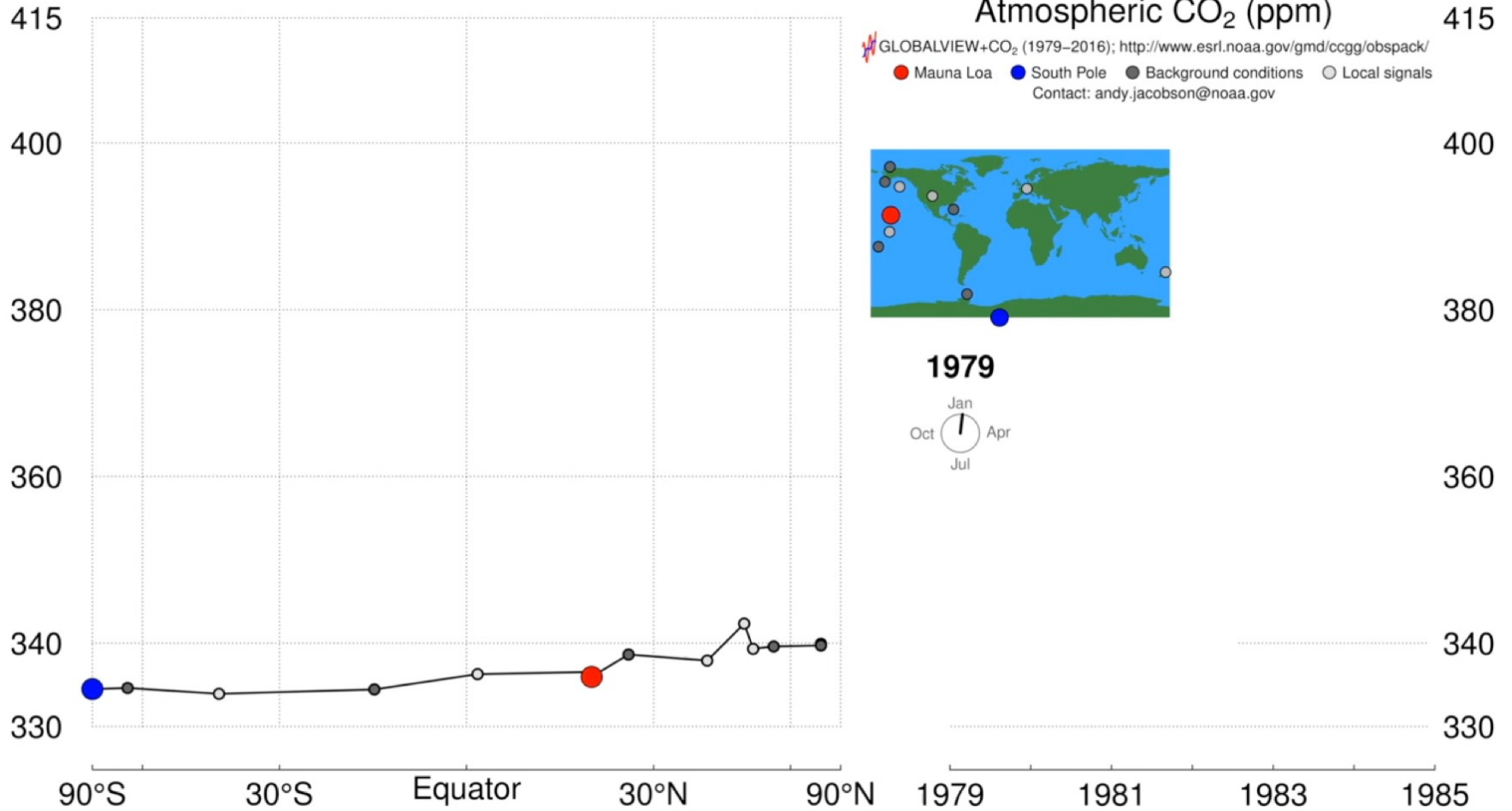


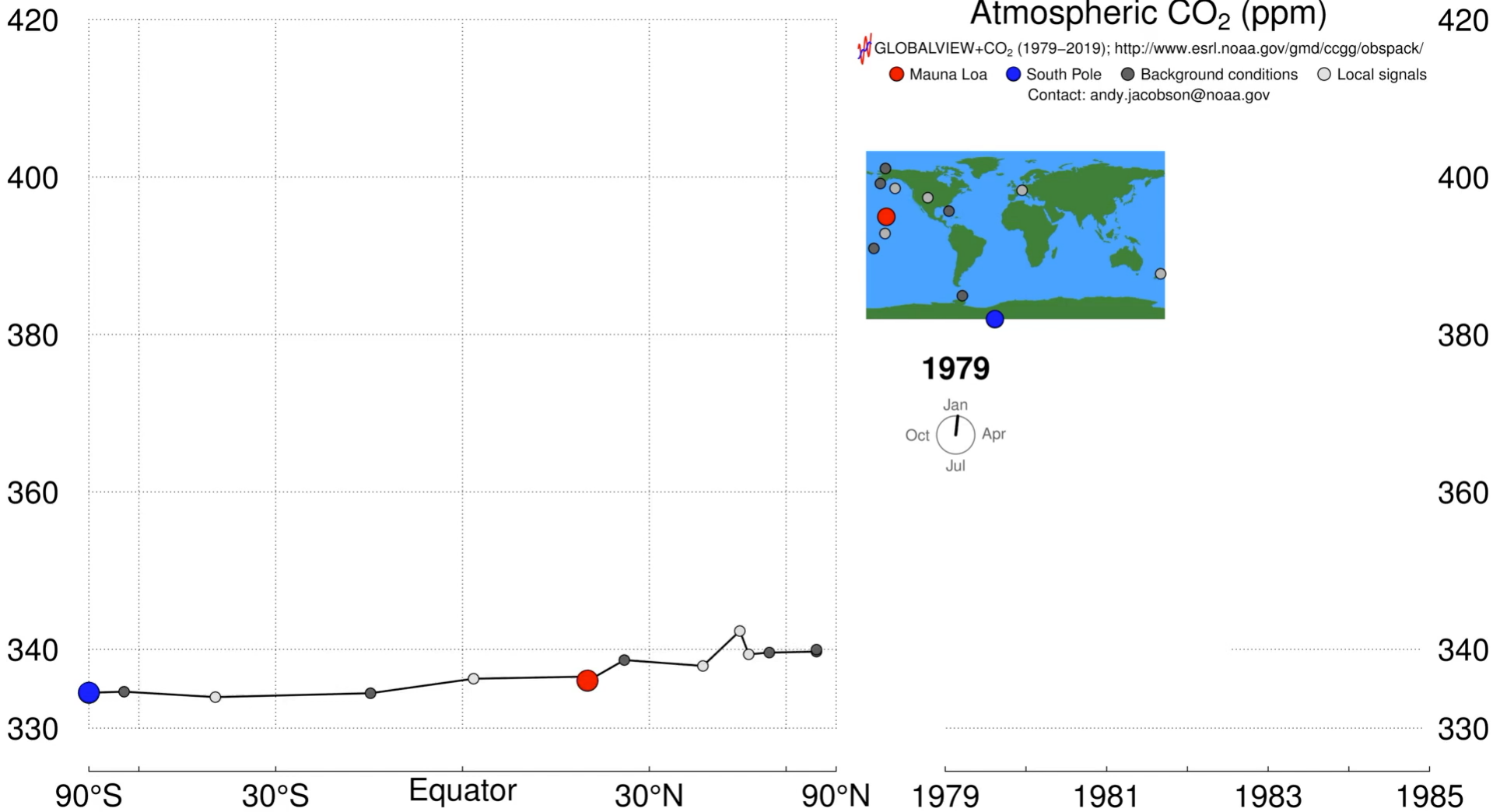


CLIMATE
CHANGE
COUNCIL
PUERTO RICO

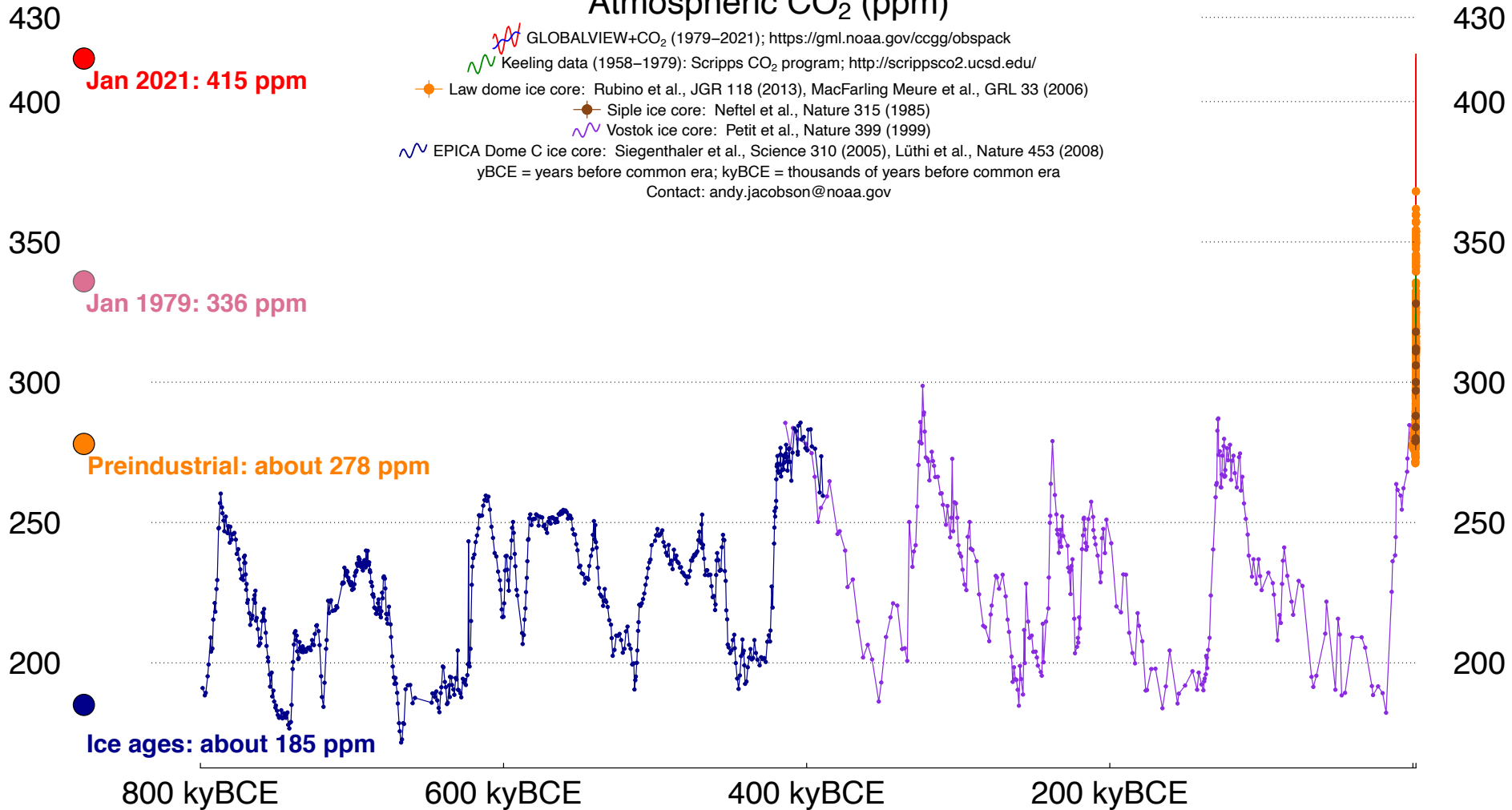
Emissions, Temperature, Rainfall, & Tropical Cyclones/Hurricanes

