?

Preponderance of evidence* suggests
climate change is occurring and humans
are responsible for a significant portion of
recent changes

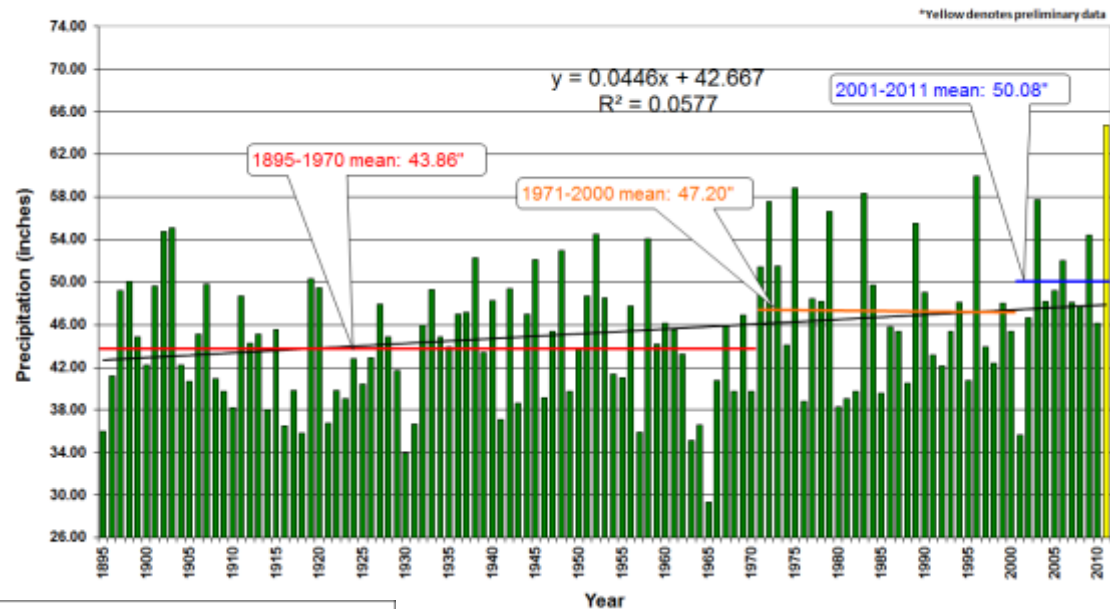
- *1. theory
- 2. observations
- 3. models

The Greenhouse Effect

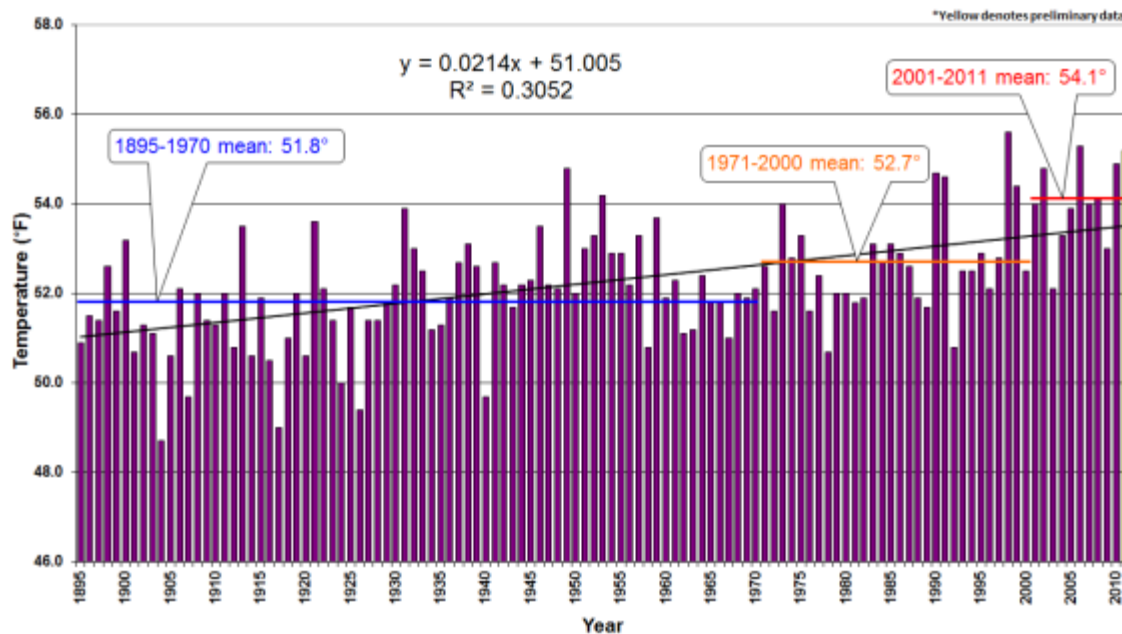


NJ historic perspective

NJ Statewide Annual Precipitation (1895-2011)

