

RUTGERS

THE STATE UNIVERSITY
OF NEW JERSEY

New Jersey's Changing Climate

ANJEC's 51st Environmental Congress

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Distinguished Professor of Geography &
New Jersey State Climatologist
Rutgers University

September 27, 2024



Rutgers NJ Weather Network station at Fortescue

Overview

1. Greetings from the ONJSC
2. New Jersey's weather and climate
3. Climate change, past, present.....future
4. Keeping an eye on NJ's weather/climate
5. Impacts and potential actions

Office of the NJ State Climatologist

Helping decision
makers

Locals trusting locals

njclimate.org

ONJSC
at Rutgers University

RUTGERS
New Jersey Agricultural
Experiment Station

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

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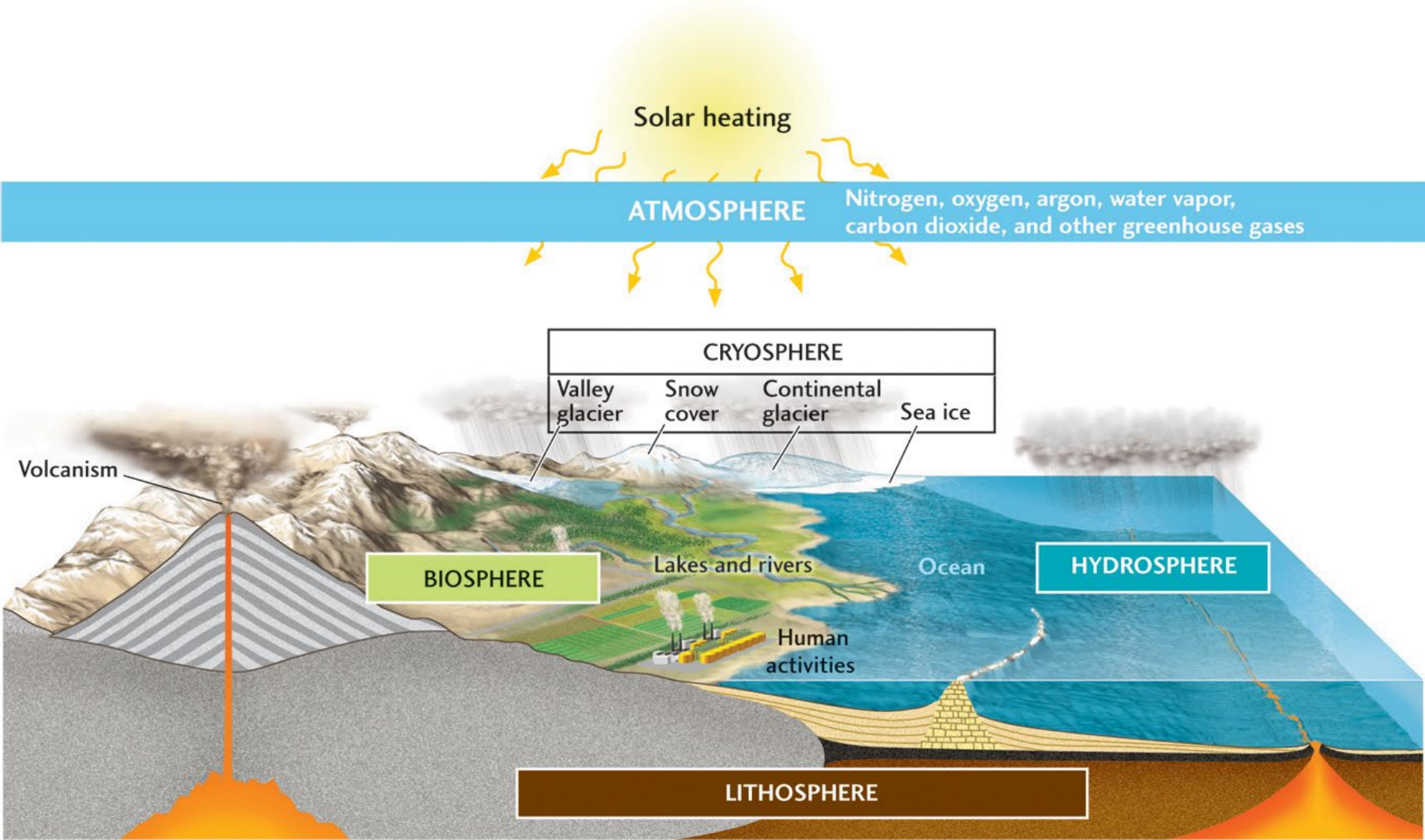
[In Sandy's Wake: Revelation and Resilience After the Superstorm](#)

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

Overview

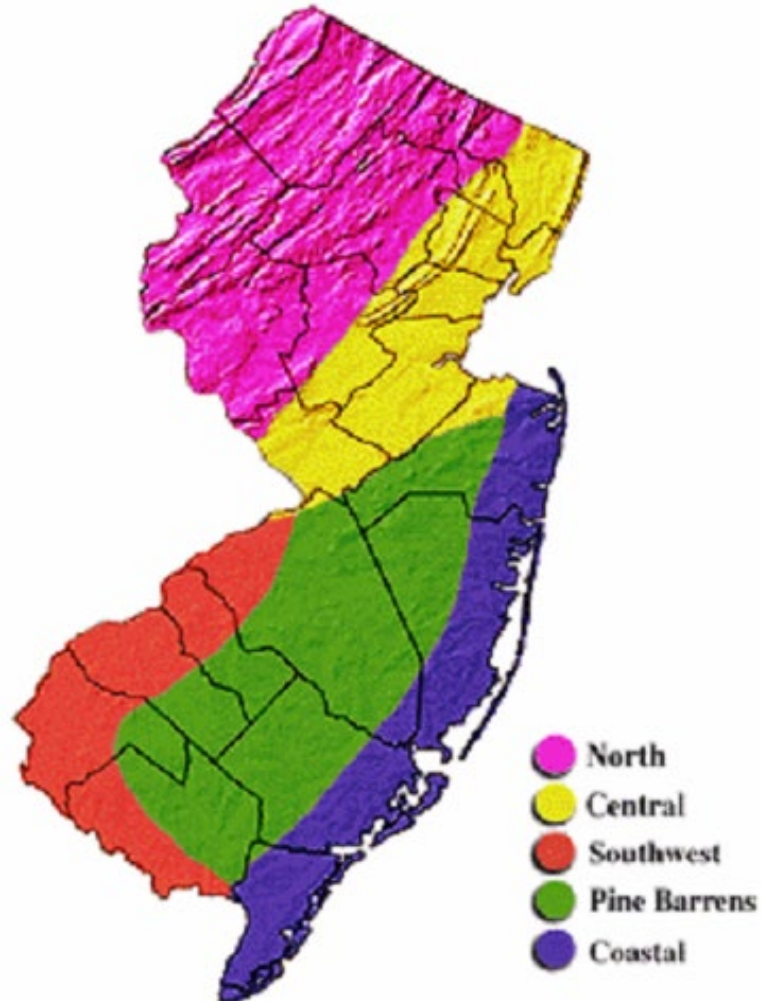
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Earth's Complex Climate System