PR-CCC.ORG

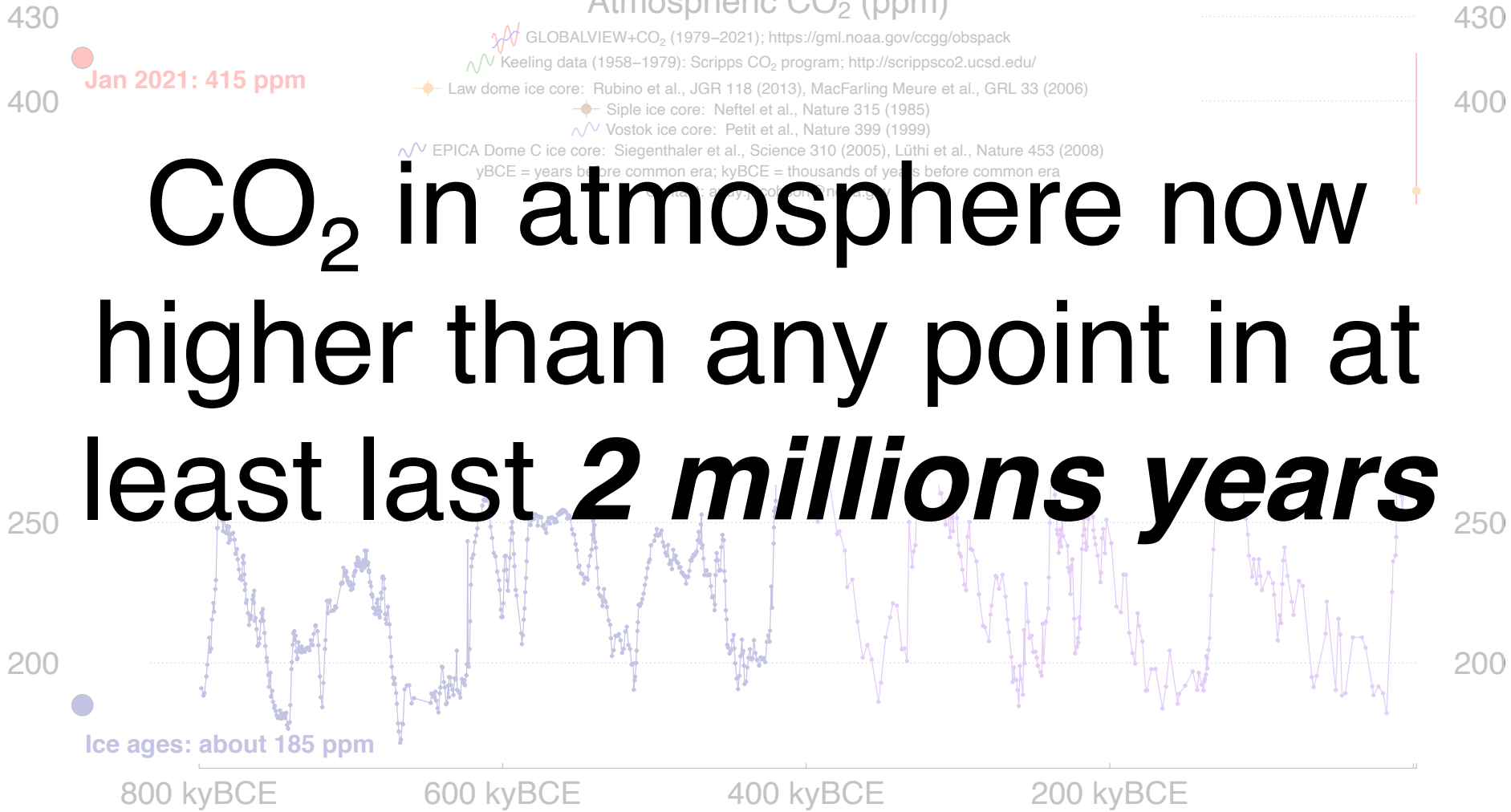




Atmospheric CO₂ (ppm)



Atmospheric CO₂ (ppm)



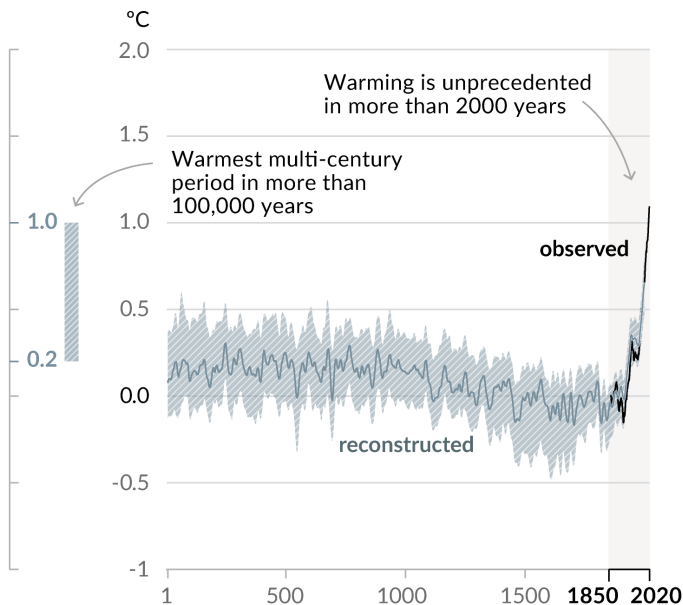
**CO₂ in atmosphere now
higher than any point in at
least last *2 millions years***

Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

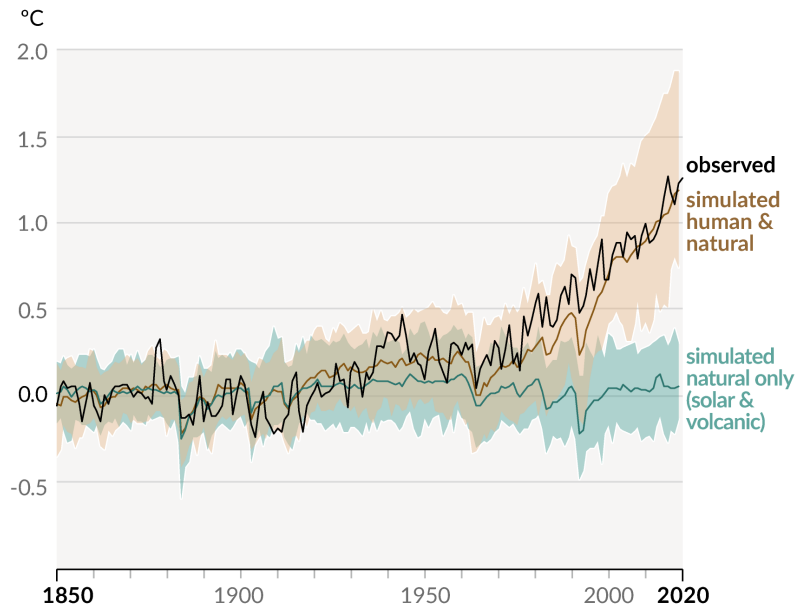
Figure SPM.1

Changes in global surface temperature relative to 1850-1900

a) Change in global surface temperature (decadal average) as **reconstructed** (1-2000) and **observed** (1850-2020)

