



# Climate Risks & Energy Policy Options

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# The climate 'crisis':

- Its warming.
- The warming is caused by us.
- Warming is dangerous.
- We need to urgently transition to renewable energy to **stop** the warming.
- Once we do that, sea level rise will stop and the weather won't be so extreme.



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## What's wrong with this narrative?

- We have vastly **oversimplified** both the problem and its solutions.
- The **complexity & uncertainty** is being kept away from the public & policy debate.
- The proposed solutions are **technologically & politically** infeasible on a global scale.
- **Overemphasizes** the role of manmade climate change in societal problems.



# "97% of climate scientists agree"

- Surface **temperatures** have **increased** since 1880
- Humans are adding **carbon dioxide** to the atmosphere
- Carbon dioxide and other greenhouse gases have a **warming** effect on the planet

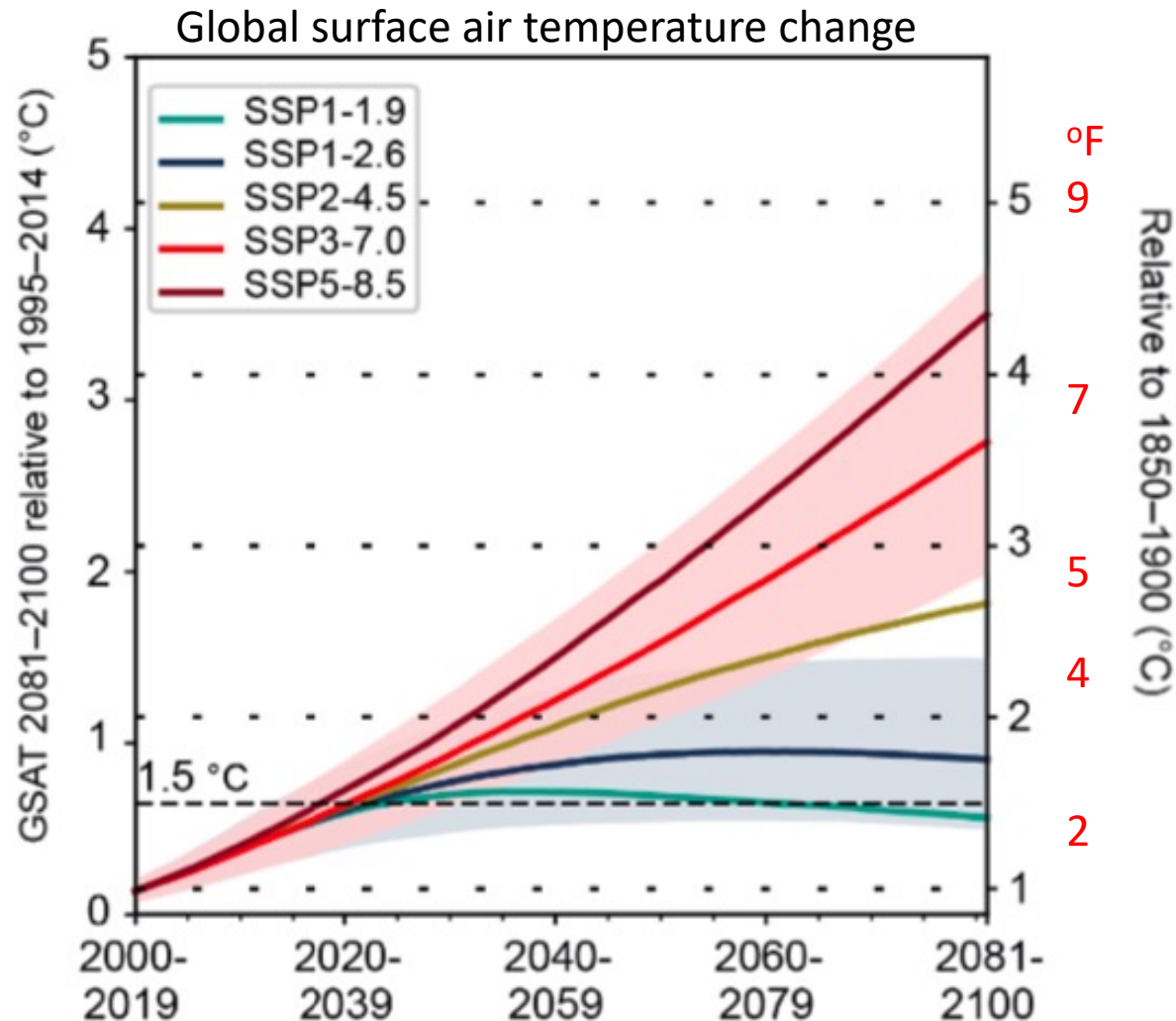
## Uncertainty & disagreement:

- How much of the warming has been **caused by humans**
- **How much** the planet will warm in the 21st century
- Whether warming is '**dangerous**'
- How we should **respond** to the warming, improve human well being