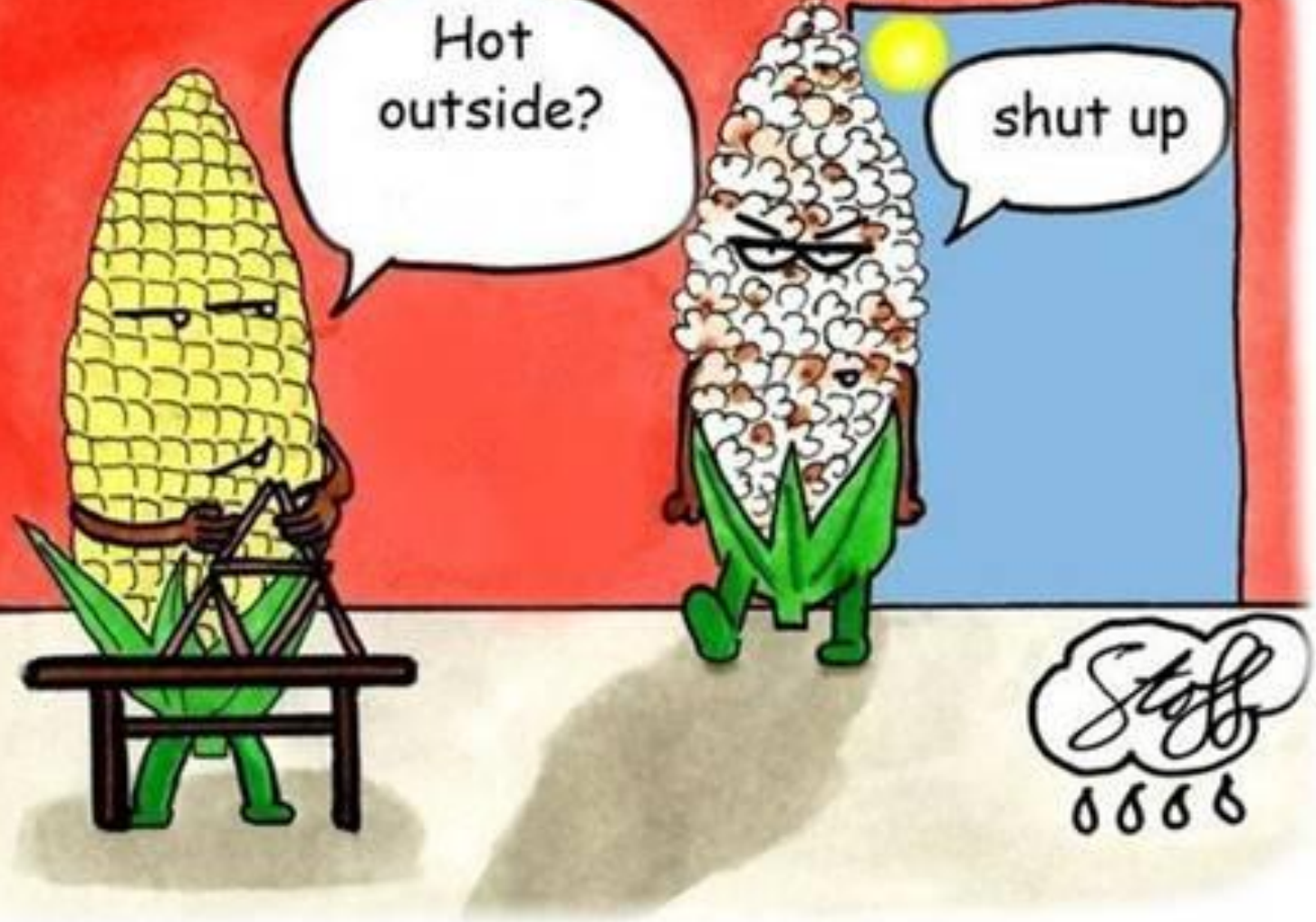


NJ Statewide Mean Annual Temperature (1895-2011)