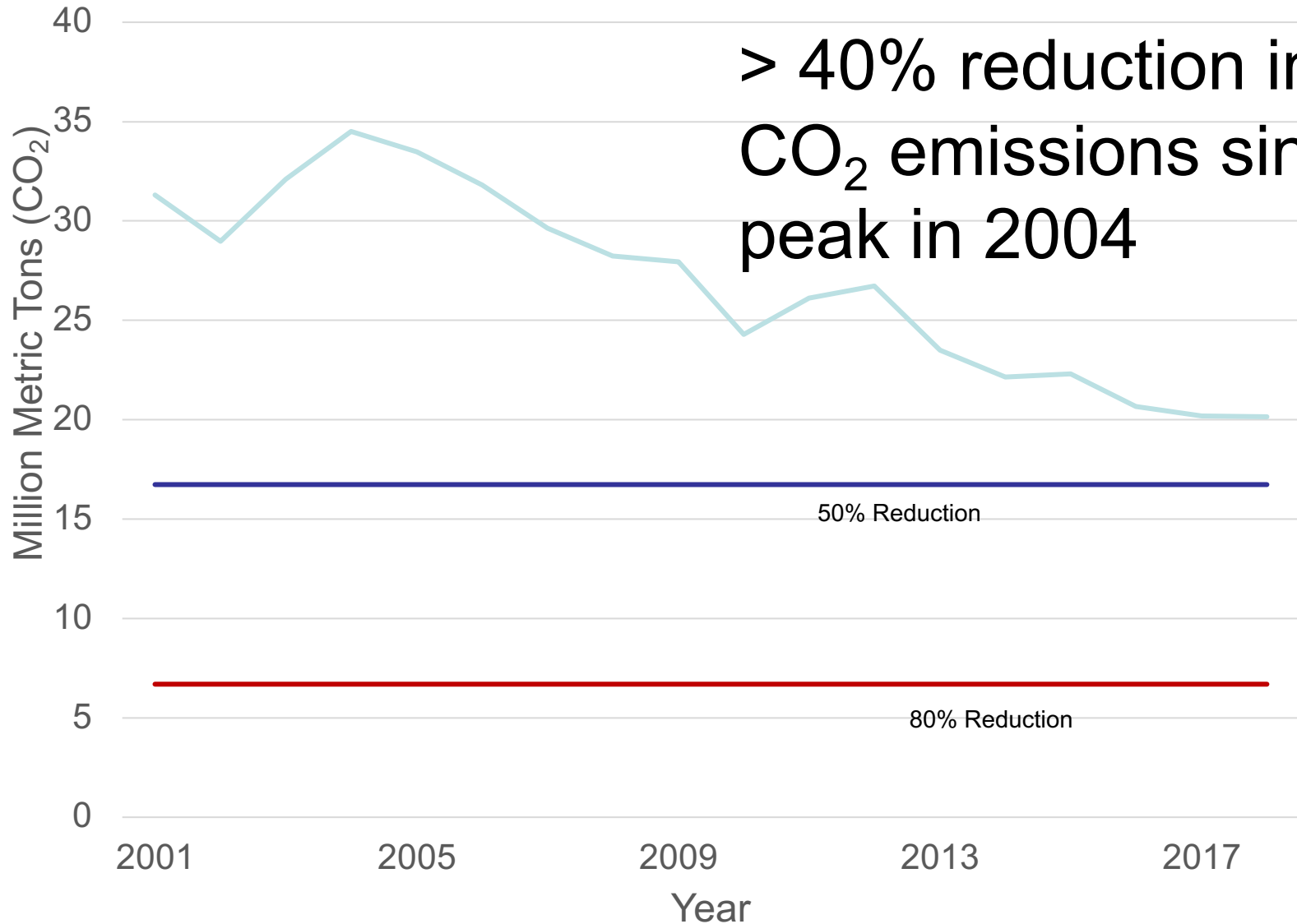


b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850-2020)



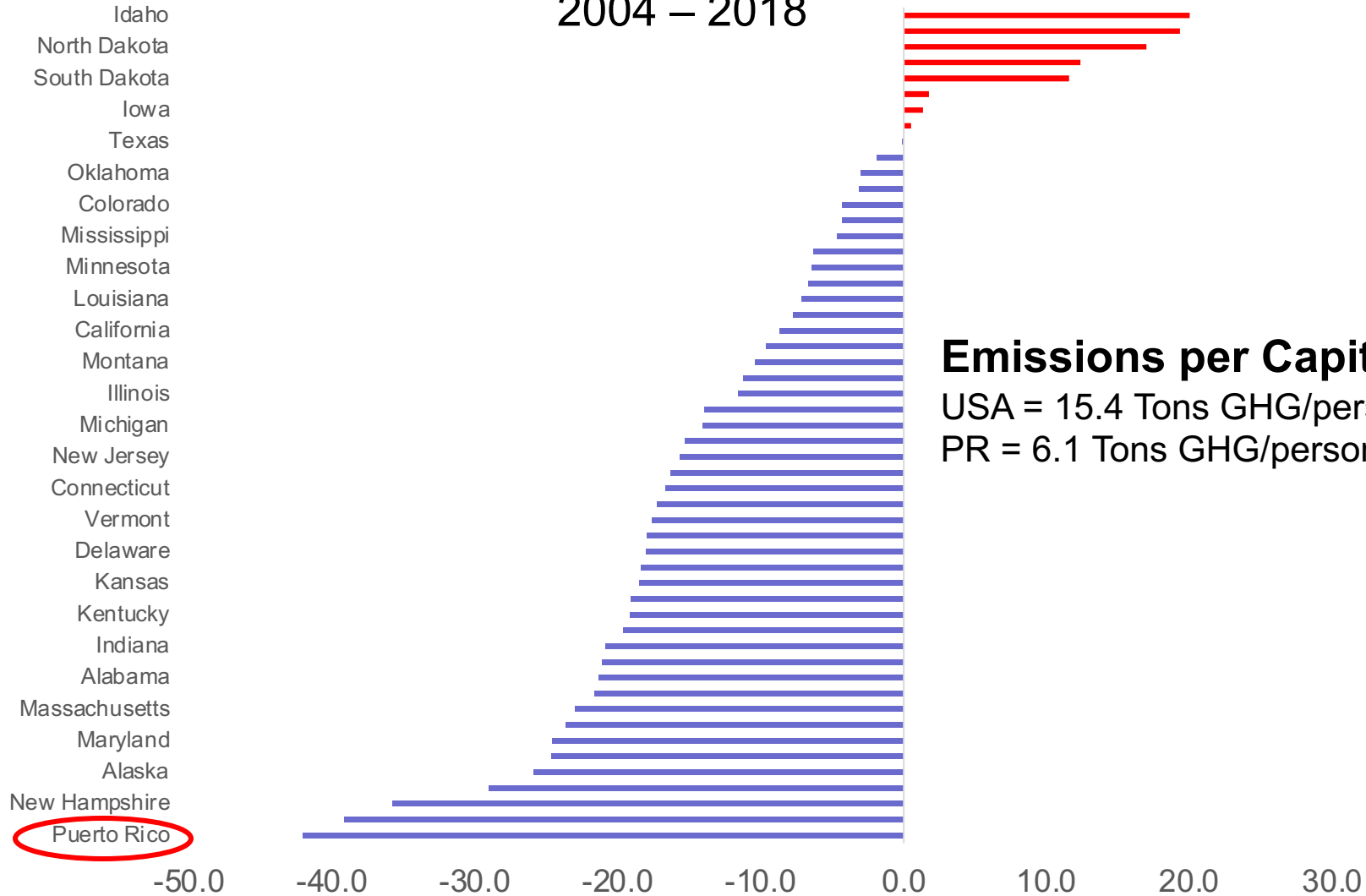
IPCC AR6 WG1

Steep reduction in greenhouse gas emissions in Puerto Rico



Steep reduction in greenhouse gas emissions in Puerto Rico

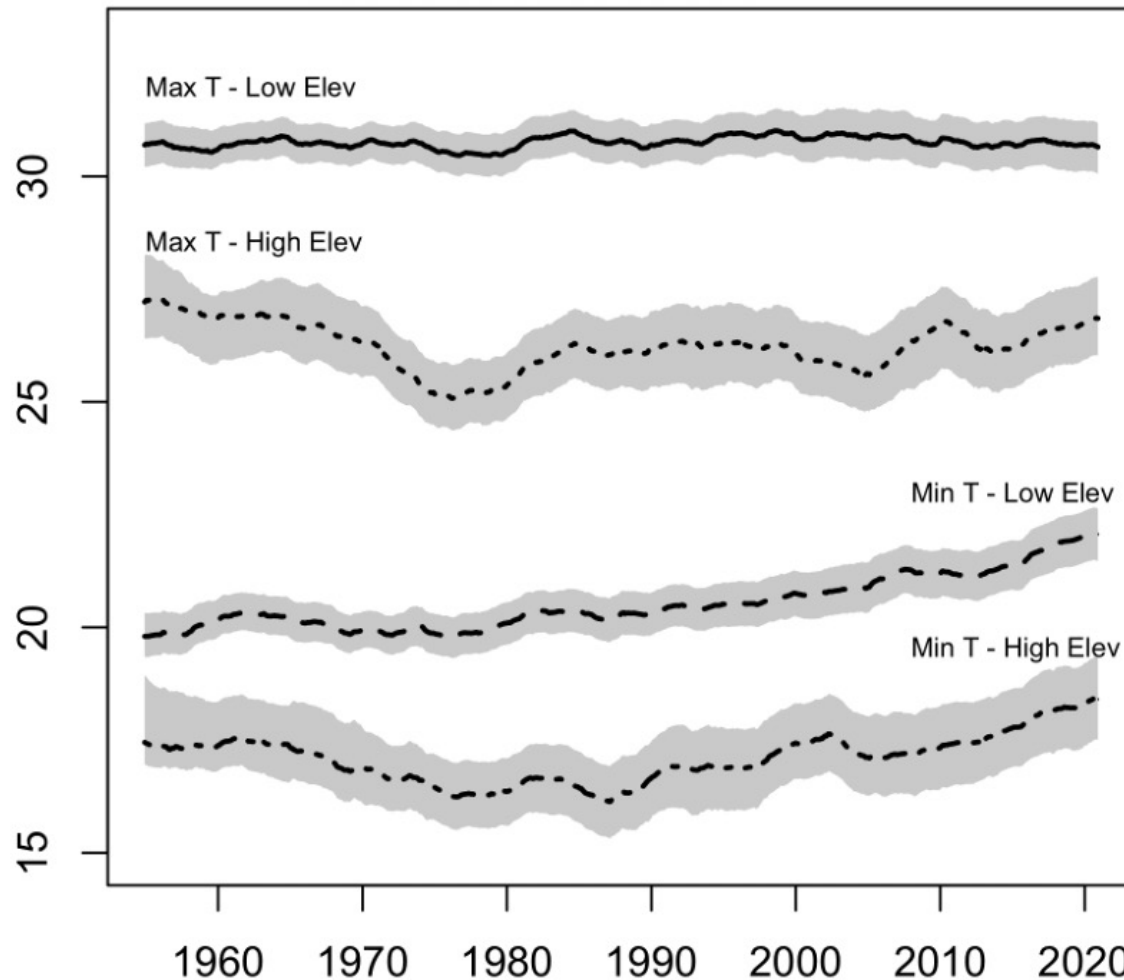
% Emissions Reduction by State/Commonwealth 2004 – 2018



