Adaptation and Resilience in Connecticut

James O’Donnell

Marc DeVos

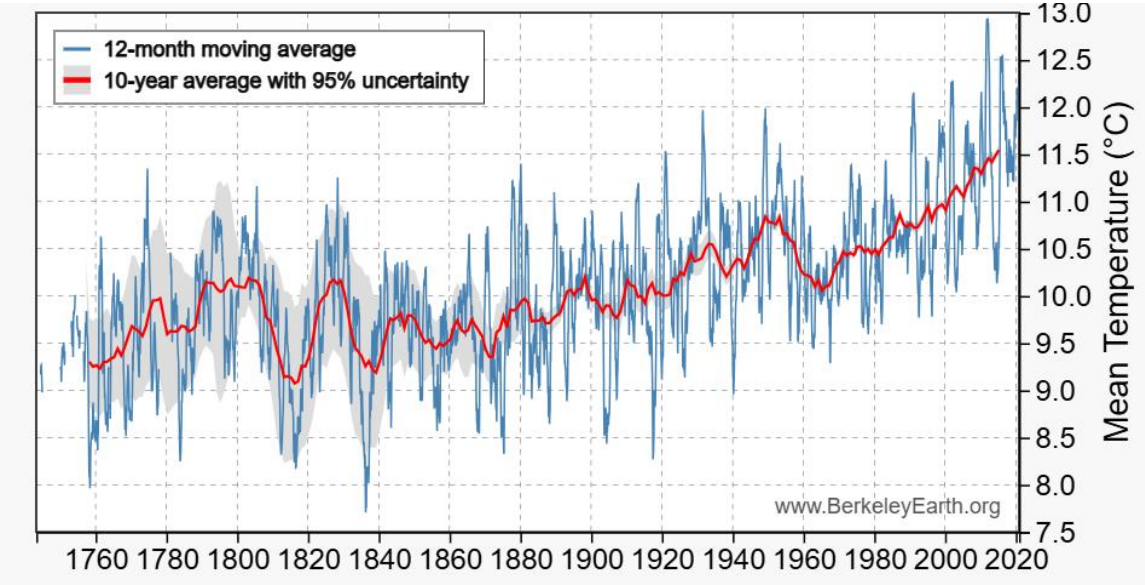
Connecticut Institute for Resilience and Climate Adaptation