Local controls on NJ's weather and climate

New Jersey Climate Zones



Altitude
Latitude
Surface Conditions
Land-Water Contrasts

Appreciating NJ's Weather & Climate Variability



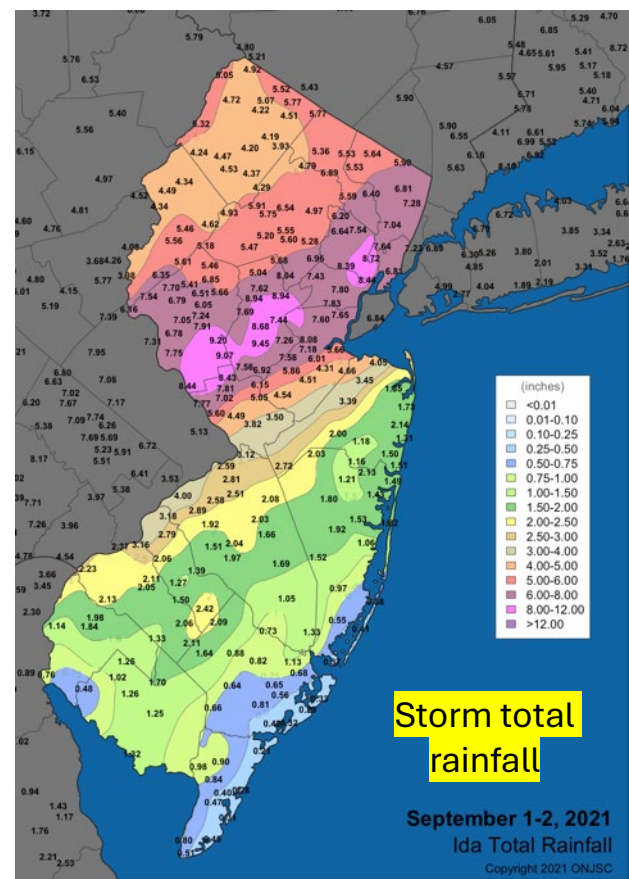
Mullica Hills, NJ



Post-tropical storm Ida: September 2021



Manville, NJ



Elizabeth, NJ



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Climate change....it's happening now, & it's affecting New Jersey



.....and humans are responsible for a significant portion of recent changes

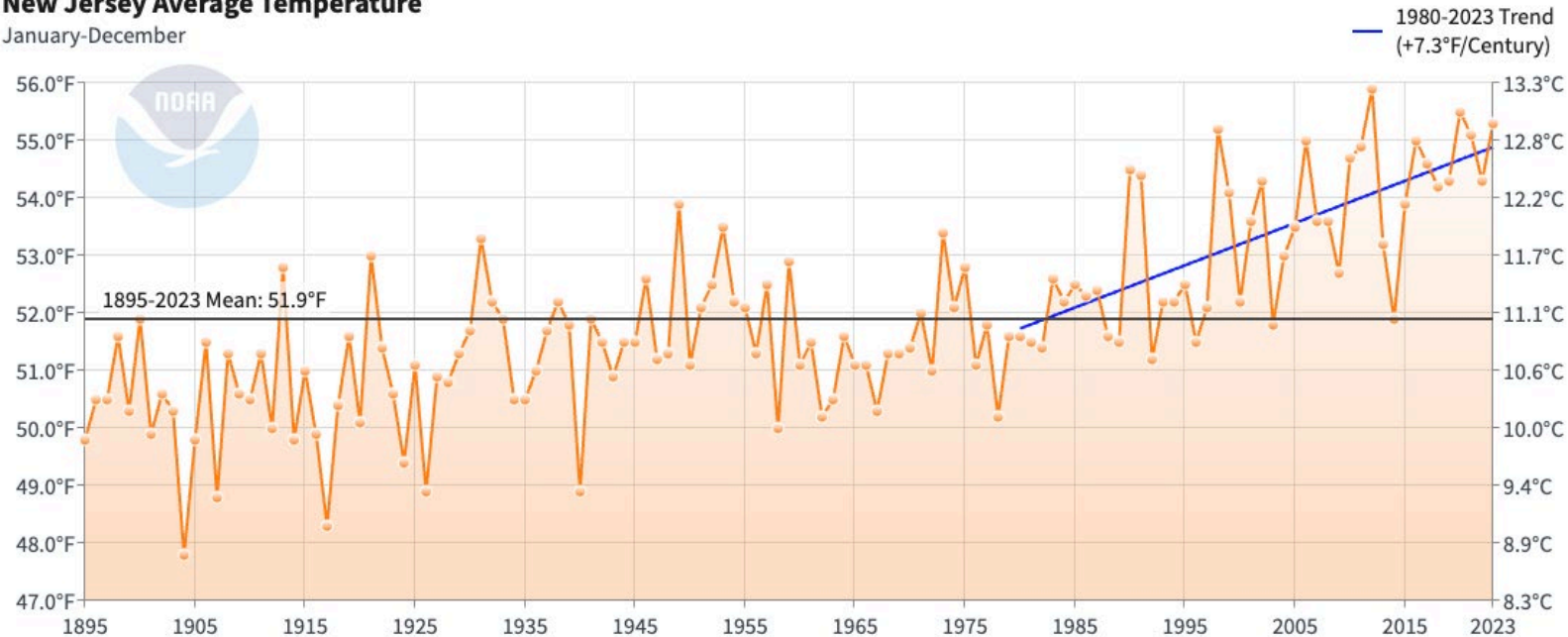
.....why so confident?

1. Observations
2. Greenhouse theory
3. Models

Observations

New Jersey annual temperature: 1895-2023

New Jersey Average Temperature
January-December



1895-2023 upward trend of 2.9° F per 100 years

1980-2023 trend is 7.3° /100 years

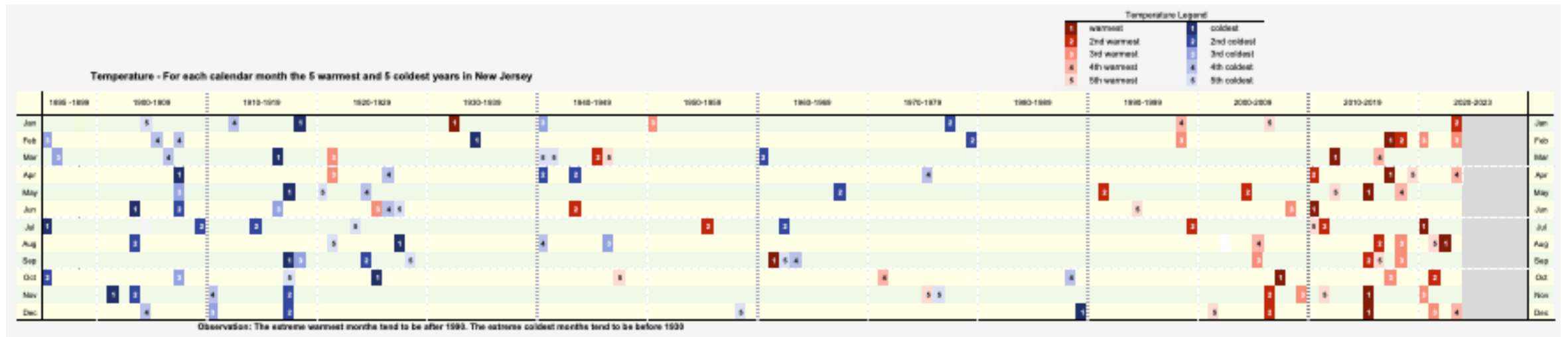
15 of the 20 warmest years have occurred since 2001; 19 of 20 since 1990

2012 was the warmest year on record, 2020 2nd warmest, 2023 3rd warmest

Warming in all seasons

data source: National Centers for Environmental Information

NJ extreme temperature months 1895-2023



1990-2023:

49 months in the warm top 5 (10 at #1)