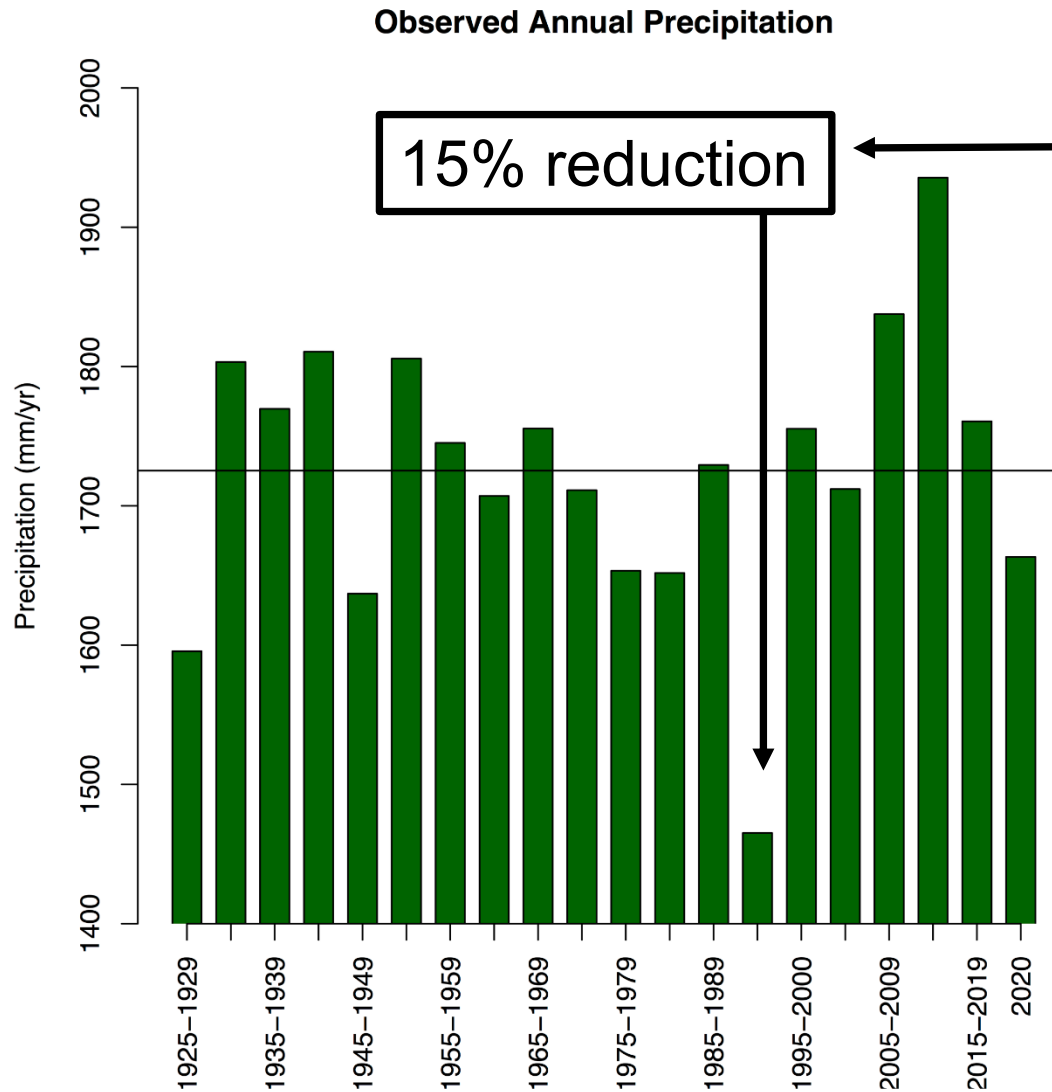
Emissions per Capita
 USA = 15.4 Tons GHG/person/year
 PR = 6.1 Tons GHG/person/year

Significant Nighttime Warming Trends

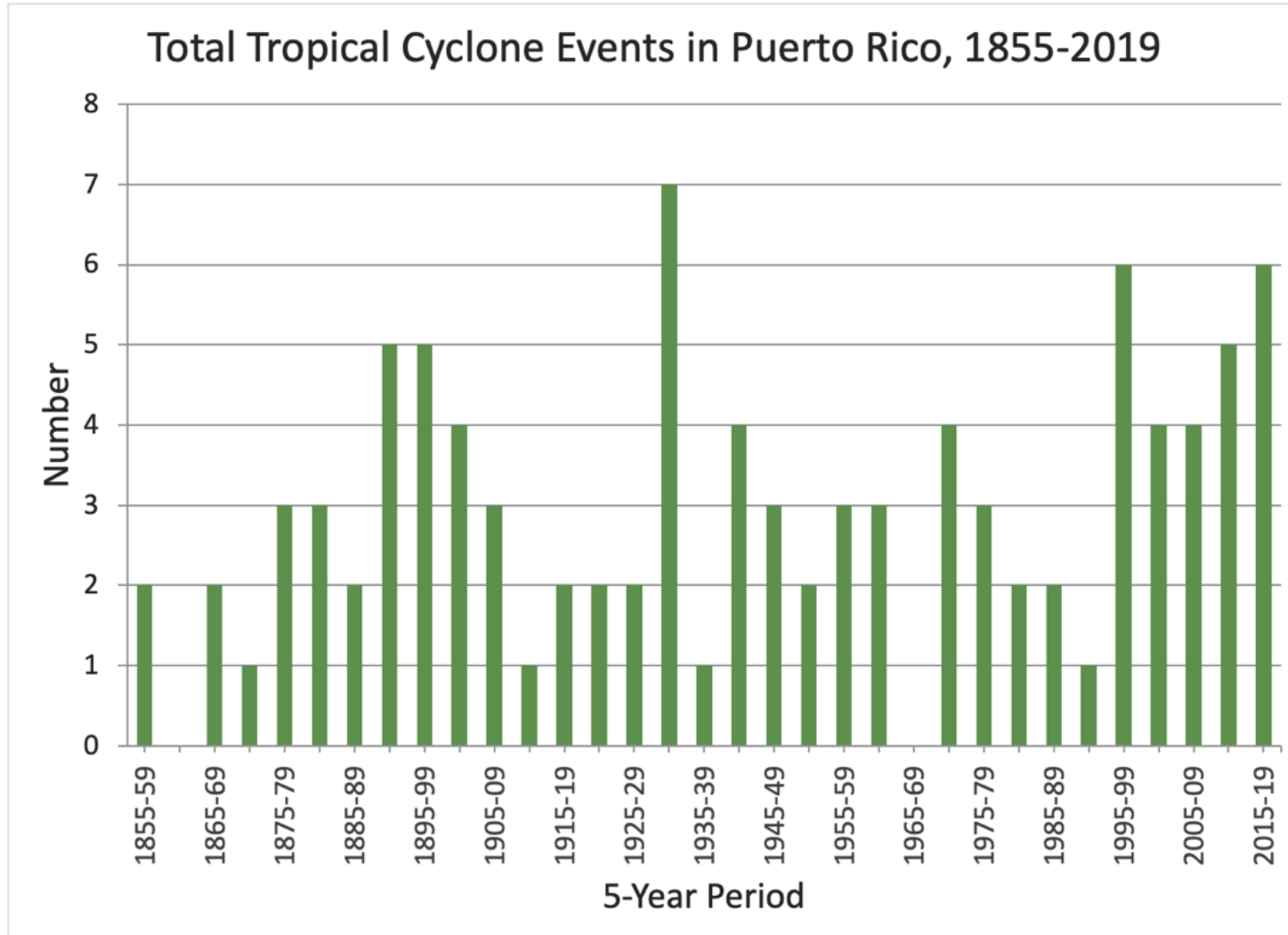
Puerto Rico Maximum and Minimum Temperature (°C) at High and Low Elevations



Precipitation – No Discernible Trends at Present



Becomes the norm
in worst case
scenario by 2050



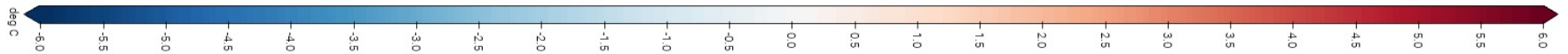
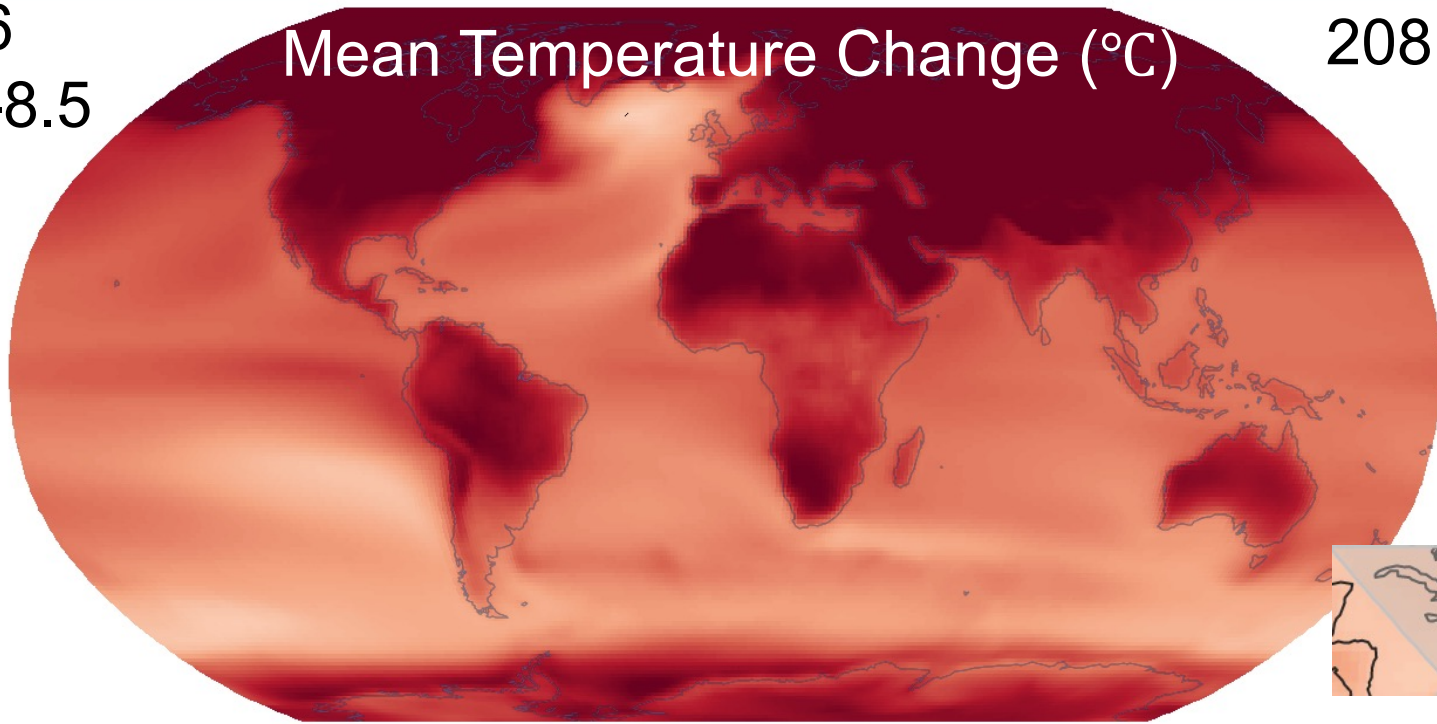
Projected Changes Temperature