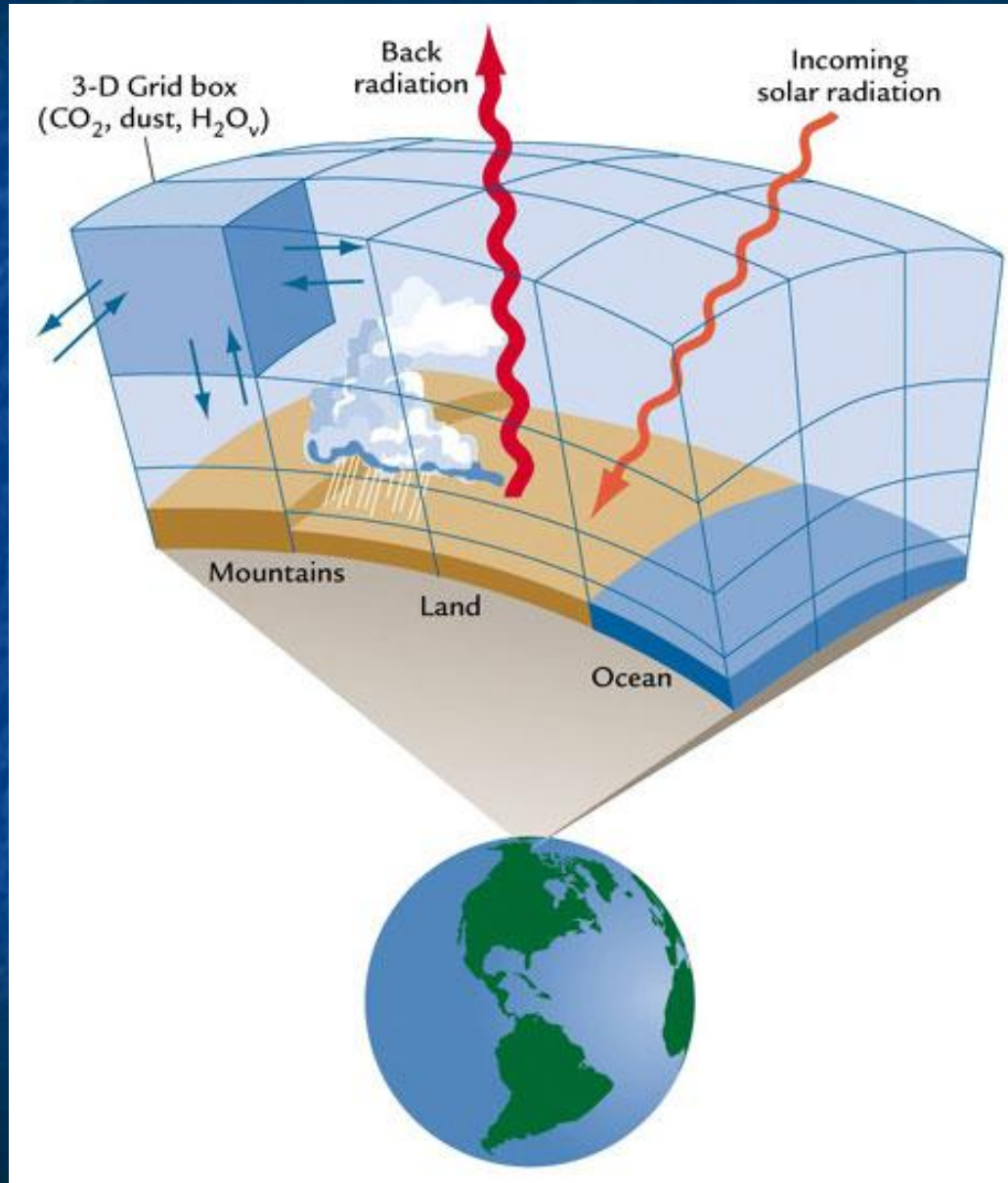


wetter

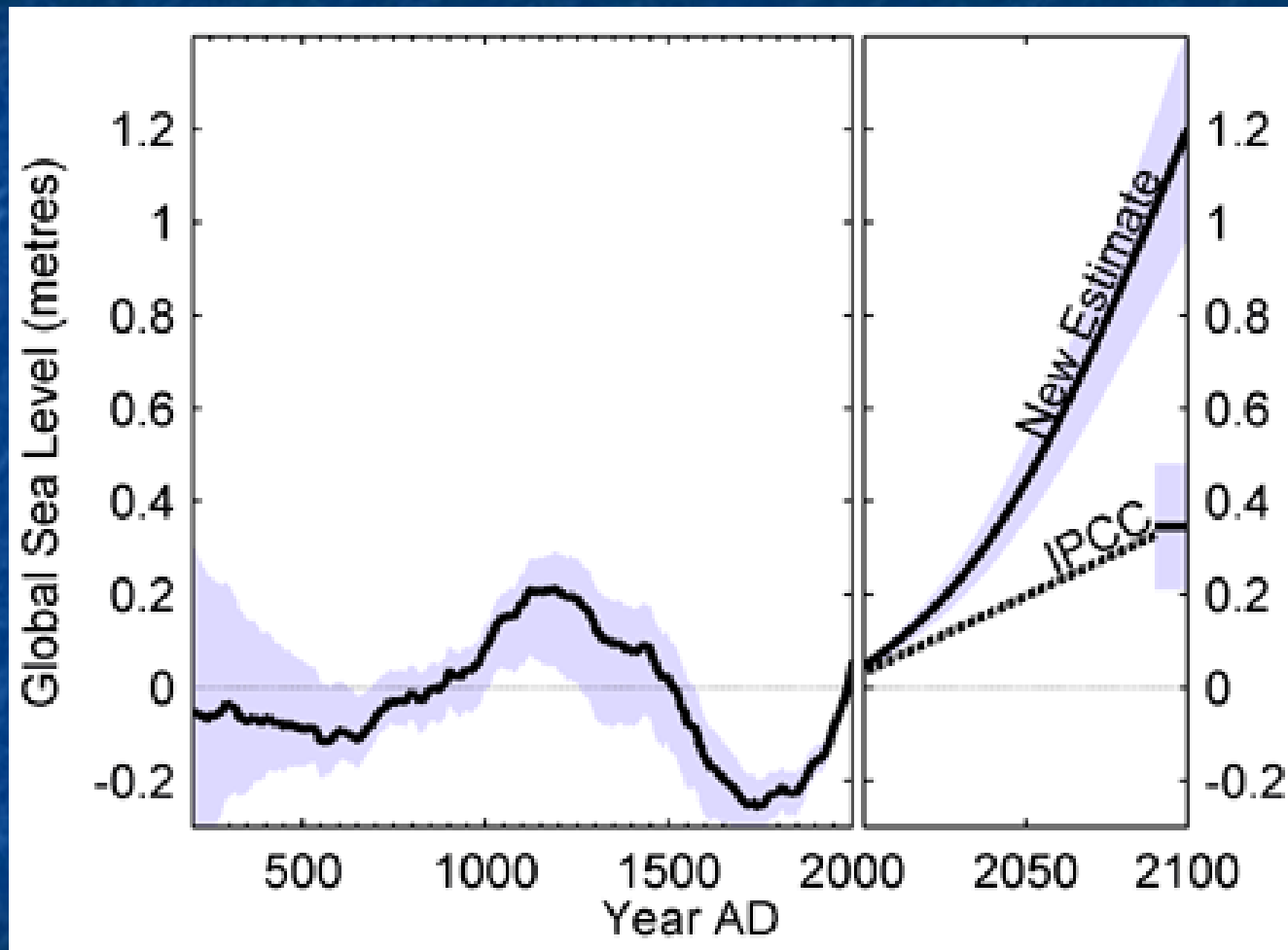
warmer



Modeling



A view of global mean sea level changes



Reconstructing sea level from paleo and projected temperatures 200 to 2100 AD
Grinsted, Moore and Jevrejeva, Climate Dynamics, 2009



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New Jersey's future climate

- Rising temperatures
- Steady or increasing precipitation
- Increasing variability and extremes
 - storms, flood, drought, heat.....
- Rising sea level

Uncertainties

1. Magnitude of baseline change
2. Seasonality of change
3. Nature and magnitudes of extremes
4. Speed and magnitude of sea level rise

Did climate change play a role in Sandy?