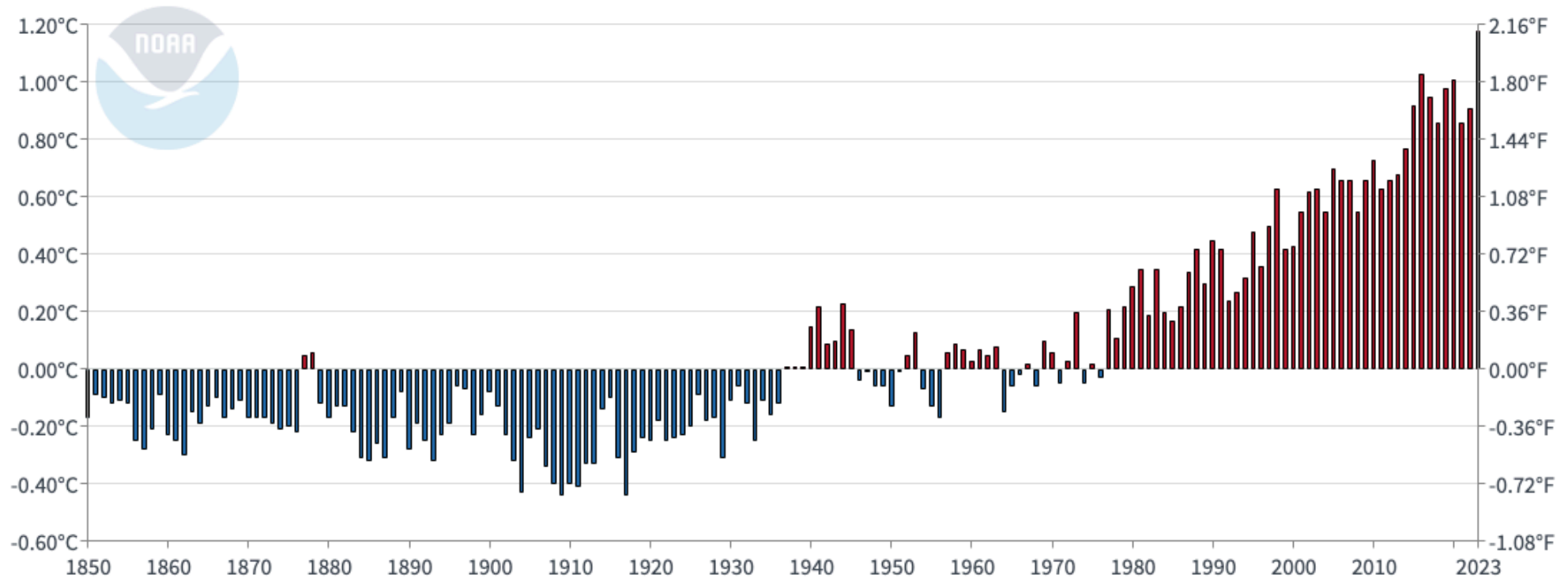
0 months in the cold top 5

Global Warming and the Greenhouse Effect

- Human-enhanced greenhouse effect
- Carbon dioxide main culprit
- Also, methane, nitrous oxide, soot

Global Land and Ocean

January-December Temperature Anomalies

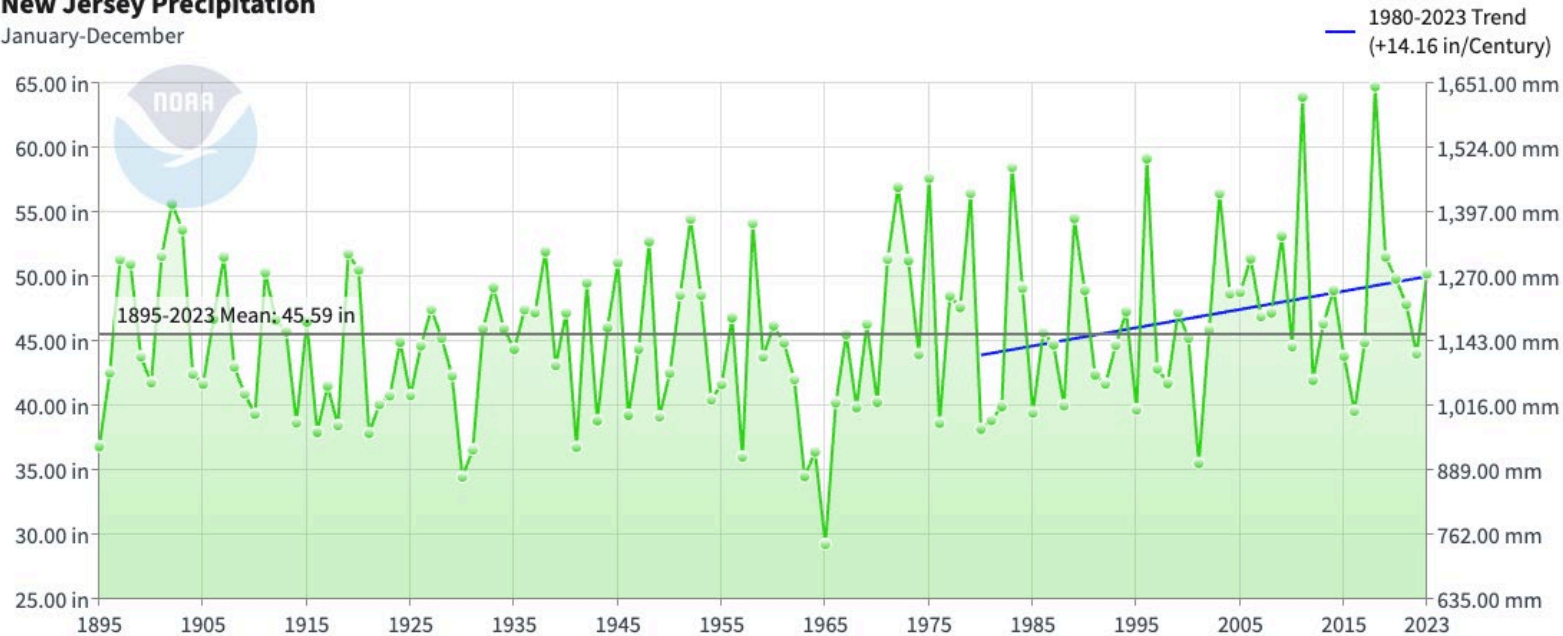


1850-2023

New Jersey annual precipitation: 1895-2023

New Jersey Precipitation

January-December



1895-2023 upward trend of 3.00" per 100 years

1980-2023 trend of 14.16" per 100 years

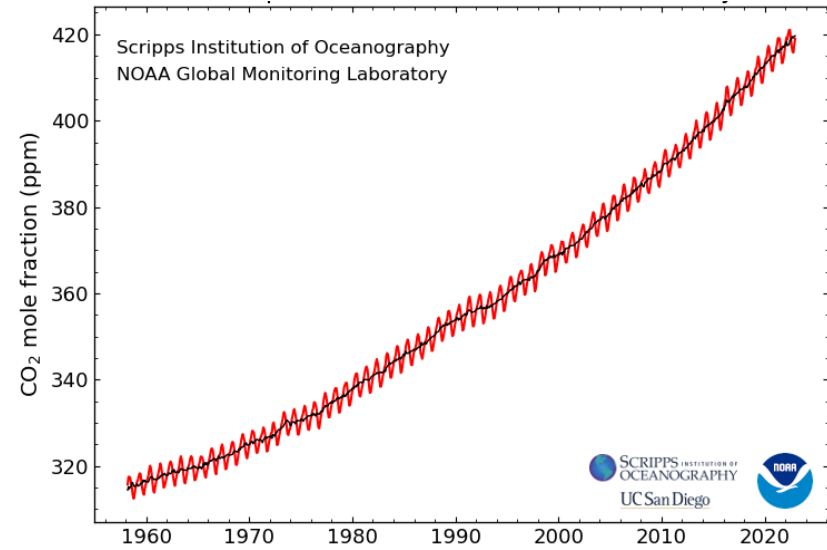
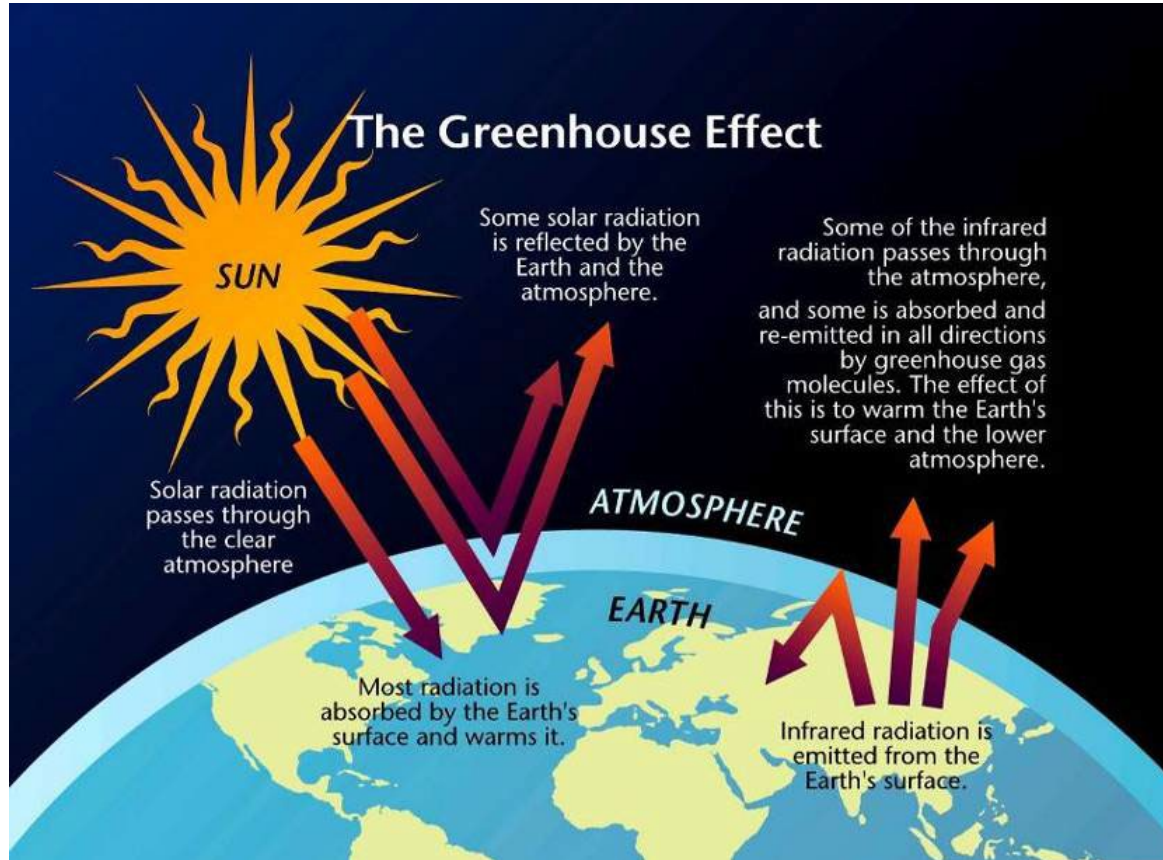
2018 & 2012 the two wettest years