CMIP6
SSP5-8.5

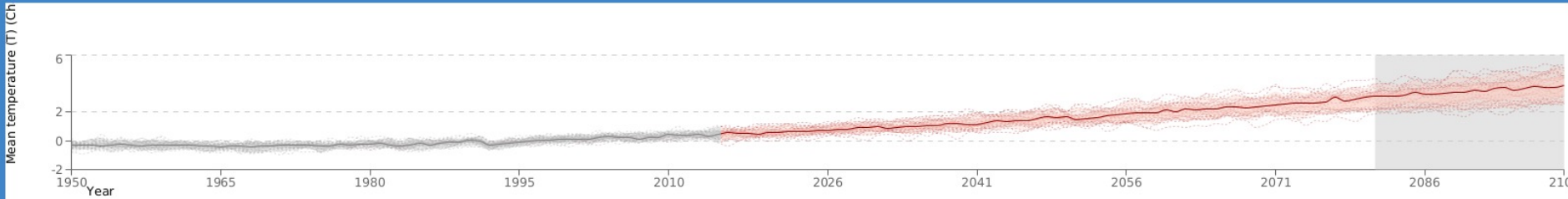
Mean Temperature Change (°C)

2081-2100



Mean temperature (T) - Change (deg C)
Long Term (2081-2100) (SSP5-8.5) (rel. to 1986-2005)
CMIP6 - Annual (34 models)

□ High agreement
▨ Low agreement



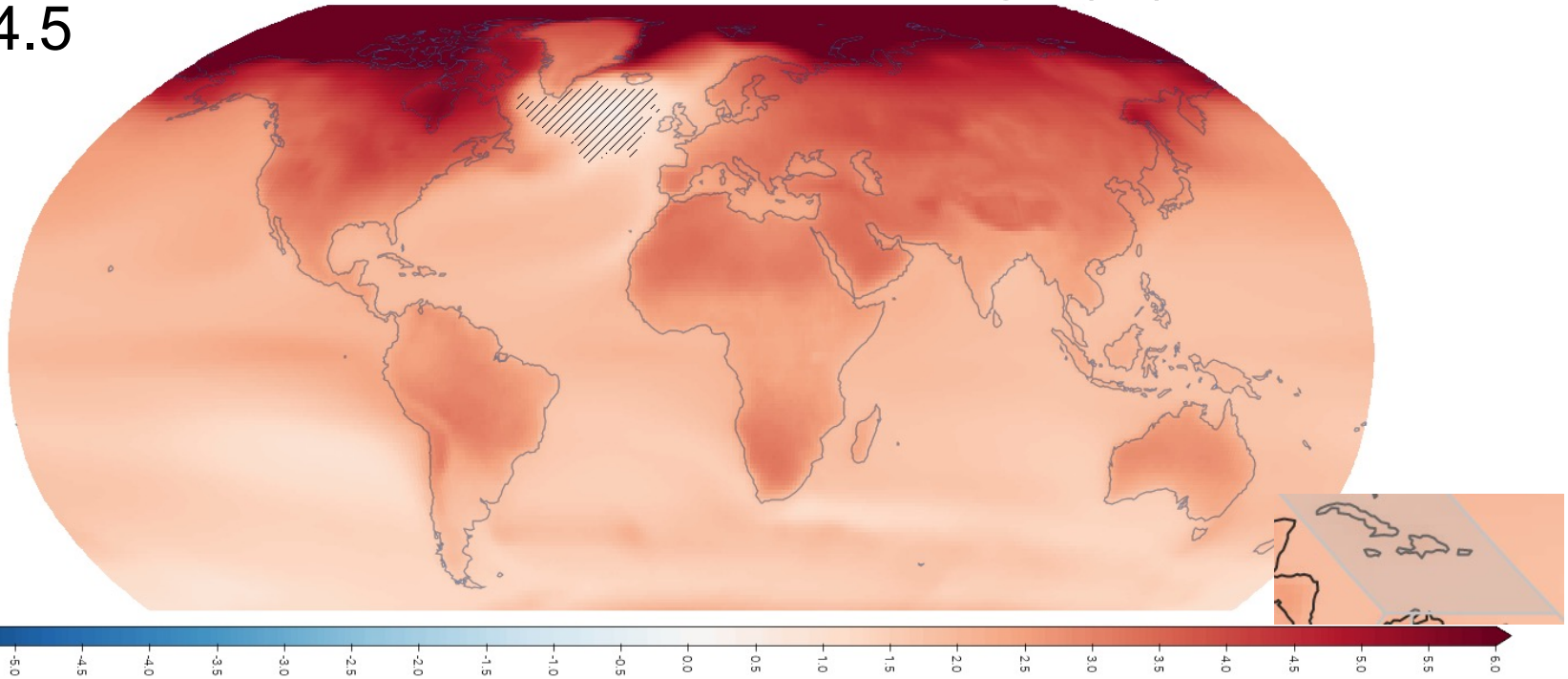
Dotted line: Model Solid line: P50 (Median) Gray shading: Selected period Light / dark area: Spread P10-P90 / P25-75

Mean temperature (T) - Change (deg C)
Long Term (2081-2100) (SSP5-8.5) (rel. to 1986-2005)
CMIP6 - Annual (34 models)-Caribbean



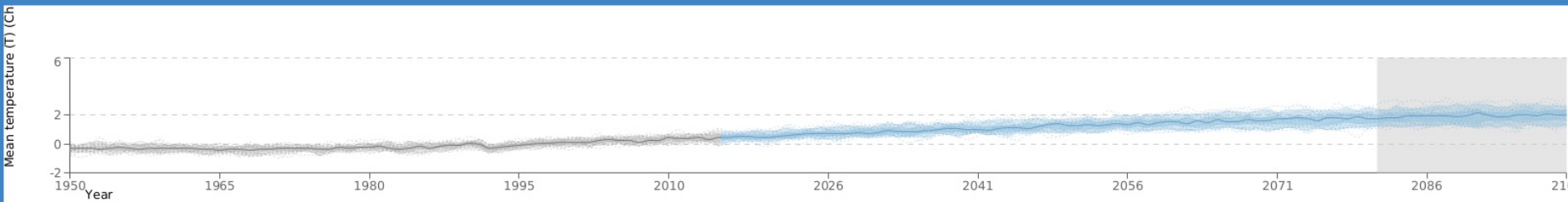
CMIP6 SSP2-4.5

Mean Temperature Change (°C) 2081-2100



Mean temperature (T) - Change (deg C)
Long Term (2081-2100) (SSP2-4.5) (rel. to 1986-2005)
CMIP6 - Annual (34 models)

□ High agreement
▨ Low agreement



Dotted line: Model Solid line: P50 (Median) Gray shading: Selected period Light / dark area: Spread P10-P90 / P25-75

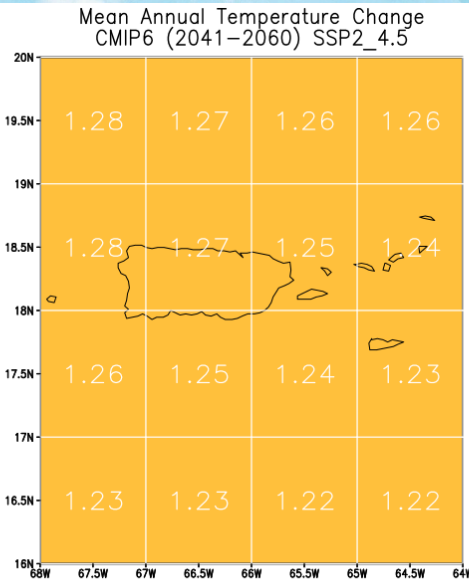
Mean temperature (T) - Change (deg C)
Long Term (2081-2100) (SSP2-4.5) (rel. to 1986-2005)
CMIP6 - Annual (34 models) Caribbean



Mean Temperature Change (°C)

Mid-Century
(2041-2060)

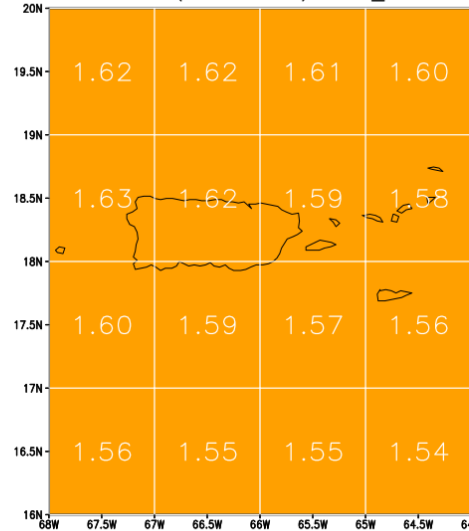
CMIP6
SSP2_4.5



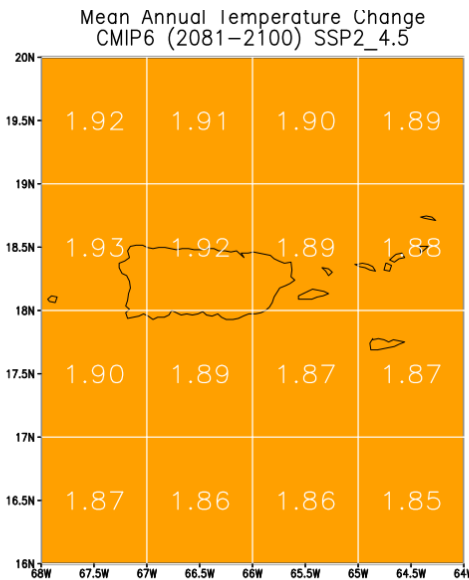
Mean Annual Temperature Change
CMIP6 (2041-2060) SSP5_8.5

Mid-Century
(2041-2060)

CMIP6
SSP5_8.5

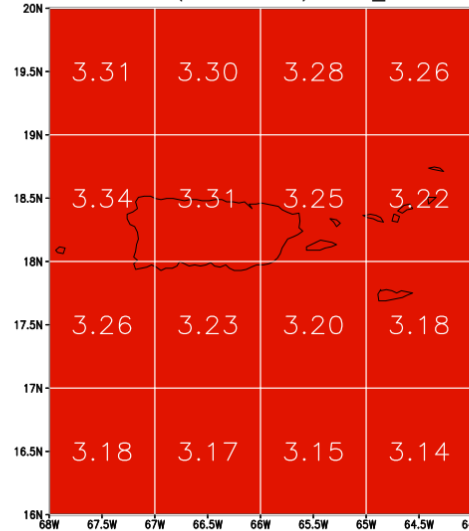


End-Century
(2081-2100)