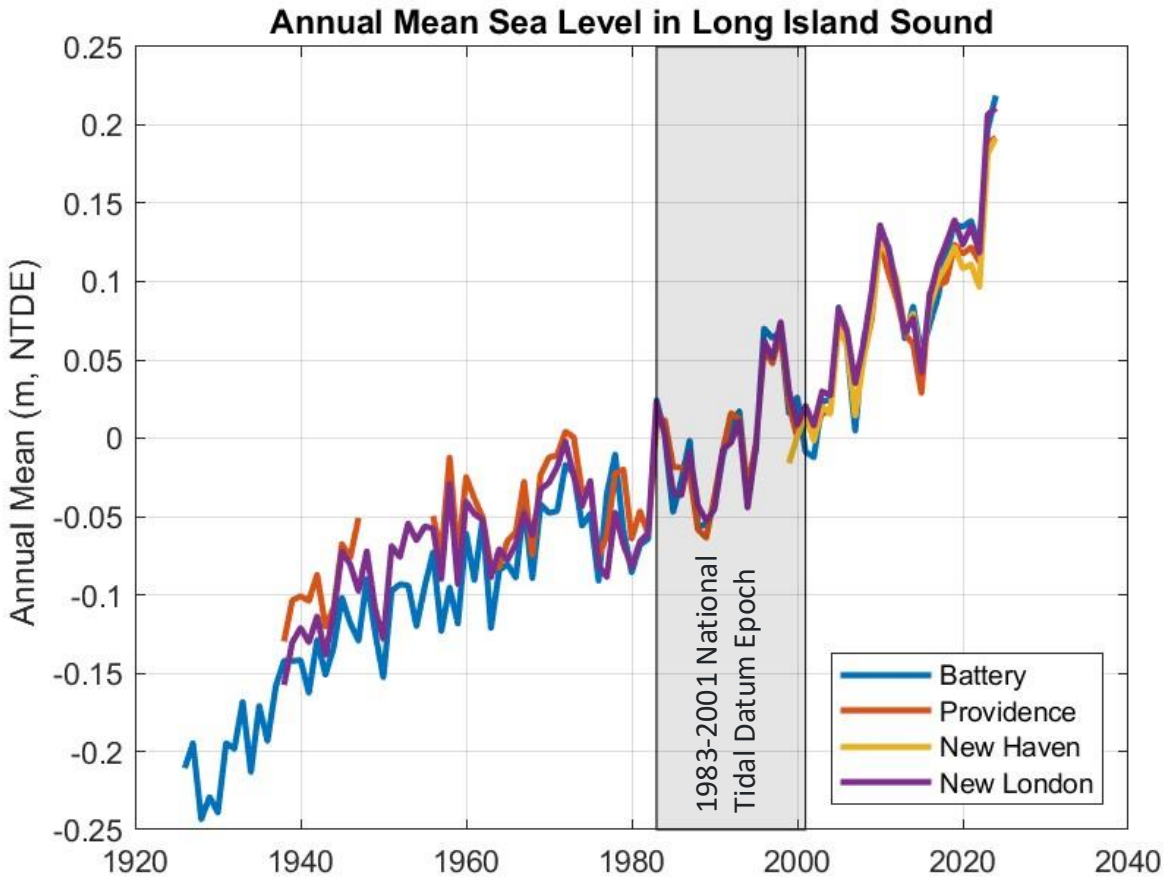
University of Connecticut

Overview

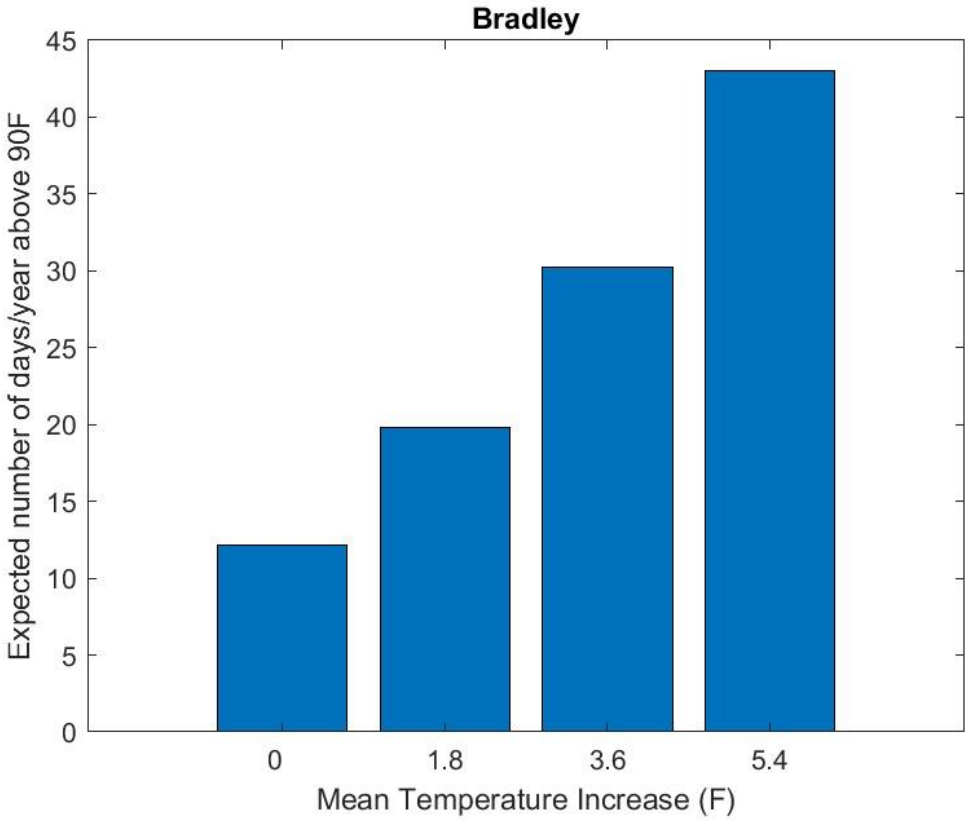
- Climate Change and its Impacts in Connecticut
  - Warming – More hot nights
  - Sea Level Rise – More frequent flooding
  - More High-Intensity Hurricanes - low risk but more likely, high wind and precip.
  - More High Precipitation Events - magnitude is uncertain
- Resilience Planning and Implementation