Large decadal variability (early 1960s drought, wet 1970s, quite variable in the past decade)

Most of the upward trend comes from changes in spring and fall

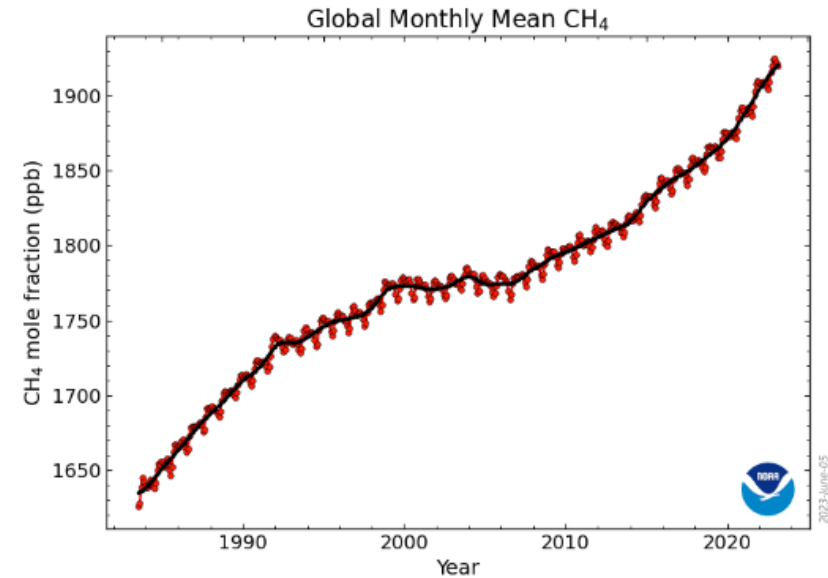
data source: National Centers for Environmental Information

Theory



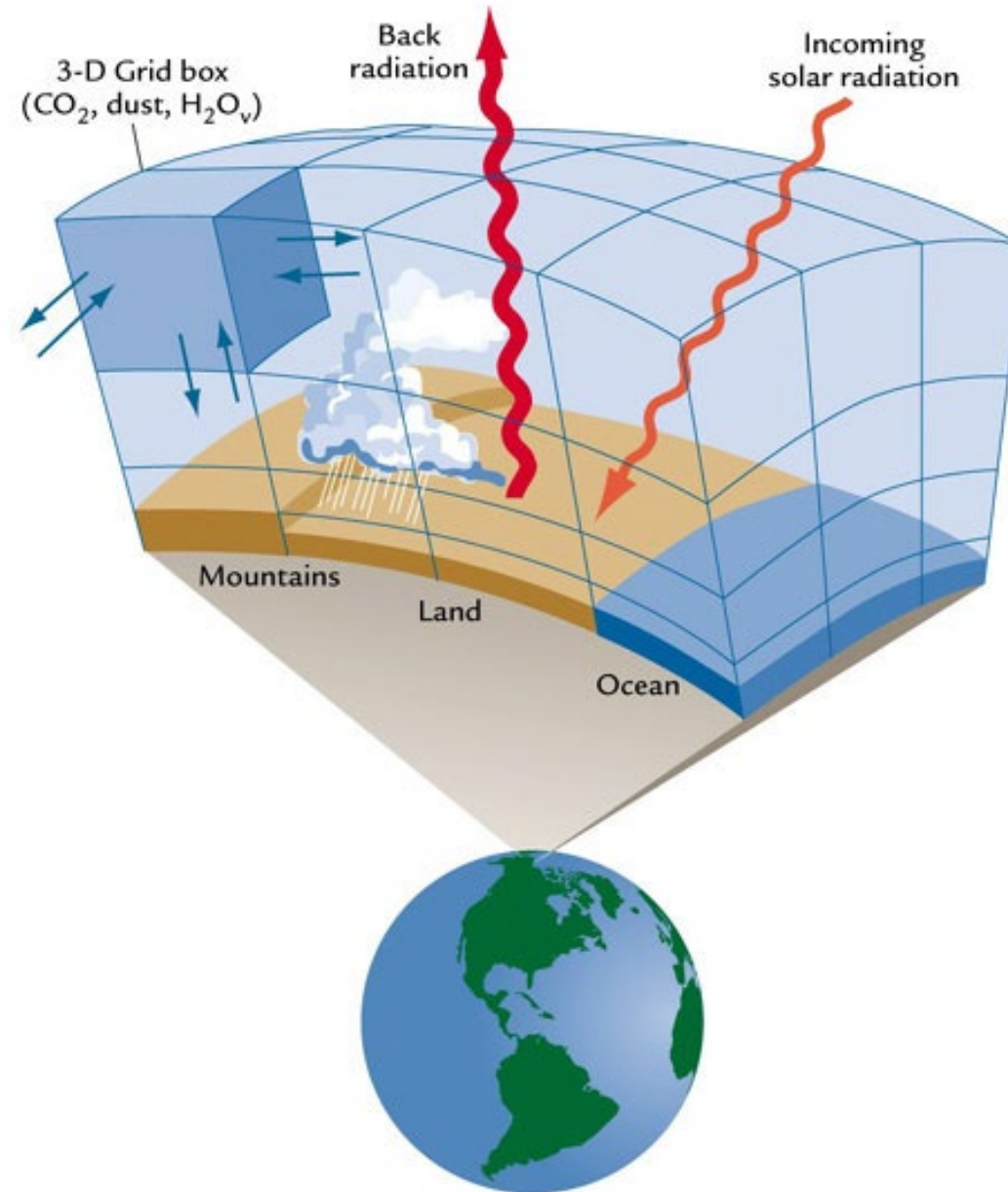
Atmospheric
carbon
dioxide:
1958-
present