# Uncertainty: how much warming in 21<sup>st</sup> century?

## IPCC 6<sup>th</sup> Assessment Report: possible climate futures

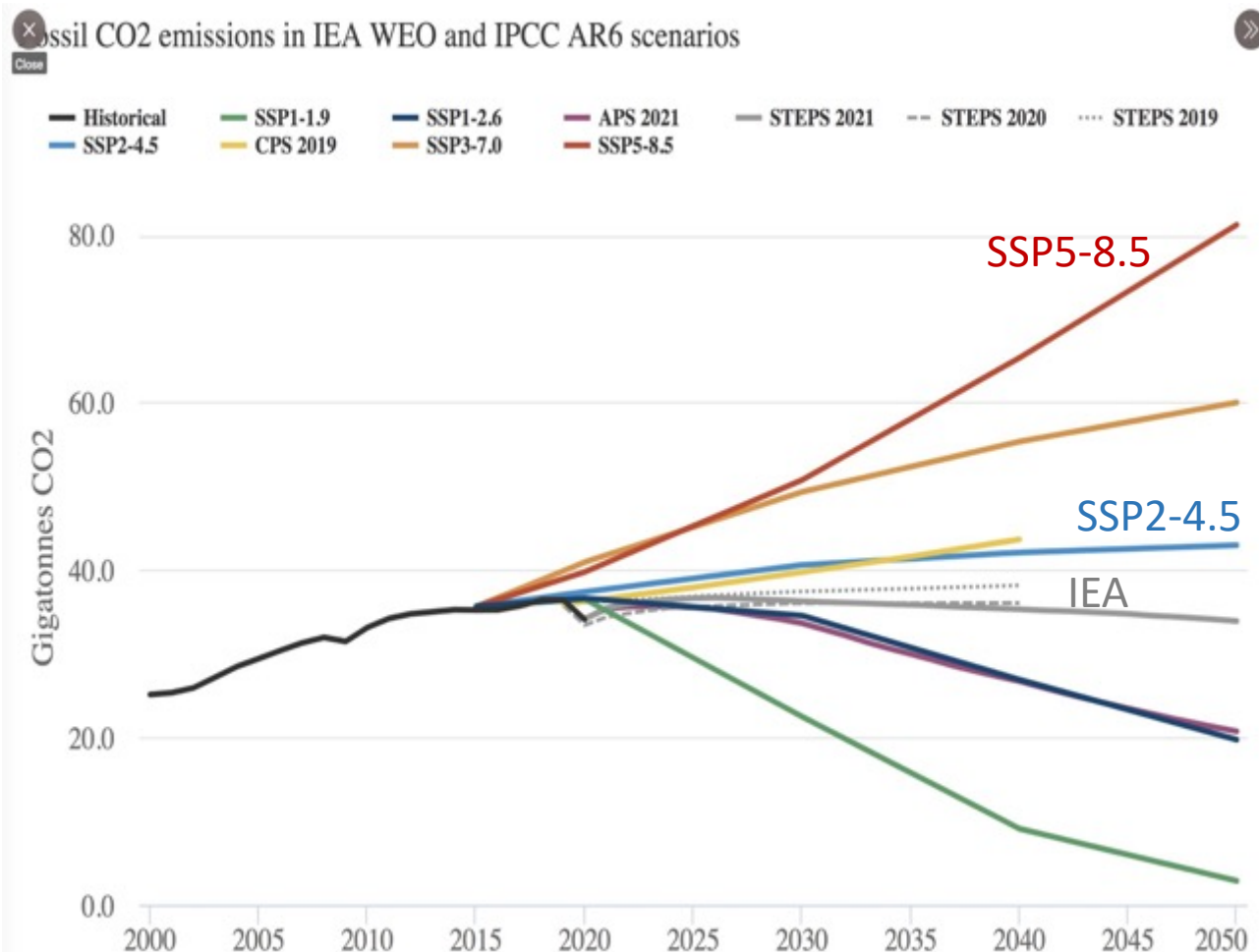


Large amount of **uncertainty** in 21<sup>st</sup> century projections of surface temperature:

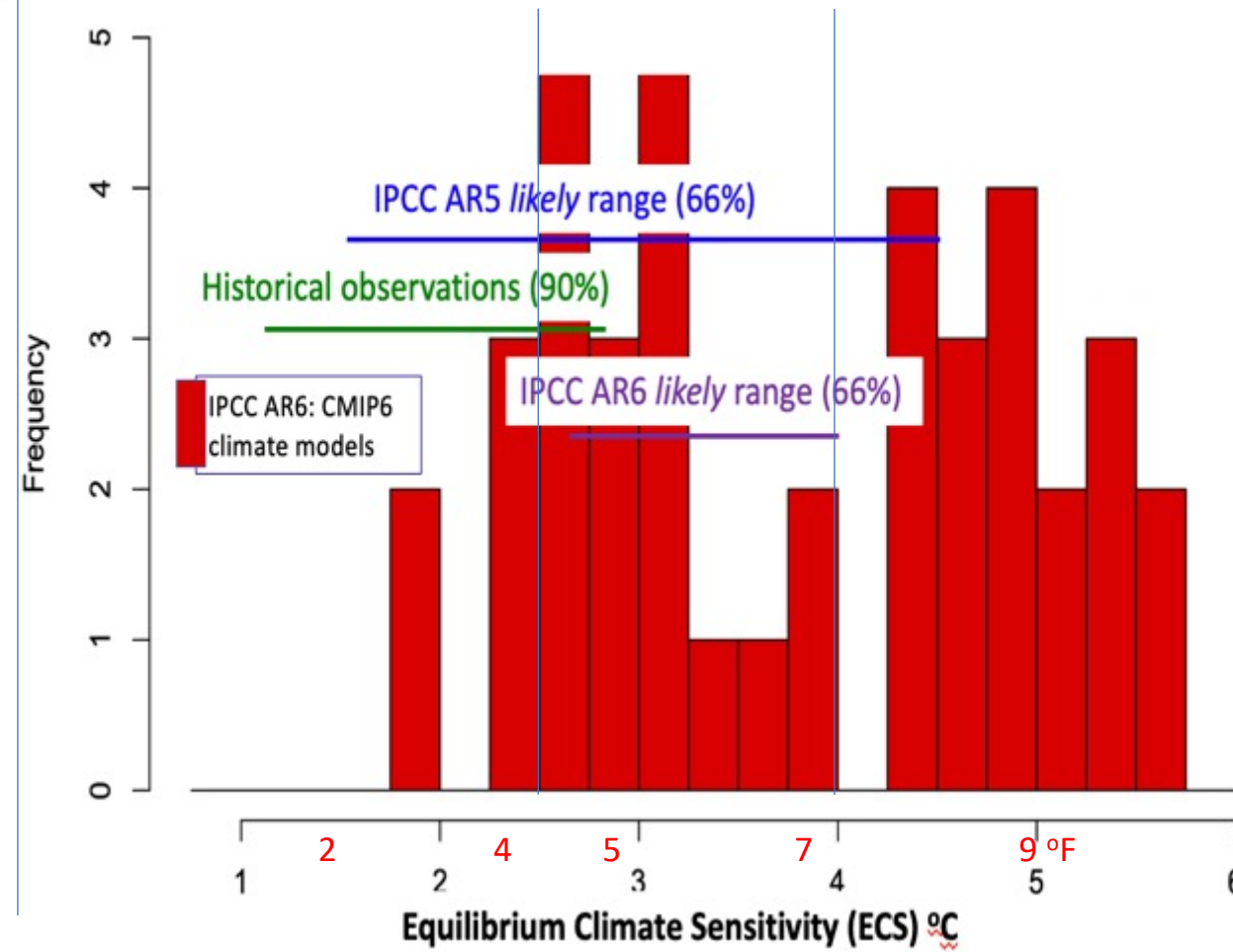
- Amount of **emissions**
- **Sensitivity** of the climate to these emissions
- Importance of **natural climate variability** relative to emissions.