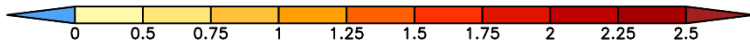
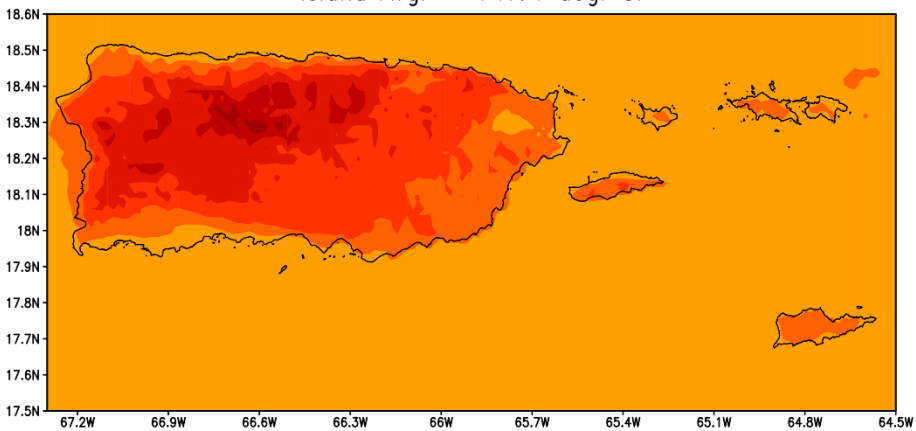
Mean Annual Temperature Change
CMIP6 (2081-2100) SSP5_8.5

End-Century
(2081-2100)

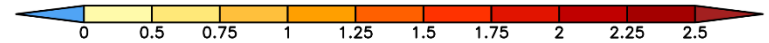
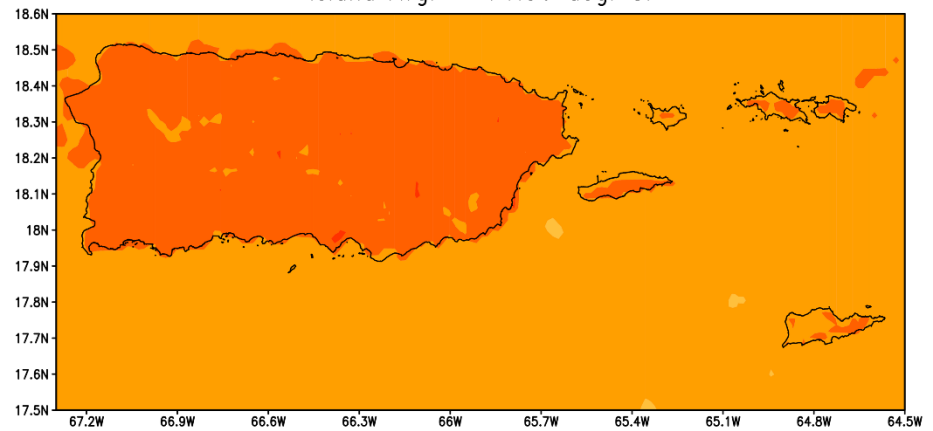


Downscaled Max. and Min. Temp. (°C) Projections for RCP8.5 Mid-Century (2041-2060)

WRF-CESM Max. Temp. - Annual
Island Avg. = +1.64 deg. C.

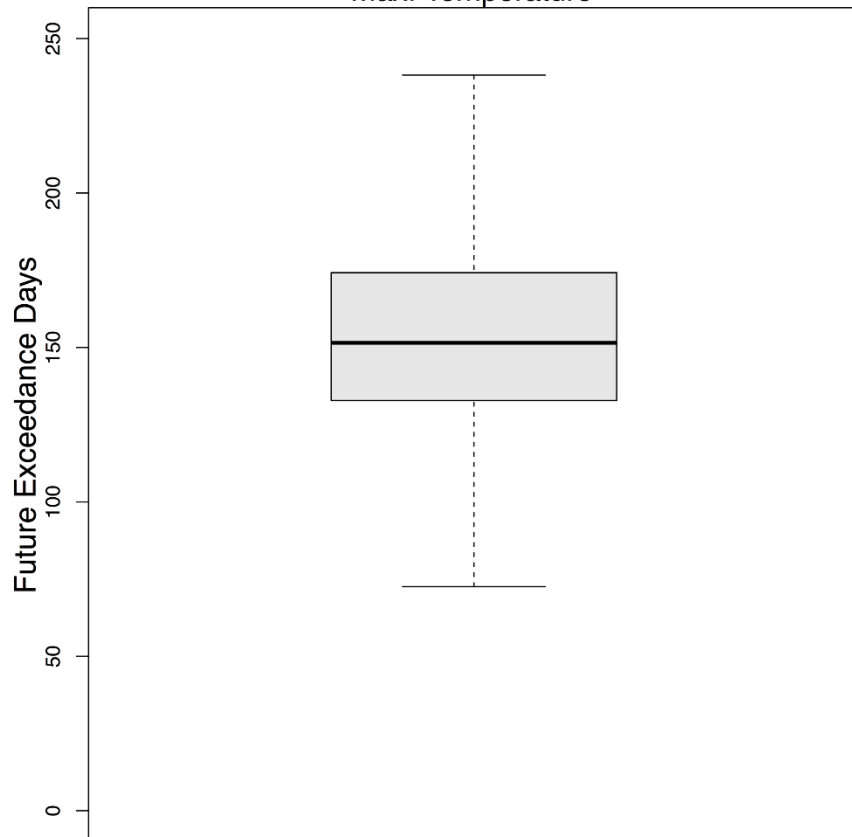


WRF-CESM Min. Temp. - Annual
Island Avg. = +1.36 deg. C.

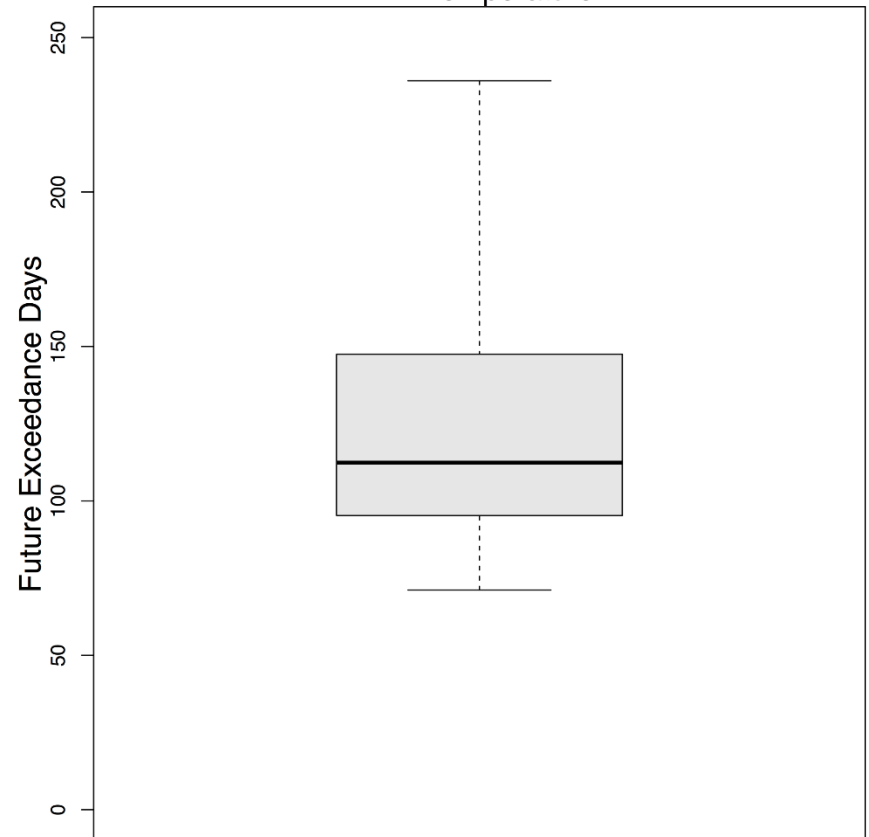


Projected changes for temperature exceedance days for RCP8.5 Mid-Century (2041-2060)

Max. Temperature



Min. Temperature



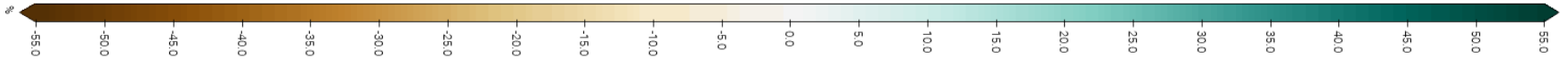
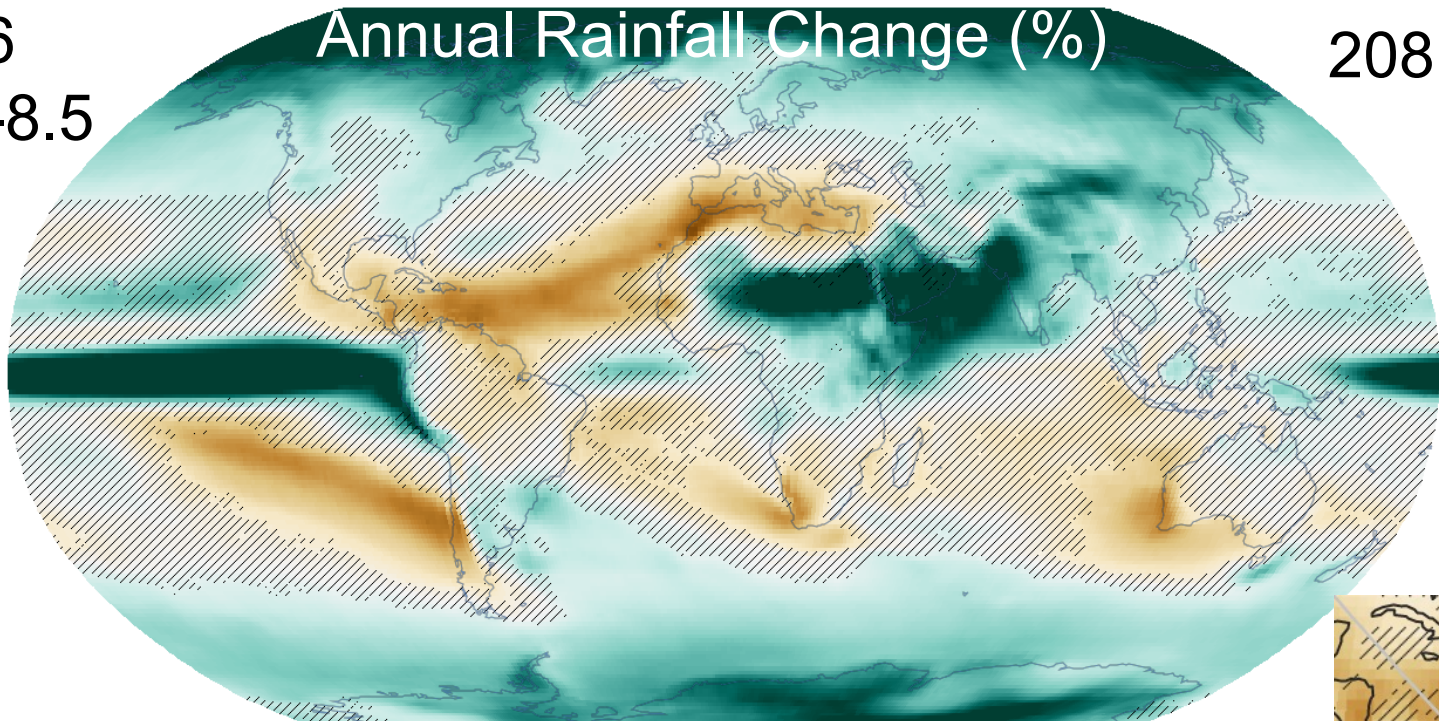
Projected Changes Rainfall