Atmospheric
methane:
1983-present





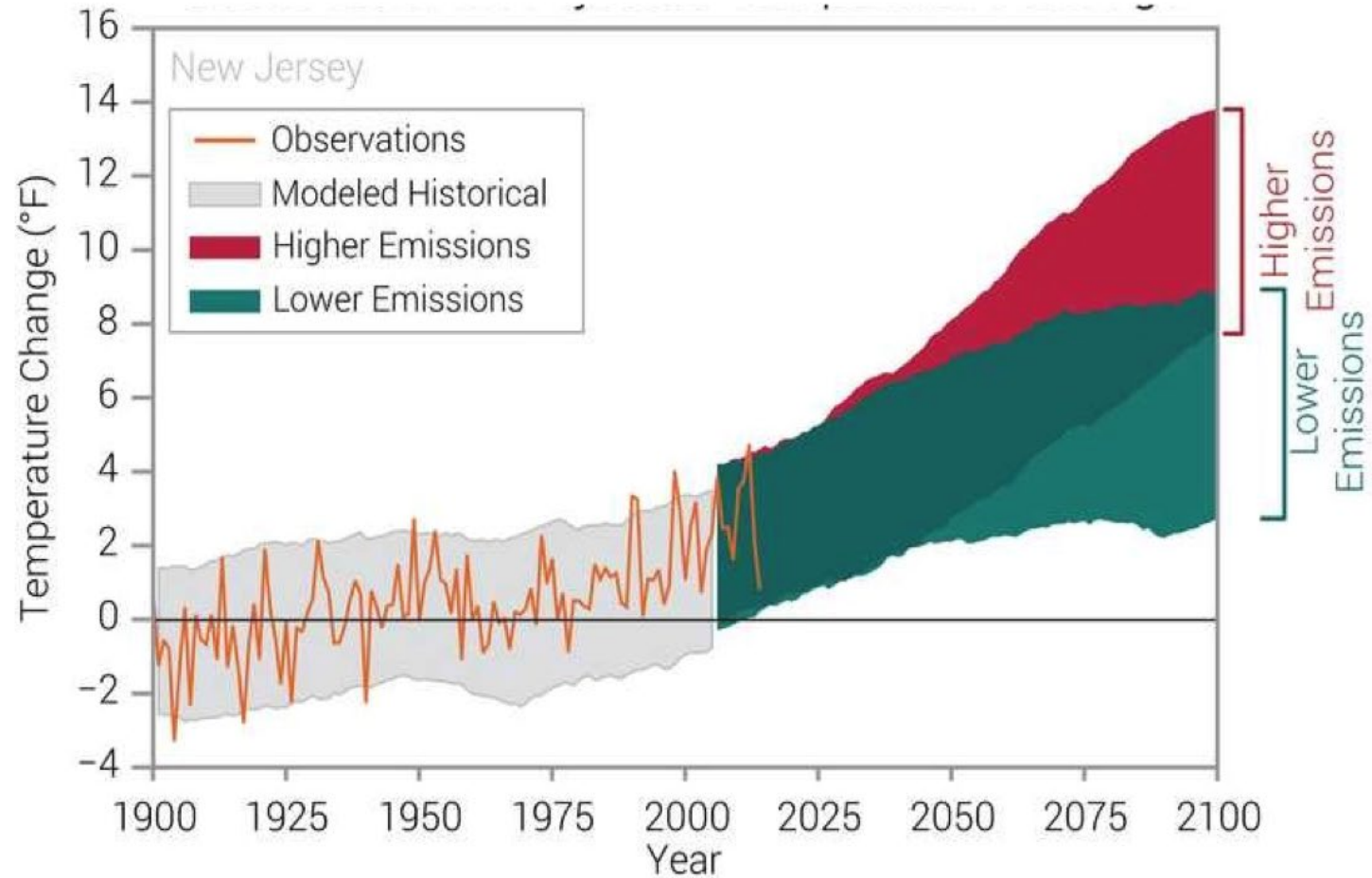
Models



New Jersey's future climate

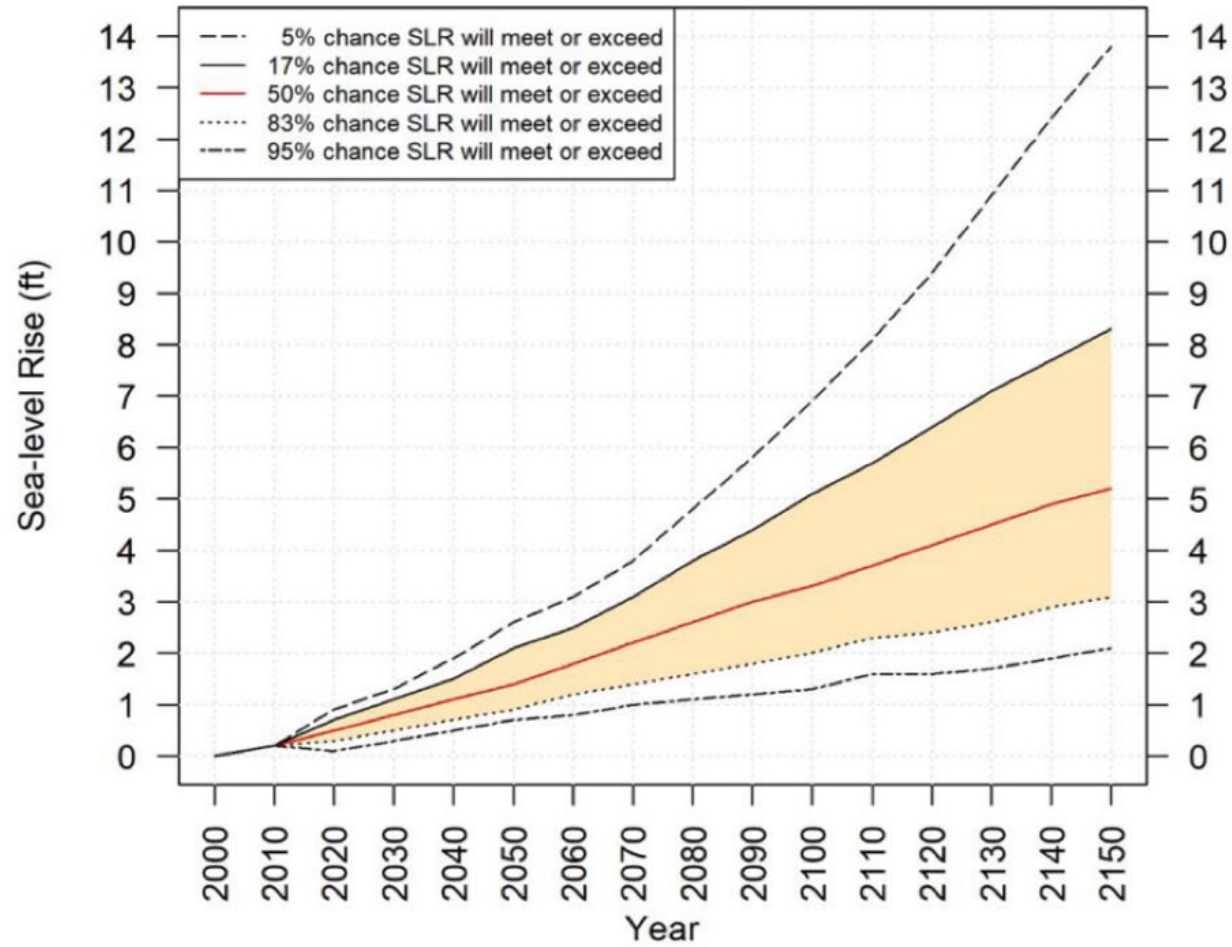
- Steady or increasing precipitation
- Rising temperatures
- Increasing variability and extremes
 - storms, flood, drought, heat.....
- Rising sea level

Observed and Projected New Jersey Temperature Change



Source: NOAA NCEI New Jersey State Climate Summary

New Jersey Sea-Level Rise Projections



Source: Kopp et al., 2019

Seaside Heights inundation from future rising seas



1 foot
(likely by ~2040)