# Outdated emissions scenarios

**Good news:** the worst scenarios for warming are becoming increasingly implausible

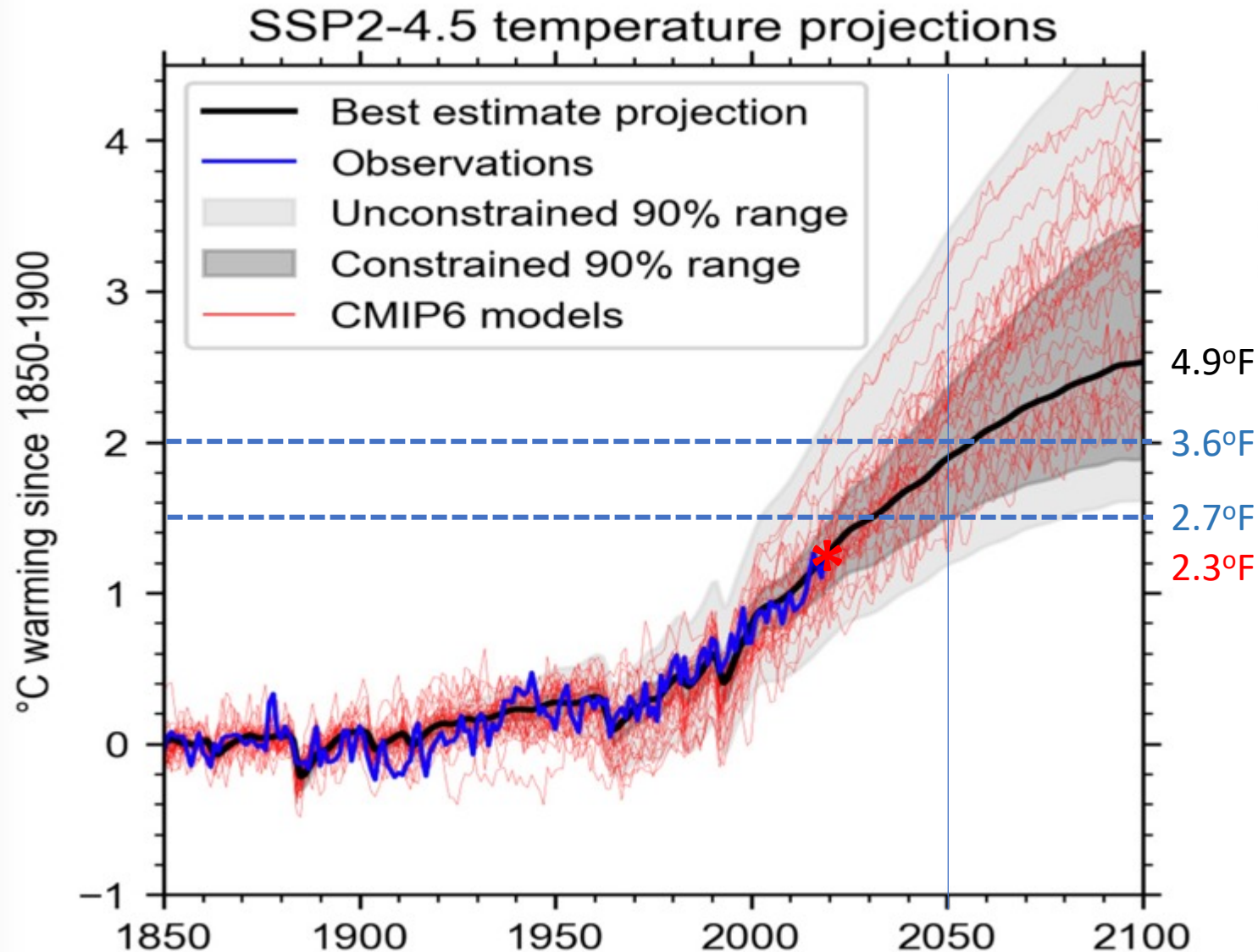


# Large uncertainty in climate sensitivity to CO<sub>2</sub>



# Deep uncertainty: how much warming in 21<sup>st</sup> century?

## Medium emissions scenario: SSP2-4.5



### Science

U.N. climate panel confronts implausibly hot forecasts of future warming

Natural climate variability:

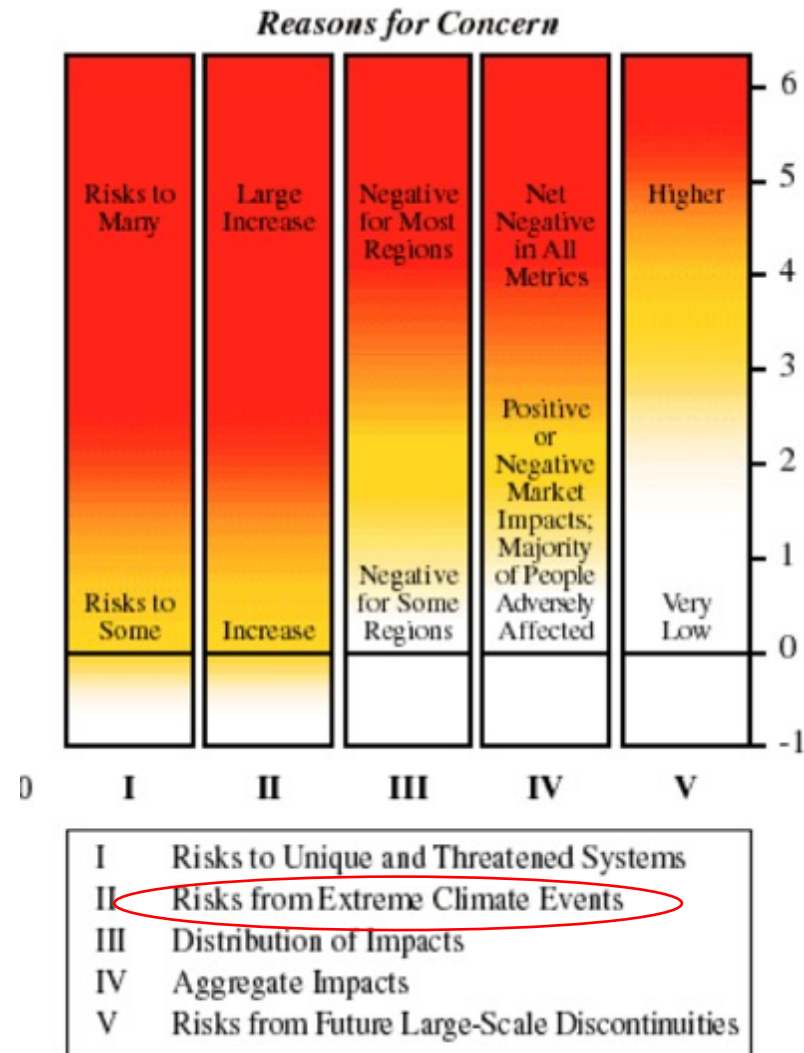
- Volcanic eruptions
- Solar minima
- Shift to cool phase of AMO

**COOL**

up to 2°F?