CMIP6
SSP5-8.5

Annual Rainfall Change (%)

2081-2100



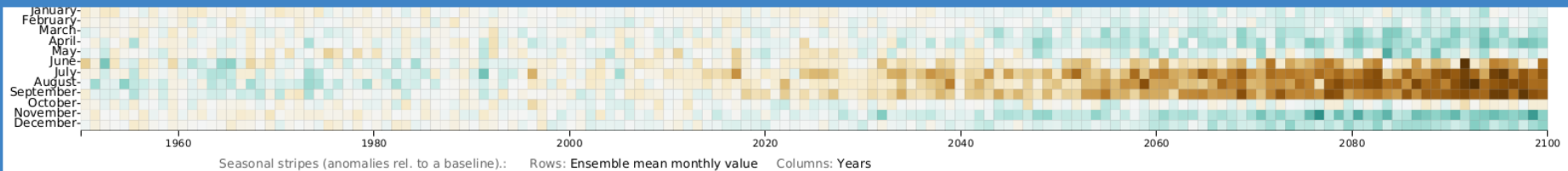
Total precipitation (PR) - Change (%)
Long Term (2081-2100) (SSP5-8.5) (rel. to 1986-2005)
CMIP6 - Annual (33 models)

High agreement
 Low agreement



<http://www.ipcc.ch/copyright>

09-03-2022 00:57:41



Total precipitation (PR) - Change (%)
SSP5-8.5 (rel. to 1986-2005)
CMIP6 - Annual (33 models)-South-Eastern South America, Caribbean



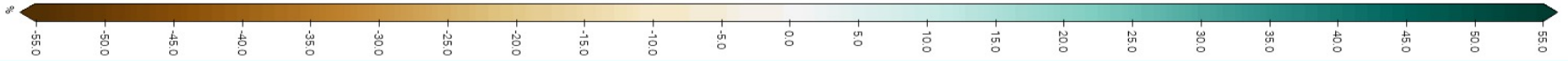
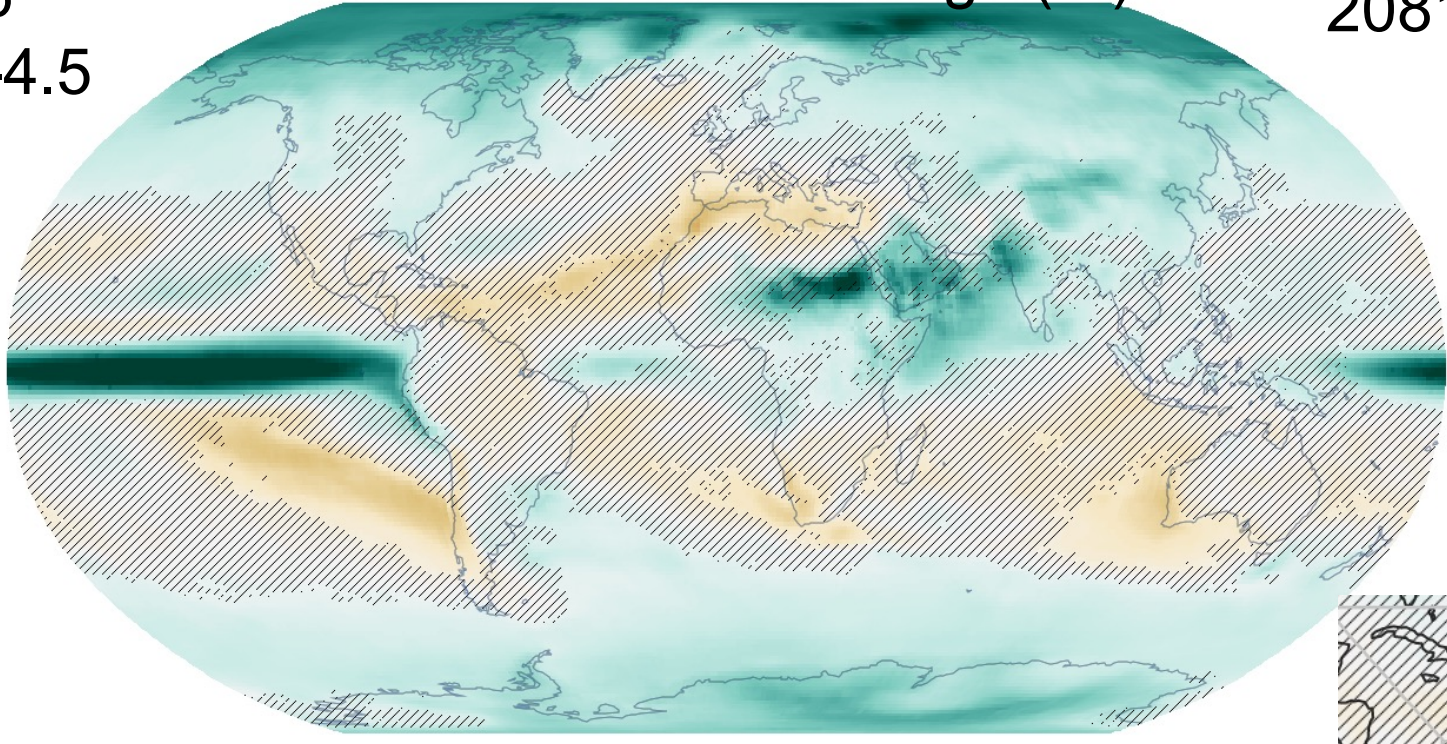
<http://www.ipcc.ch/copyright>

09-03-2022 00:56:57

CMIP6
SSP2-4.5

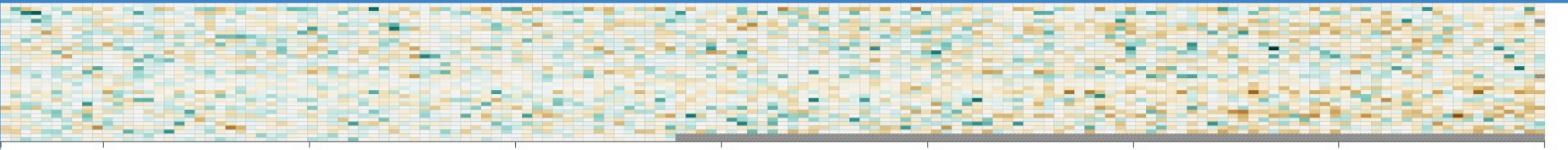
Annual Rainfall Change (%)

2081-2100



Total precipitation (PR) - Change (%)
Long Term (2081-2100) (SSP2-4.5) (rel. to 1986-2005)

□ High agreement
▨ Low agreement



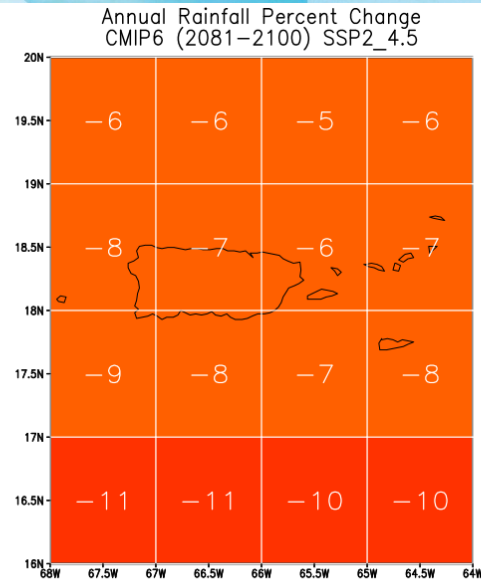
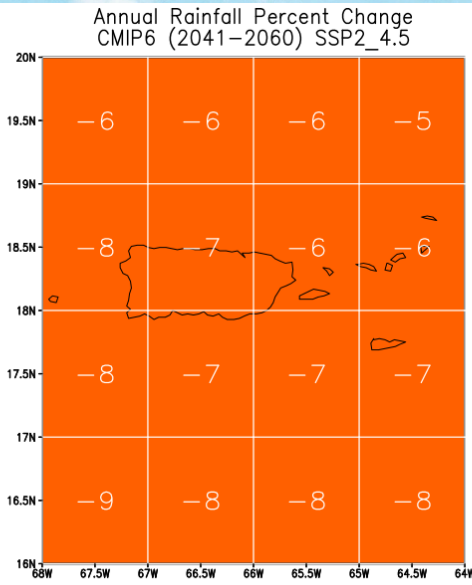
Climate stripes (anomalies rel. to a baseline): Rows: Models (median on the top) Columns: Years

Total precipitation (PR) - Change (%)
SSP2-4.5 (rel. to 1986-2005)
CMIP6 - Annual (32 models)-Caribbean



Annual Rainfall Change (%)

Mid-Century
(2041-2060)

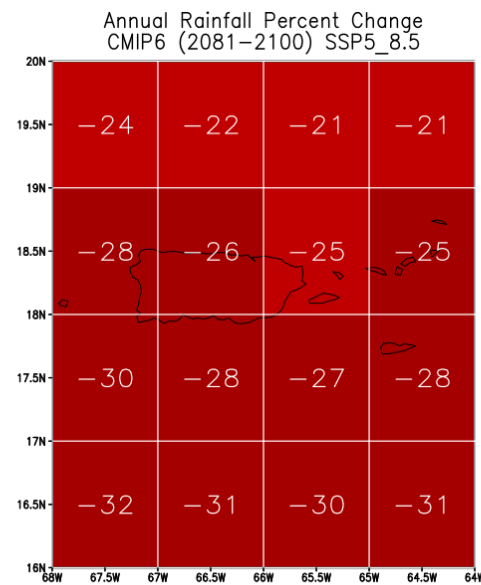
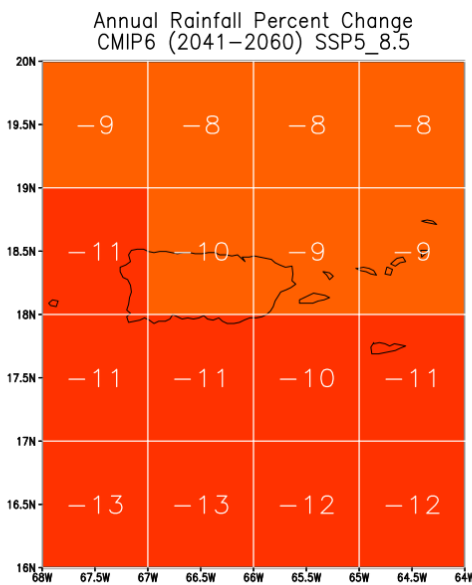