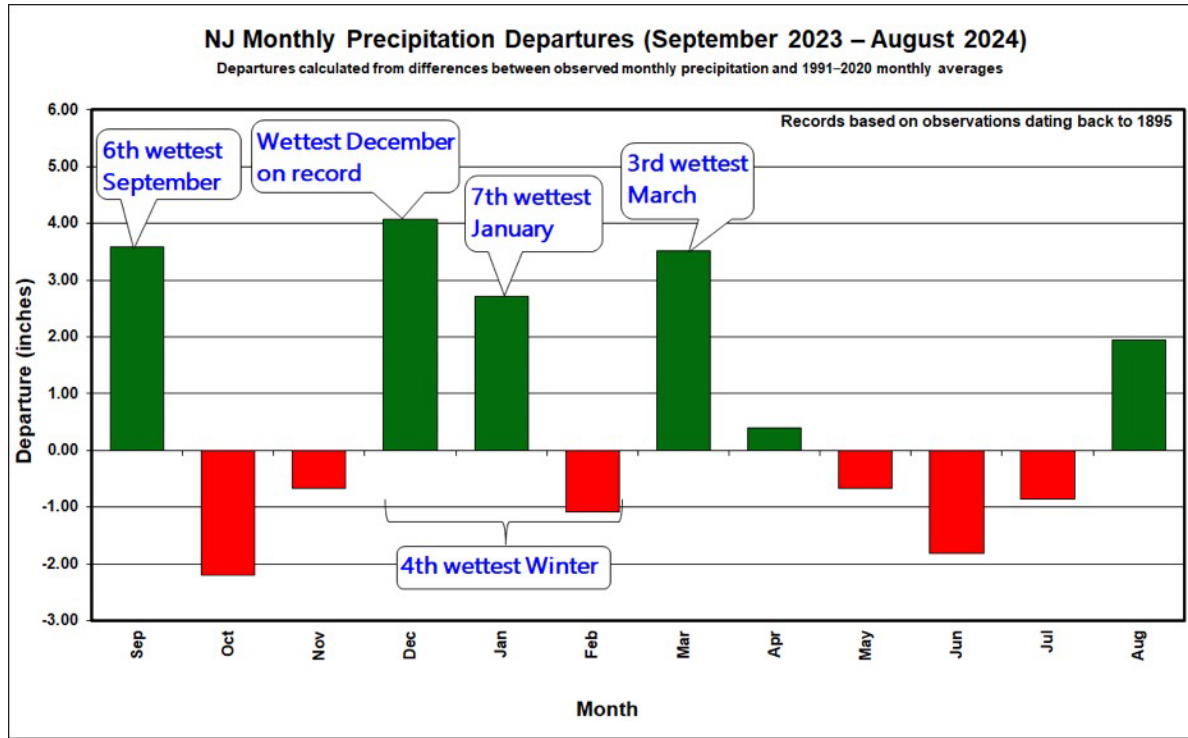
3 feet
(likely by 2090s)

6 feet
(~5% chance by
2100)

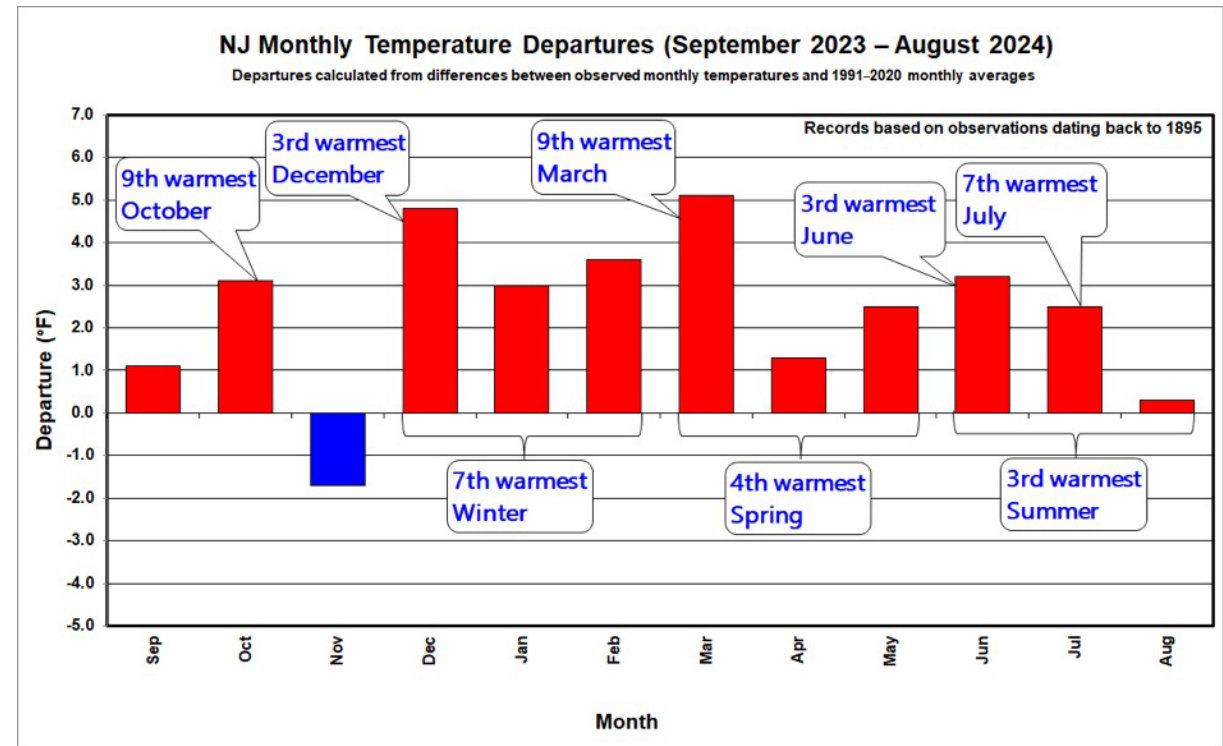
Maps available from <http://slrviewer.rutgers.edu/> and <http://sealevel.climatecentral.org/>

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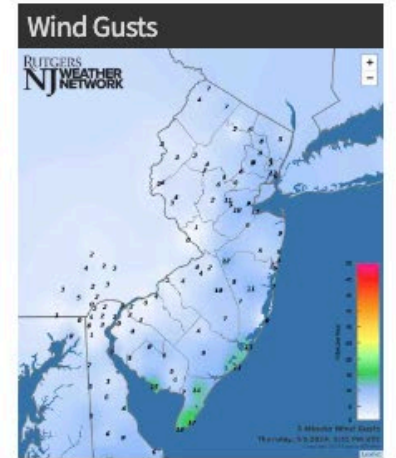


NJ Monthly Precipitation & Temperature Departures: September 2023 – August 2024



Rutgers New Jersey Weather Network

njweather.org



Moorestown, NJ Burlington County Community Agricultural Center

SET AS FAVORITE

search by zipcode or city/state

Latest NWS Forecast



60% CHANCE
Showers Likely

51 °F

This Afternoon

Showers likely. Cloudy, with a high near 70. East wind around 5 mph. Chance of precipitation is 60%. New precipitation amounts of less than a tenth of an inch possible.



70% CHANCE
Showers Likely

70 °F

Tonight

Showers likely. Cloudy, with a low around 51. East wind around 5 mph. Chance of precipitation is 70%. New precipitation amounts between a tenth and quarter of an inch



Friday

Showers. High near 53. East wind around 10 mph

Latest Conditions

67 °F



Wind
3 mph from the ESE
Wind Gust
4 mph from the ENE

	Now	This Hour		Last 6 hr		Today		Last 24 hr	
Temperature	67	67	68	65	69	56	74	56	86
Heat Index	--	--	--	--	--	--	--	--	--
Dewpoint	54	53	55	51	55	50	56	50	64
Wind Speed/Gust	3	--	6	--	8	--	16	--	21
Precip	--	0.00		0.00		0.00		0.00	

Values in blue are minimums, values in red are maximums. Data as of May 9 05:45 PM.