# Disagreement: is warming dangerous?

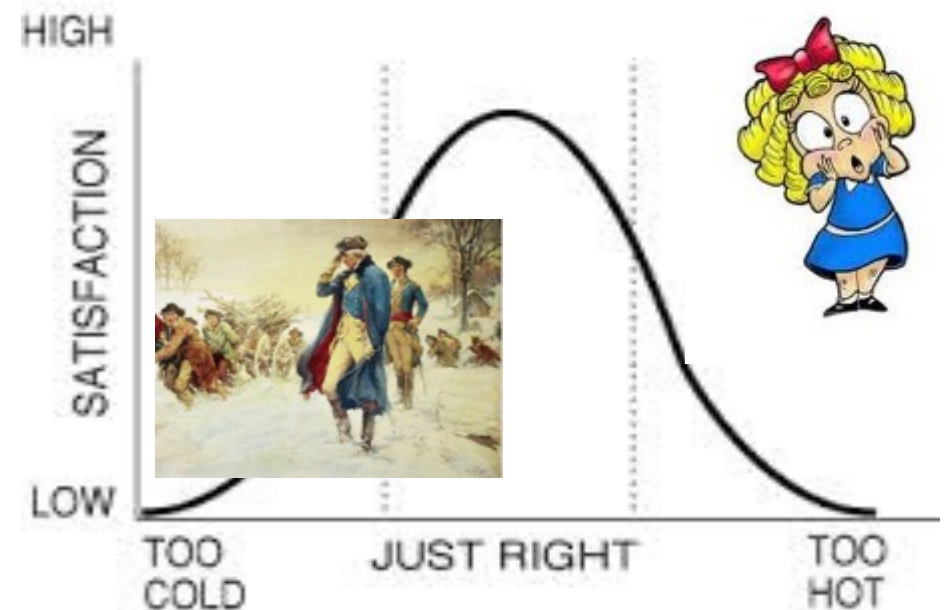
IPCC AR5 'burning embers' diagram



What climate do we want?

Winners & losers

## Goldilocks Principle



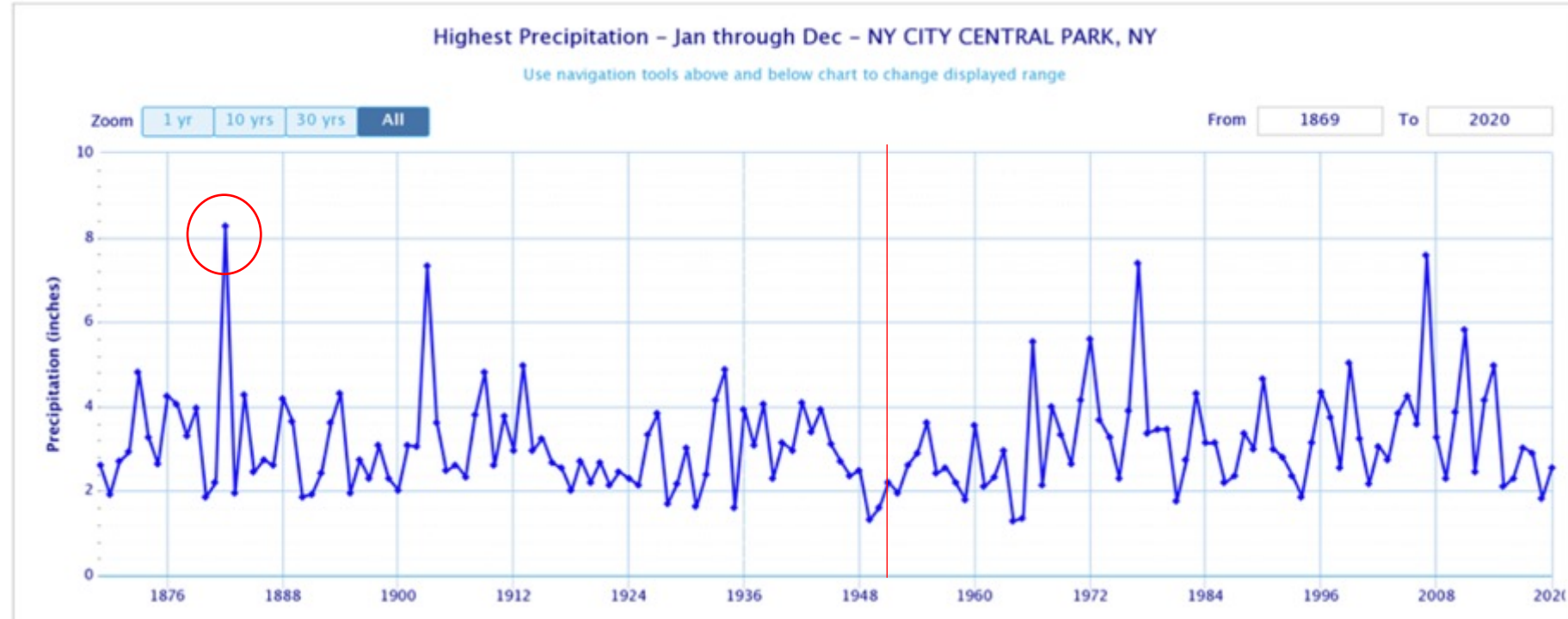
# “New normal” or weather amnesia?