A unique recipe

Ingredient 1: Hurricane Sandy



Ingredient 2: Blocking High



Ingredient 3: Inverted trough/strong jet stream



Additional ingredients.....adding insult to injury

Landfall close to high tide

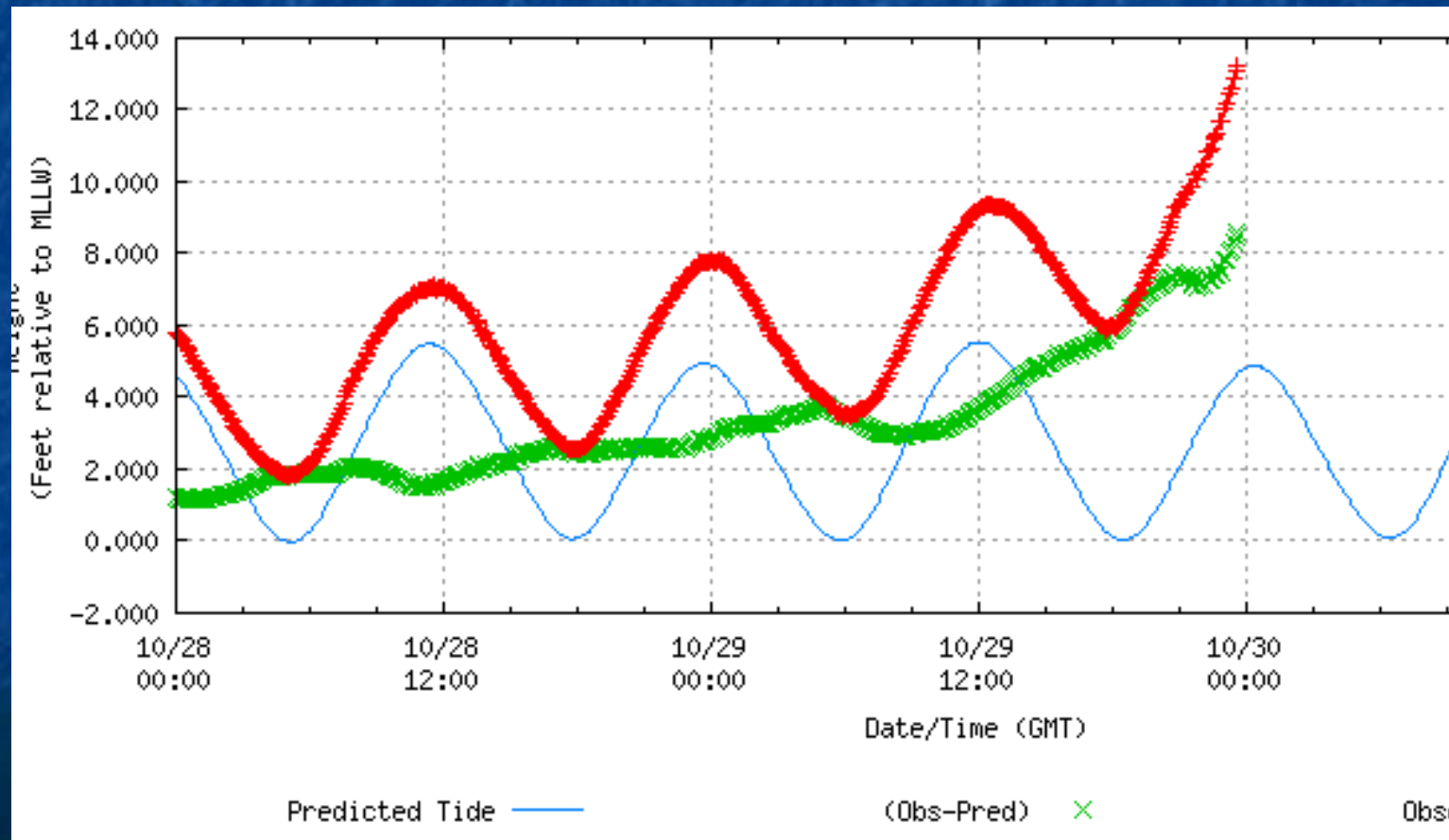
Astronomical high tide

Higher sea level than 50-100 years ago



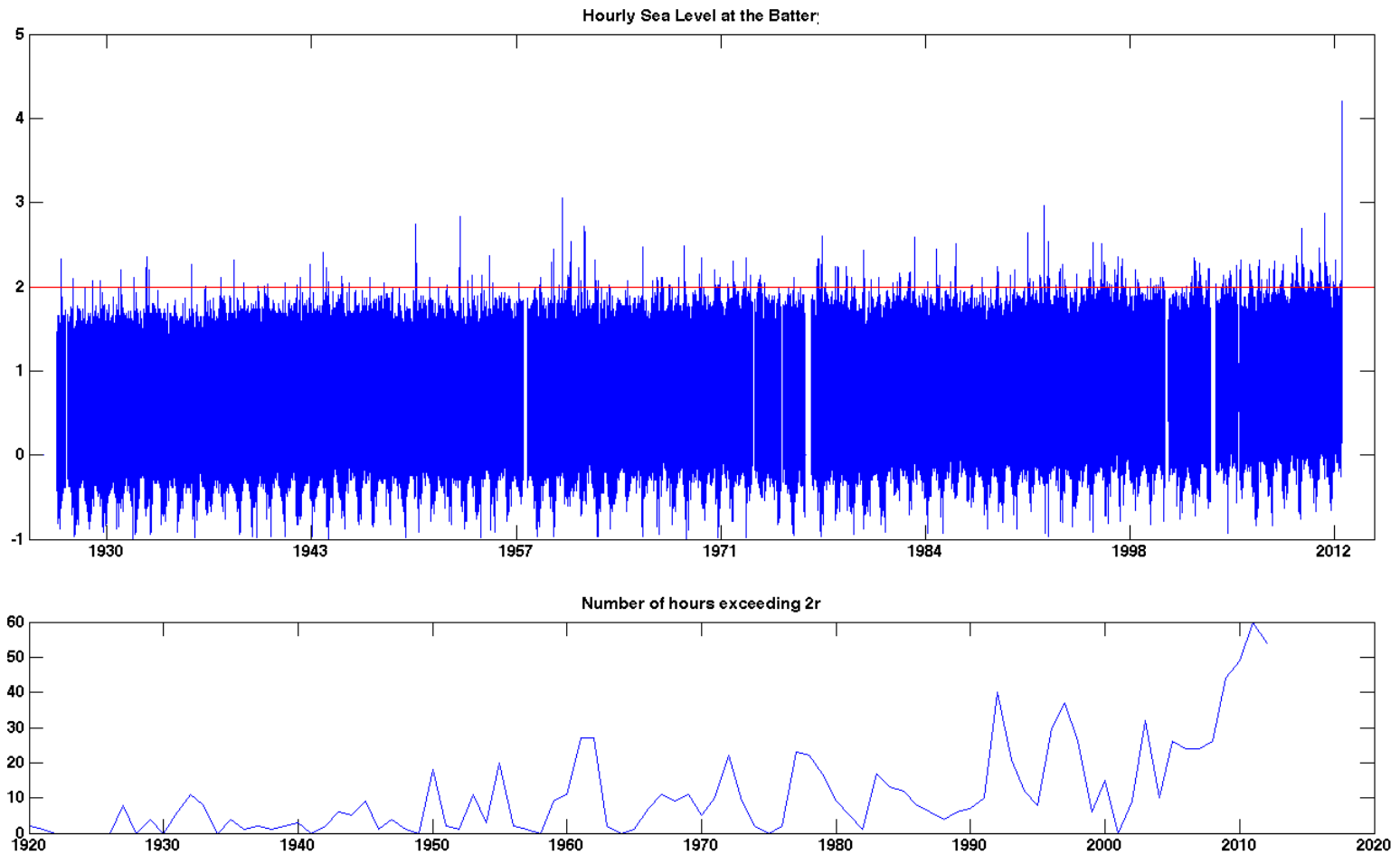
Sandy Hook tide gauge record

NOAA/NOS/CO-OPS
Verified Water Level vs Predicted Plot
Sandy Hook, NJ from October 28-30, 2012



The Battery (lower Manhattan) tide gauge record

Long-term perspective compiled by R. Chant, Rutgers U.



Summing up

How is NJ's weather and climate changing?

- increased warmth
- increased precipitation
- more extremes?

What should we expect?

- further warming
- steady or increased precipitation
- increasing variability and extremes
- increasing sea level

Thank you



www.njclimate.org