Mid-Century
(2041-2060)

CMIP6
SSP2_4.5

CMIP6
SSP5_8.5

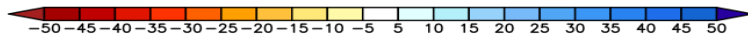
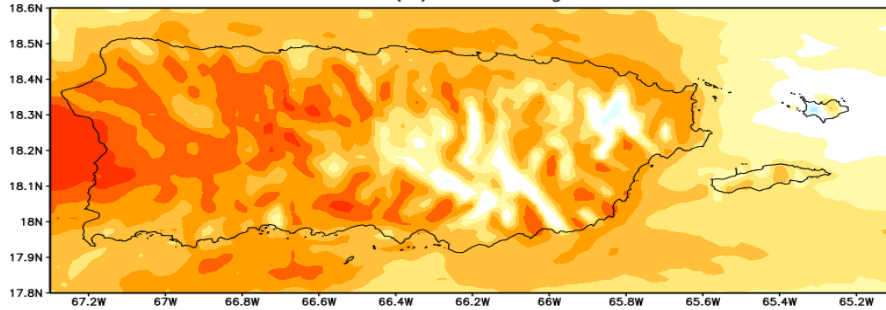
End-Century
(2081-2100)



End-Century
(2081-2100)

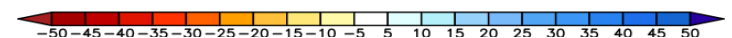
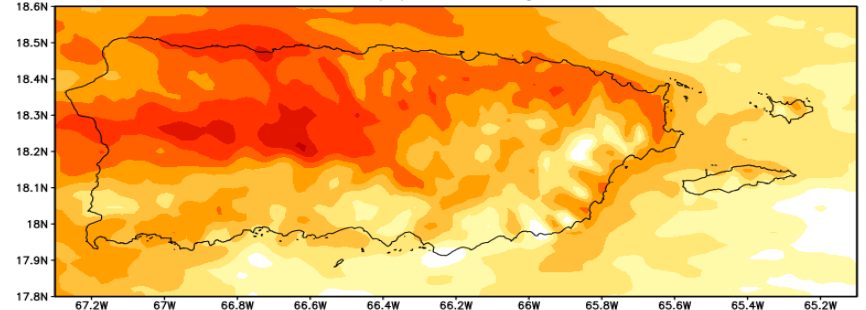
Downscaled Rainfall Projections (%) for RCP8.5 Mid-Century (2041-2060)

WRF-CCSM Precip. - Wet Season
Difference (%) Island Avg. = -20%



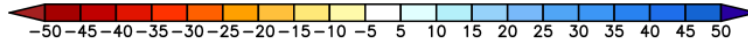
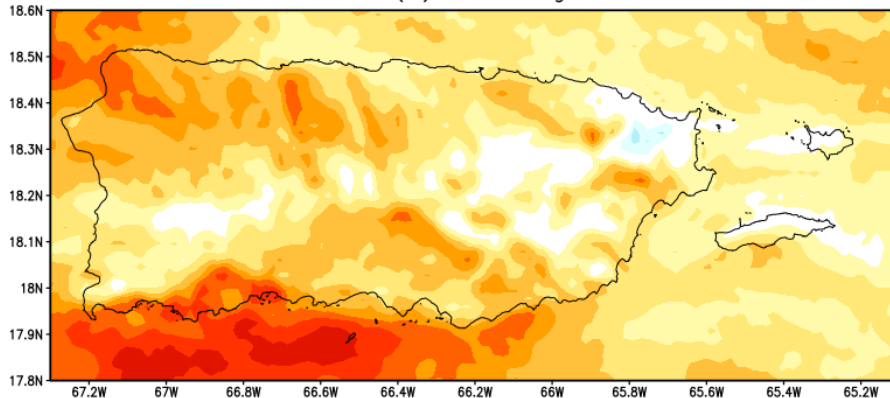
WET SEASON (April-Oct.)

WRF-CCSM Precip. - Dry Season
Difference (%) Island Avg. = -23%

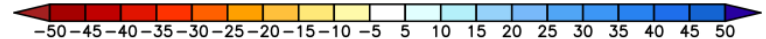
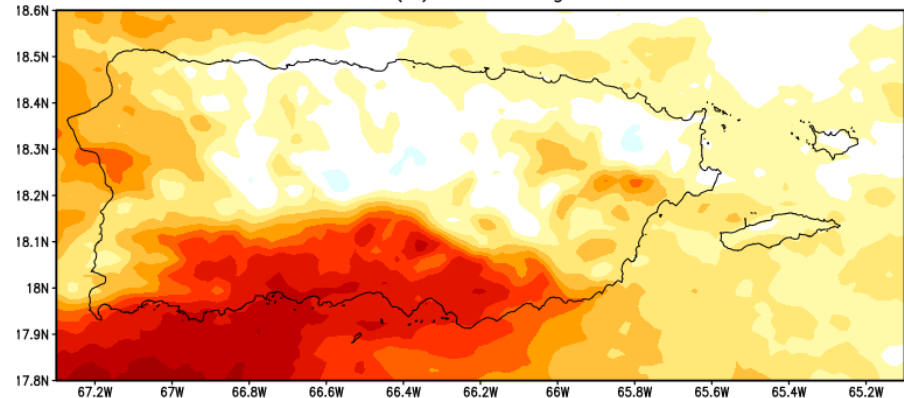


DRY SEASON (Nov. - March)

WRF-CNRM Precip. - Wet Season
Difference (%) Island Avg. = -13%



WRF-CNRM Precip. - Dry Season
Difference (%) Island Avg. = -15%

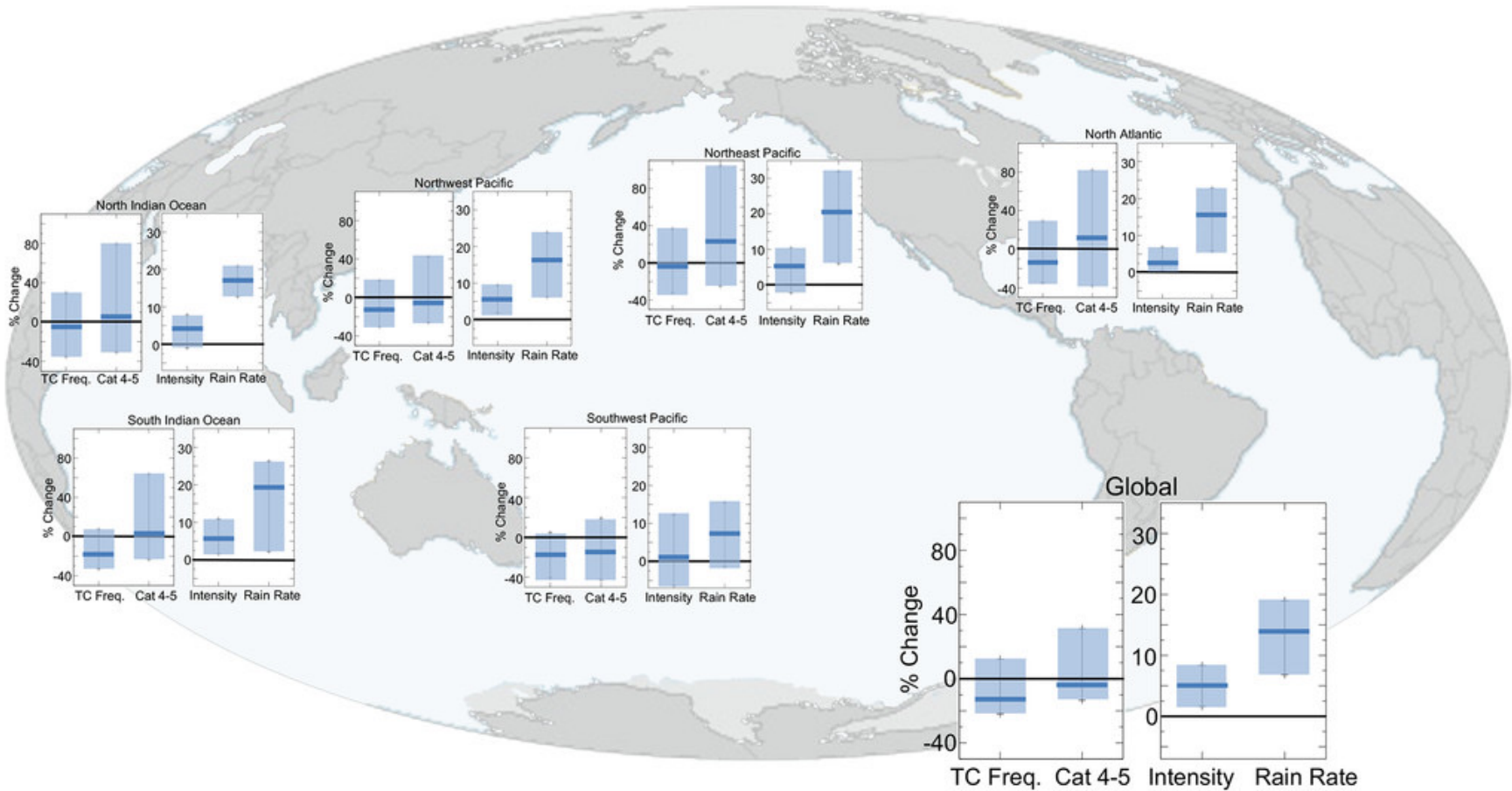


Projected Changes Tropical Cyclones



Increase rainfall rates & intensity winds
 Number of very intense storms increase (Cat 4/5 storms)
 Uncertainty in total number of storms

Tropical Cyclone Projections (2°C Global Warming)



Adapted from Knutson et al. 2020



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¡MUCHAS GRACIAS!

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