## IPCC AR6 climate-impact drivers:

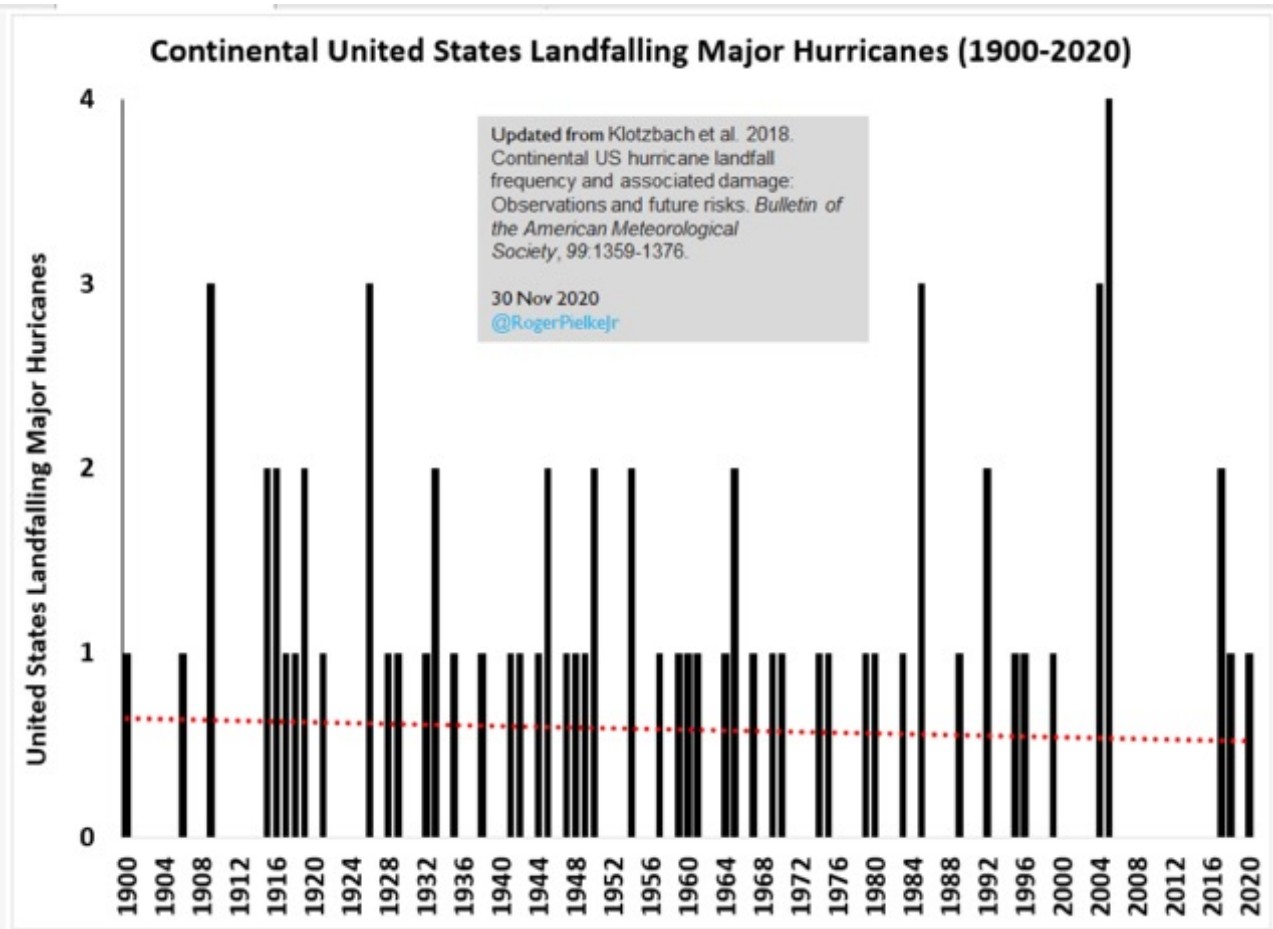
- Increased intensity & duration of heat waves
- Decreased intensity & duration of cold waves
- Increased frequency & intensity of heavy rainfall events

**1821 Long Island Hurricane:**  
Cat 4, 13 ft storm surge

## Heaviest daily rainfall – NYC Central Park



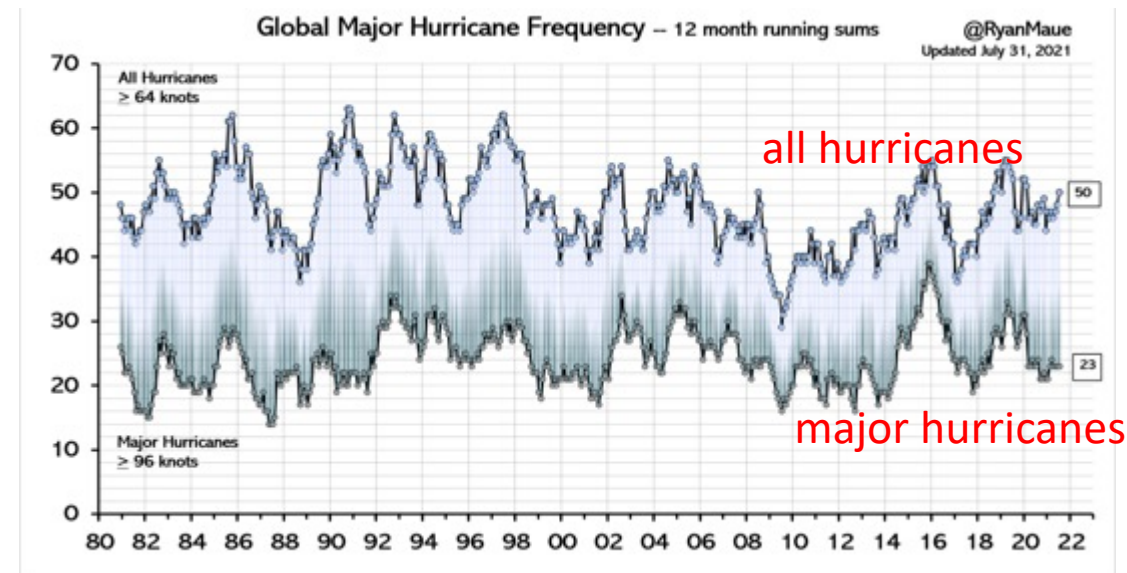
# Hurricanes and global warming



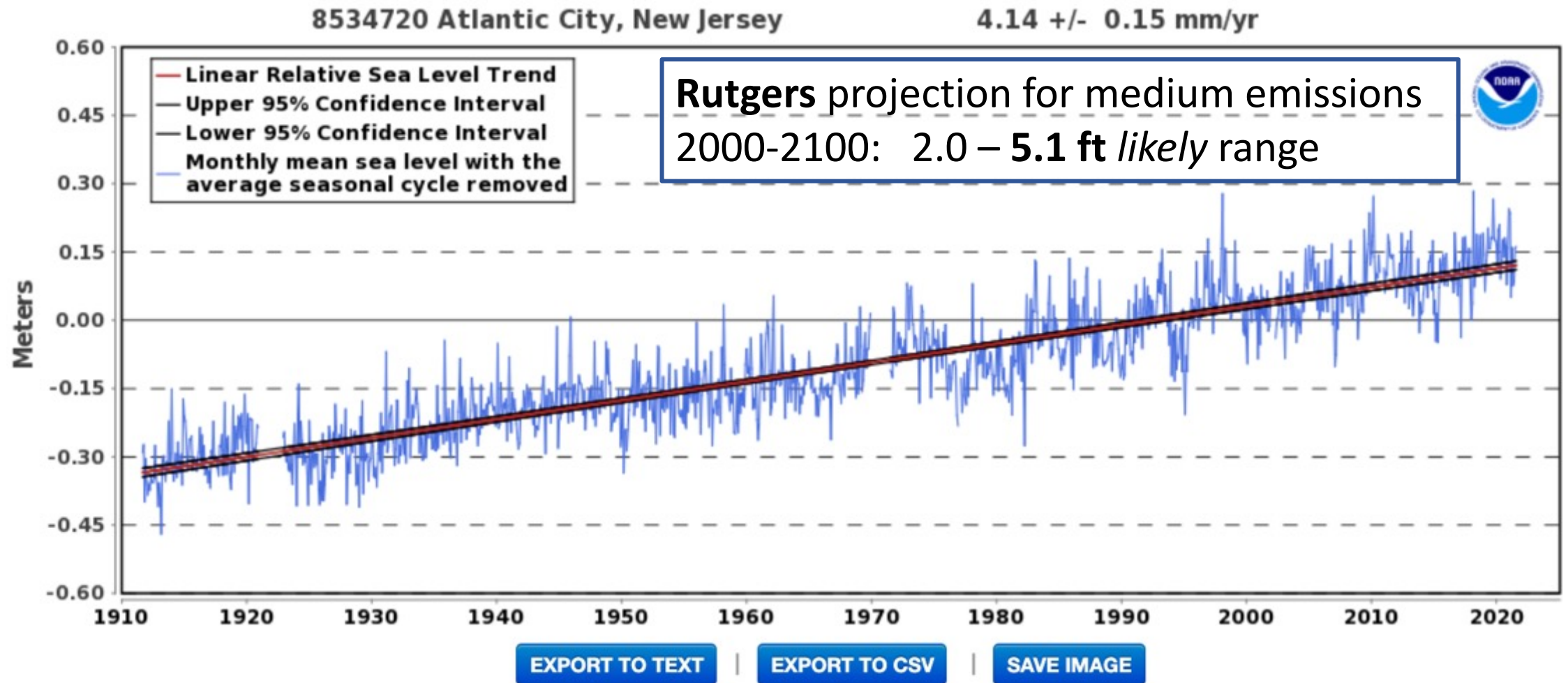
- Many major hurricane landfalls early in the 20<sup>th</sup> century
- Record # in 2005, which was followed by an 11 year drought