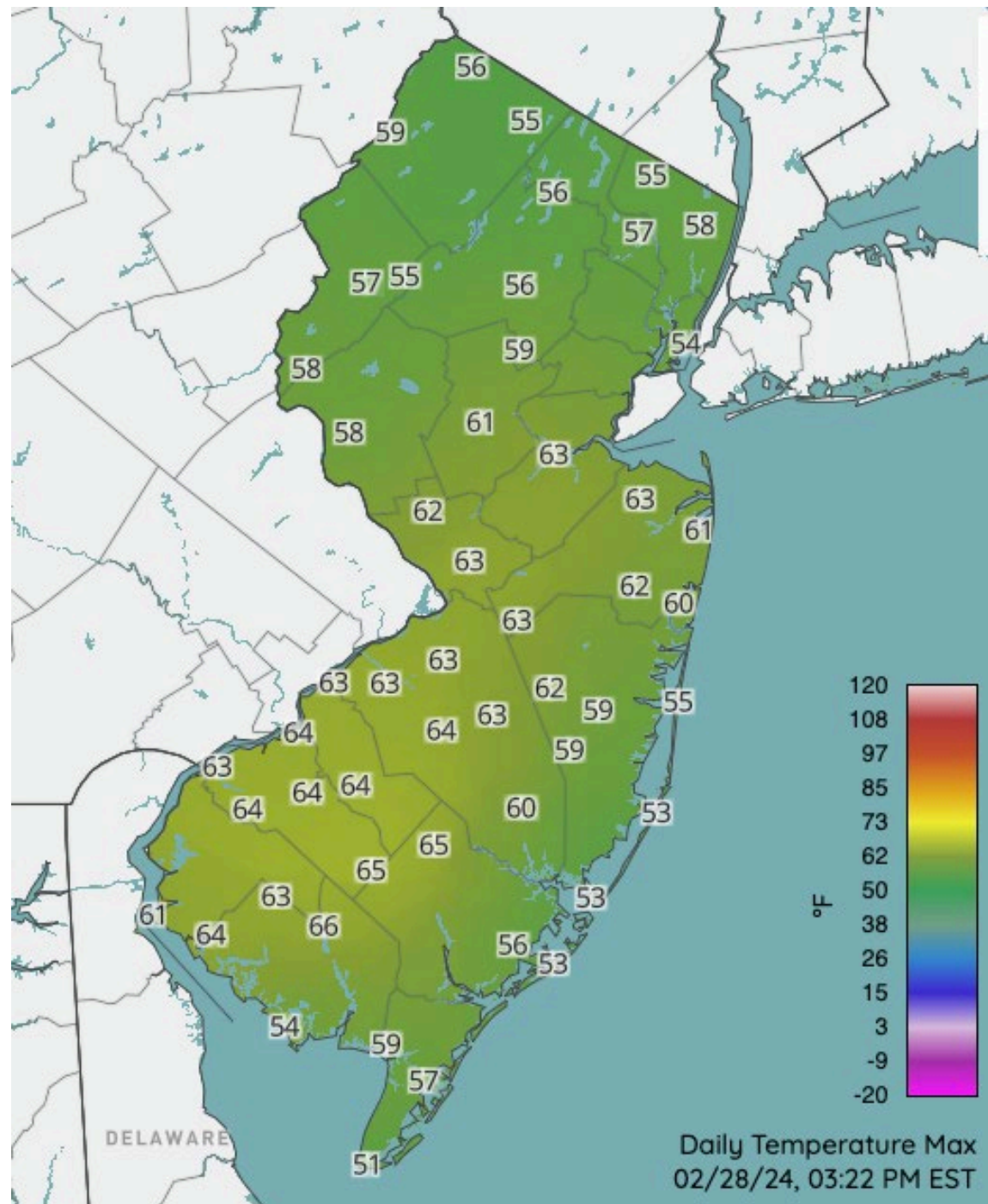
View expanded tabular data for this station: [5 Minute](#) / [Hourly](#) / [Daily](#)

Trends and Climatologies

NJWxNet stations

Observations every:
Hour since the 1990s
Five minutes since 2012

Network has grown to the
current 69 stations



NJWxNet stations measure:

- Air temperature
- Wind speed and direction
- Dew point/Relative humidity
- Precipitation
- Barometric pressure
- Solar radiation
- Soil temperature
- Soil moisture
- Snow depth

Columbus, NJ
(Burlington County Fairgrounds)



Hammonton, NJ
(Mill Rock Farm)



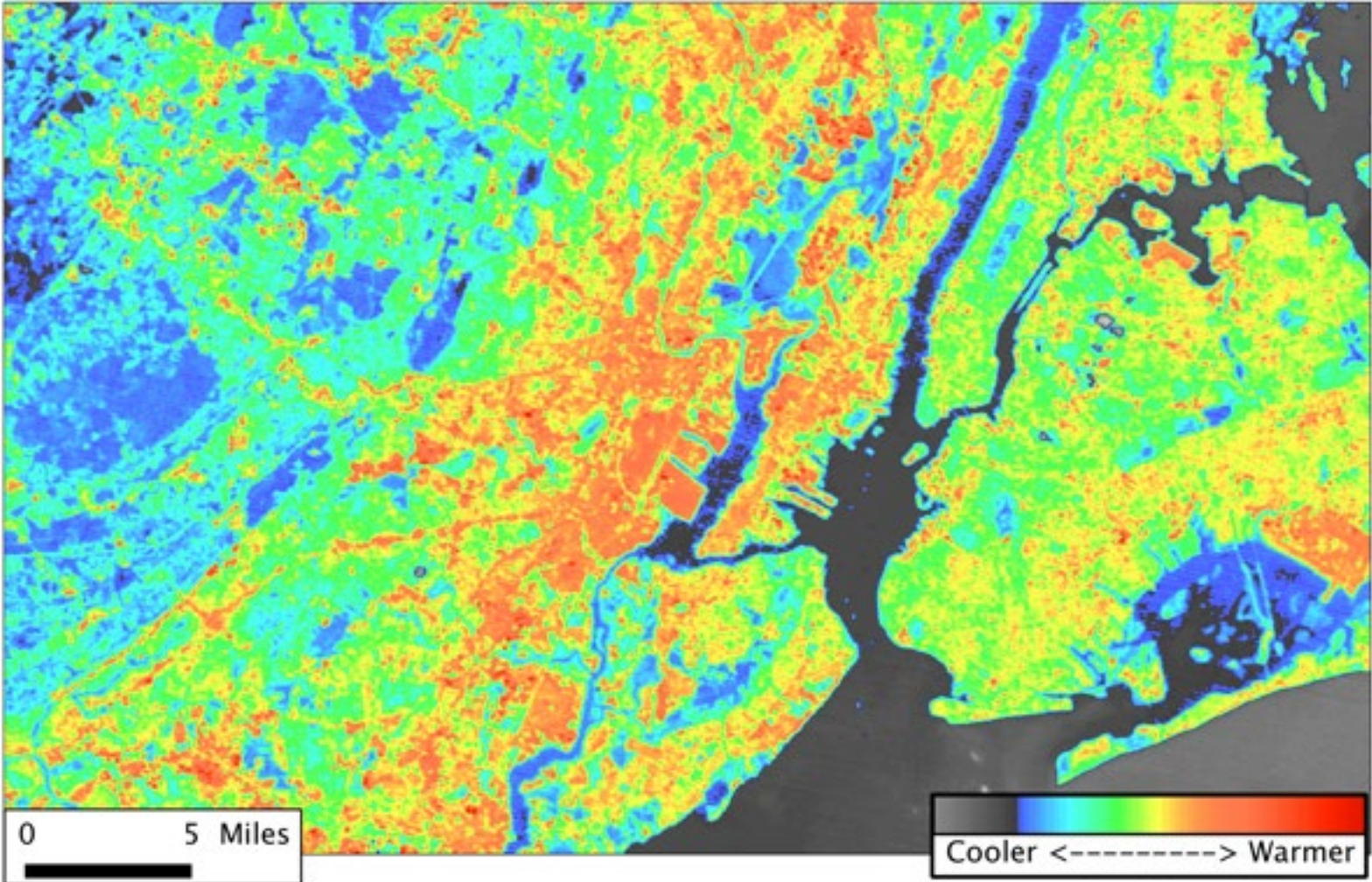
Solar power

Cellular communications

Ability for expansion built into station design

NY/NJ Metro Heat Island

Landsat of New York area on July 14, 2011 : Thermal Band-6



Map produced by Michael Hove

Community Collaborative Rain, Hail and Snow Network (CoCoRaHS)