## IPCC AR6

“It is *likely* that the global proportion of major (Category 3–5) tropical cyclone occurrence has increased over the last four decades”



## Relative Sea Level Trend 8534720 Atlantic City, New Jersey



The relative sea level trend is 4.14 millimeters/year with a 95% confidence interval of +/- 0.15 mm/yr based on monthly mean sea level data from 1911 to 2020 which is equivalent to a change of 1.36 feet in 100 years.

# Assessment of projected sea level rise scenarios for the New Jersey Coast

25 February 2021

Submitted to:

New Jersey Business & Industry Association

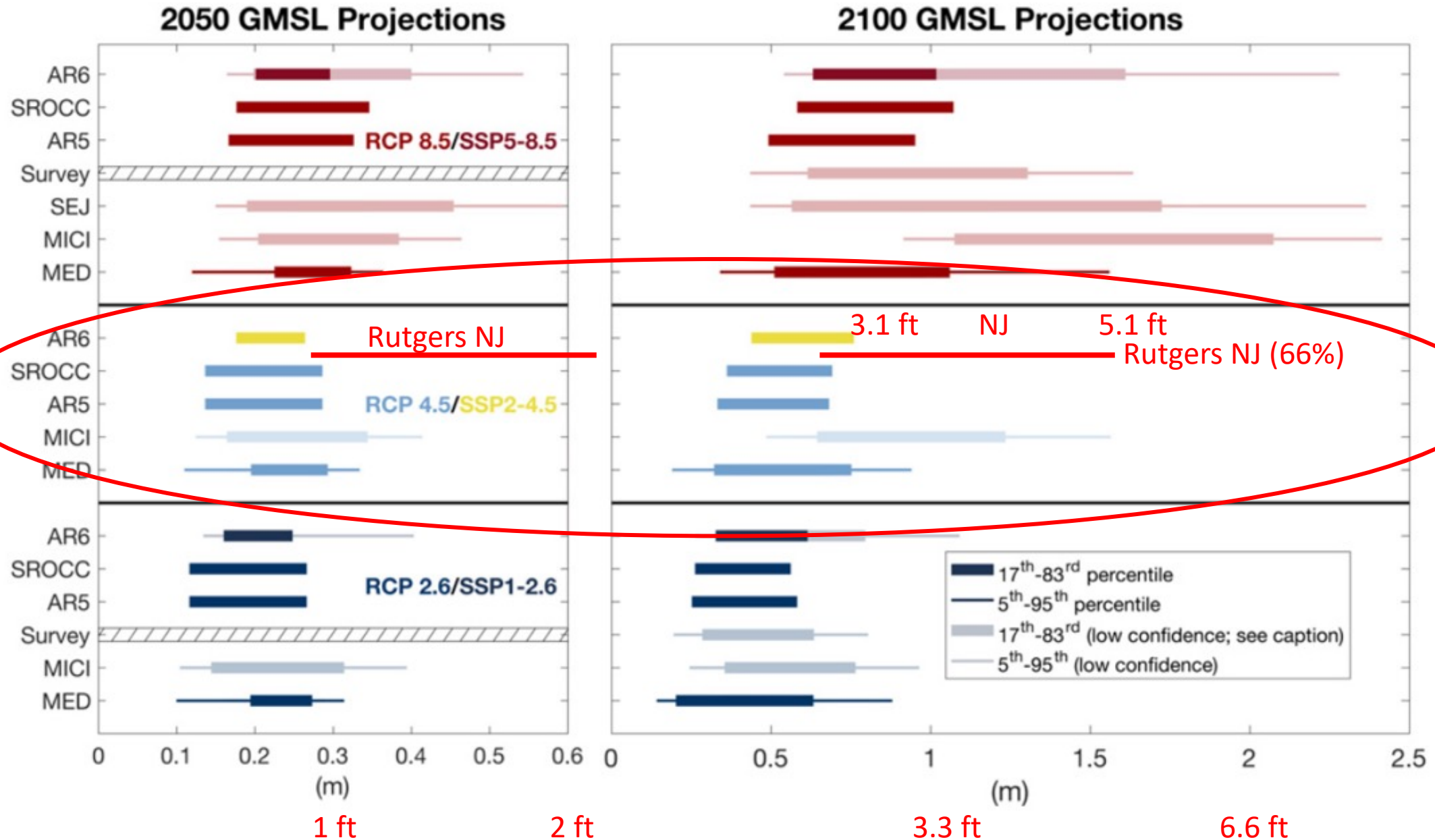


## SUMMARY

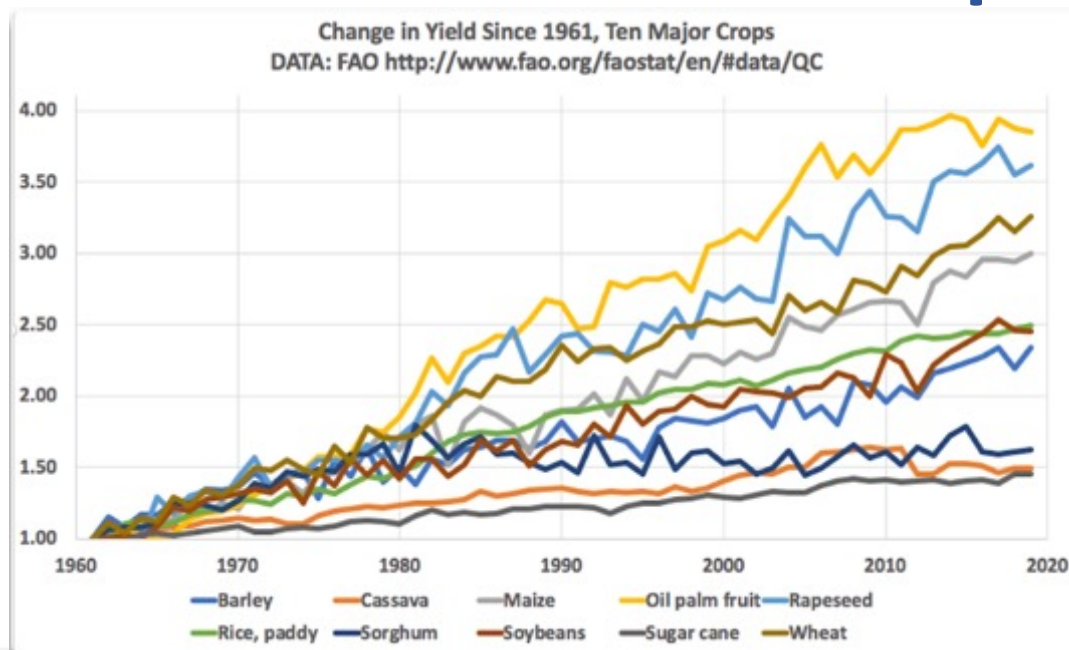
Projections of sea level rise in the Rutgers Report are evaluated relative to projections provided by the IPCC.

The Rutgers projections are substantially higher than the IPCC projections, owing to their method of incorporating extreme scenarios of instability in the West Antarctic Ice Sheet.

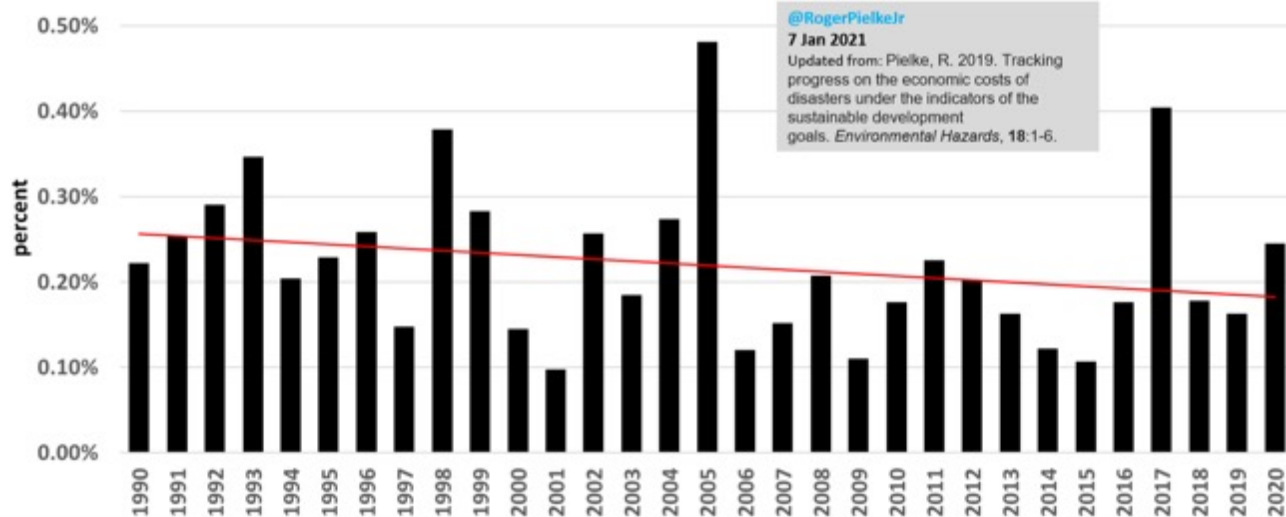
# IPCC AR6 projections of global mean sea level rise



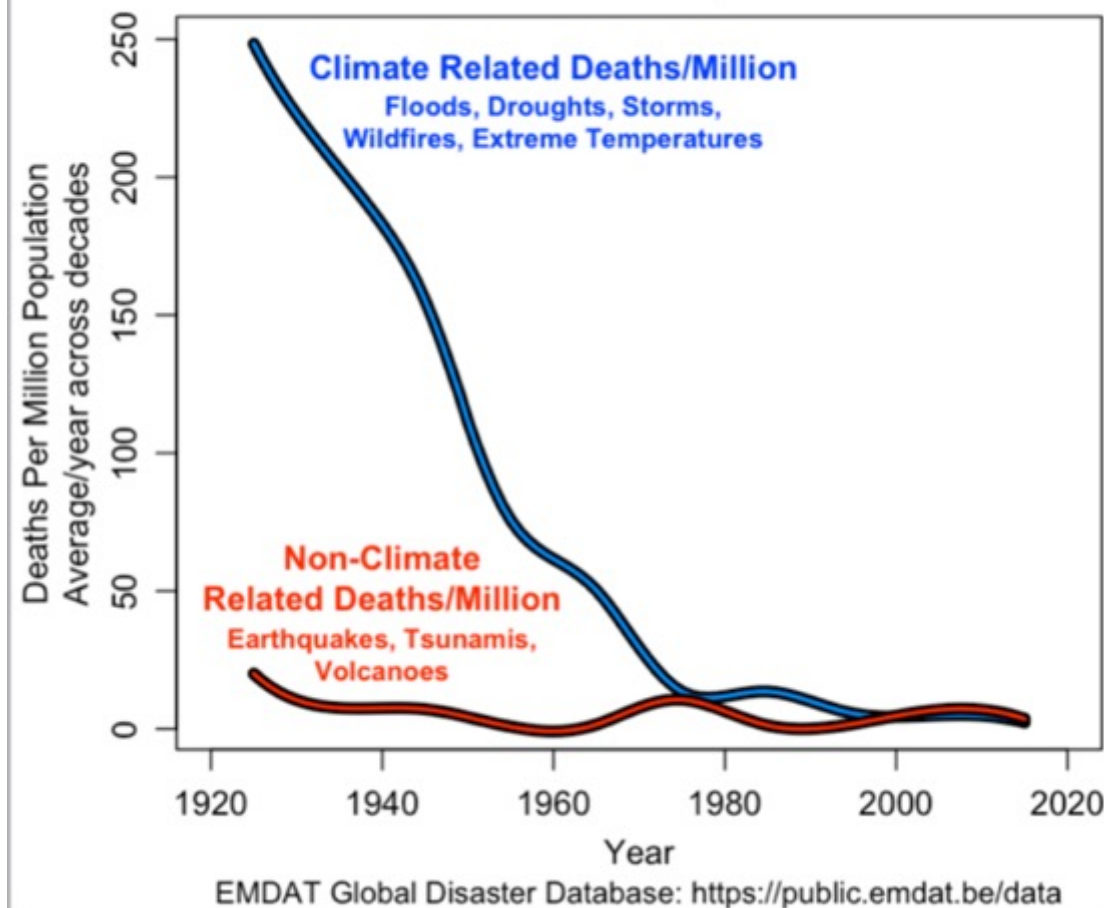
# The world is adapting to climate change