Daily observations
by
trained volunteers
of all ages

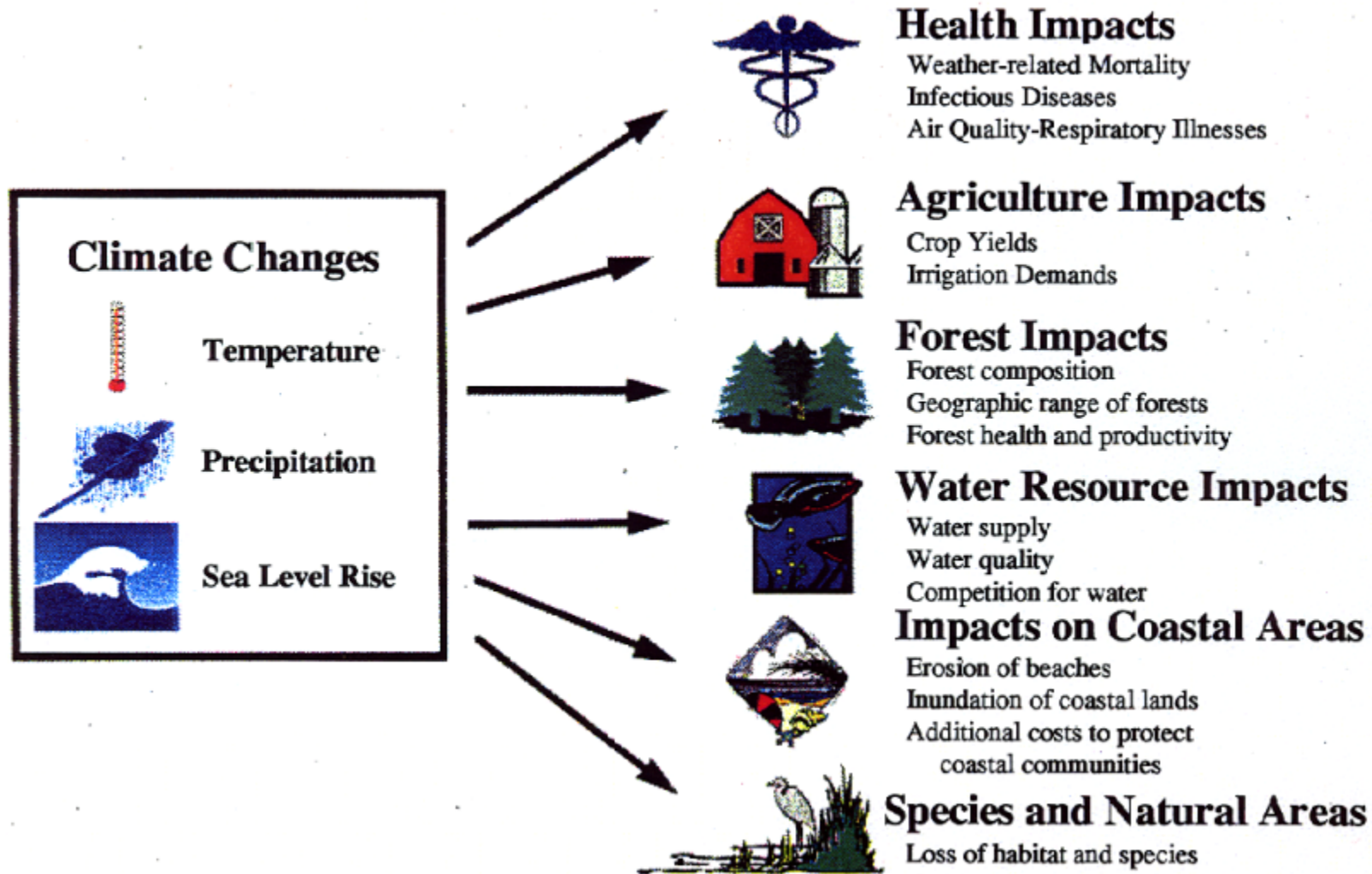
<https://cocorahs.org>



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Ongoing climate change impacts



Challenges Requiring Attention

- **Knowledge:** Develop a better understanding of the details of future climate change.
- **Mitigation:** Reduce emissions of carbon dioxide and other greenhouse gases.
- **Adaptation:** Enhance the resilience of society to climate change.
- **Participation:** Increase public awareness of the challenges posed by climate change. Encourage involvement. Be part of the solution. Vote.

Summing up:

New Jersey has a wide variety of weather and climate conditions.

Climate continues changing in New Jersey, much like elsewhere.

This includes changes in extremes.

Change will continue and likely accelerate in the foreseeable future.

Expect more extremes.

Impacts will expand, becoming increasingly noteworthy.

We must keep a watchful eye of NJ's weather and climate

While ongoing change is certain, time remains for mitigative and adaptive actions to address and attenuate threatening conditions.

For more information:



*An overview from the Royal Society and the
US National Academy of Sciences*

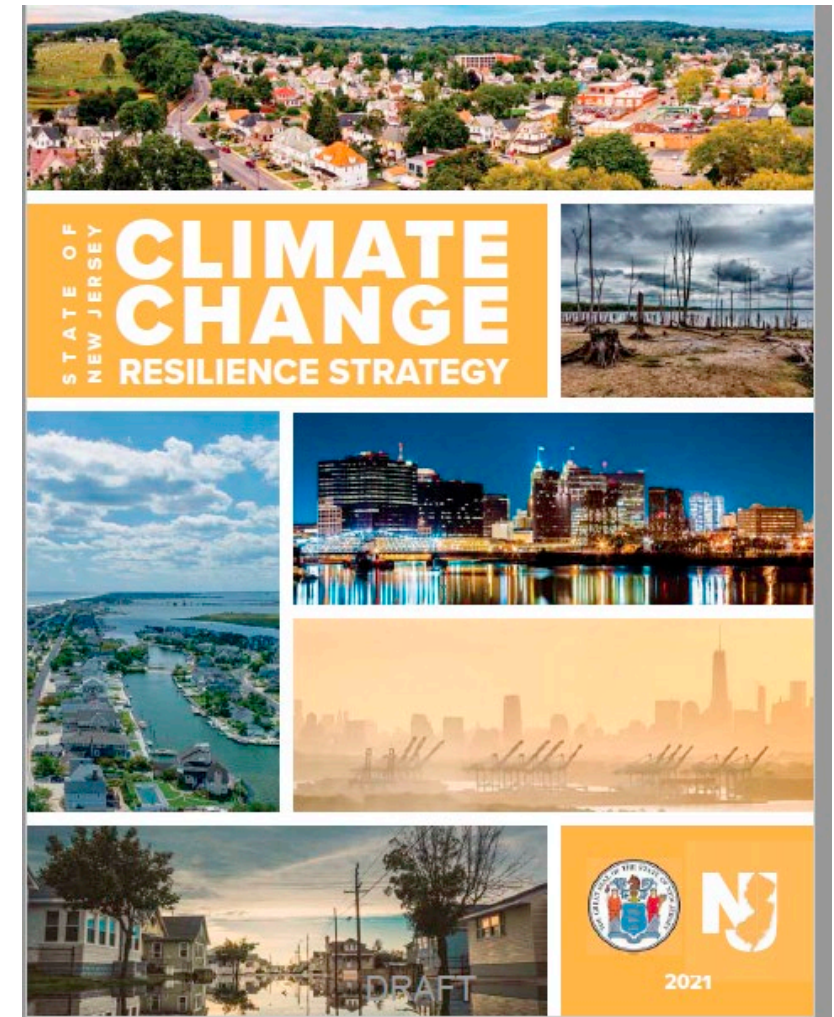
<https://nap.nationalacademies.org/catalog/25733/climate-change-evidence-and-causes-update-2020>



THE
ROYAL
SOCIETY



<https://www.nj.gov/dep/climatechange/index.html>



<https://www.nj.gov/dep/climatechange/docs/nj-climate-resilience-strategy-2021.pdf>

Thanks

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njclimate.org



Great
Swamp