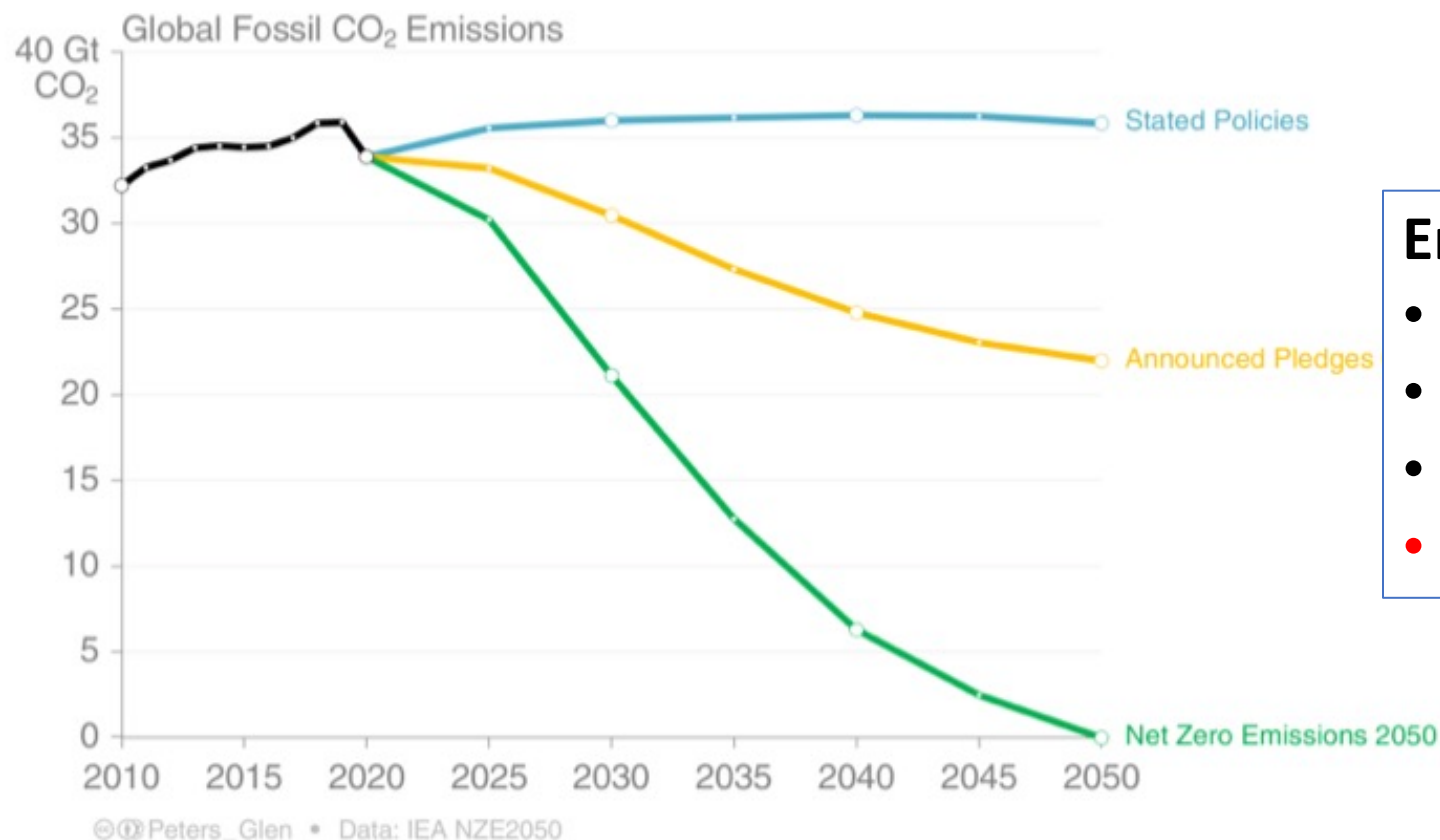
Global Weather Losses as Percent of Global GDP: 1990-2020  
(Sources: Munich Re, World Bank)



Global Deaths Per Million Population from Climate and Non-Climate Catastrophes, 1920 - 2019



# Net Zero Emissions 2050



## Emissions reduction gap:

- Technology
- Economics
- Politics
- Electricity reliability & cost

# Urgently meeting **NETZERO** targets

- **Eliminate fossil fuels**
- Replace with **clean energy**:  
particularly solar, wind, biofuels
- **Nuclear** remains controversial;  
growing support in Europe and Japan
- Austerity: **use less energy**
- (carbon capture & storage)

## **Netzero by 2050 - IEA Roadmap Energy Sector**

- Requires huge leaps in clean energy innovation
- Major efforts to build new infrastructure
- “Possible” but narrow pathway

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# Problems with **NETZERO** strategy

Setting targets and reasoning backwards to policy is **unproductive**:

- Targets are untethered from actual policies
- Relieves political pressure for short-term action

## How urgent?

- Panic makes us less likely to tackle this smartly
- Stringent targets lead to suboptimal short-term decisions that aren't overall beneficial
- Hazards of overdependence on wind & solar

**Need for electricity is growing**: increasing population, economic development, electrify everything, new innovations and possibilities  
~~ENERGY DIET~~

# Towards a **pragmatic** and **robust** transition

## Re-framing the challenge:

- Maintain energy **security** (reliability, cost) as top priority
- Increasing **demand** for electricity
- Focus on the **transition** to cleaner energy, not the target
- Innovation: invest in developing **better technologies**
- 21<sup>st</sup> century **transmission** infrastructure



## Keeping the electricity supply robust:

- Keep existing **natural gas and nuclear** as long as needed; add new clean energy
- Wind/solar plus weather extremes increase need for **peaking power plants**
- Evaluate **new and better technologies** 2030+, e.g. modular nuclear reactors, advanced geothermal, storage

Evaluate electricity sources in terms of lifecycle costs & environmental impacts and other unintended consequences on ~30 year timescale

Slides and verbal remarks for today's presentation can be found at

<http://judithcurry.com>

# Thank you



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