New Haven Annual Mean Temperature





Expected number of nights above 90F at Bradley Airport at different mean warming levels



Effect of mean Sea Level Rise on Flood Risk: 25cm increases flood risk by ~5

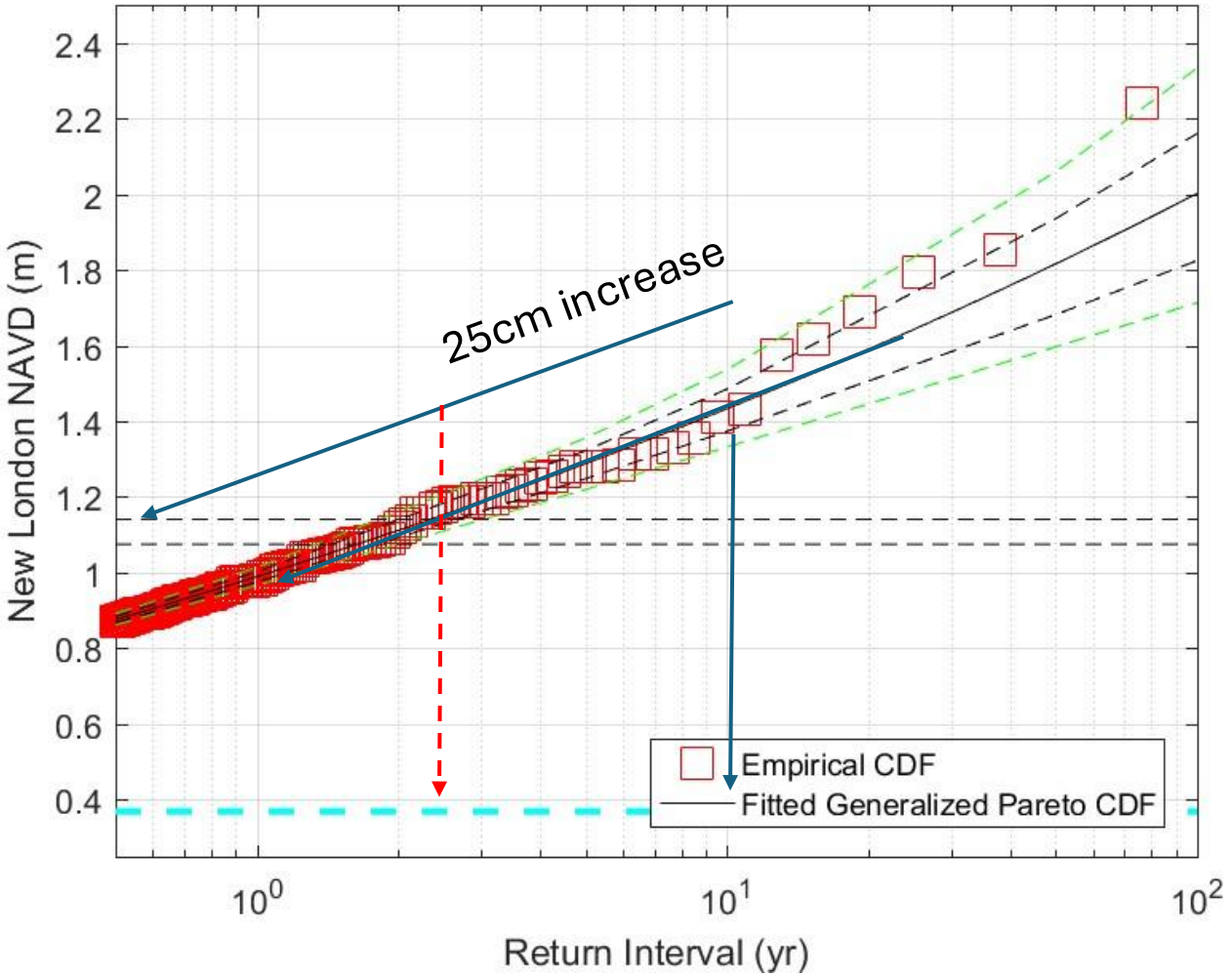
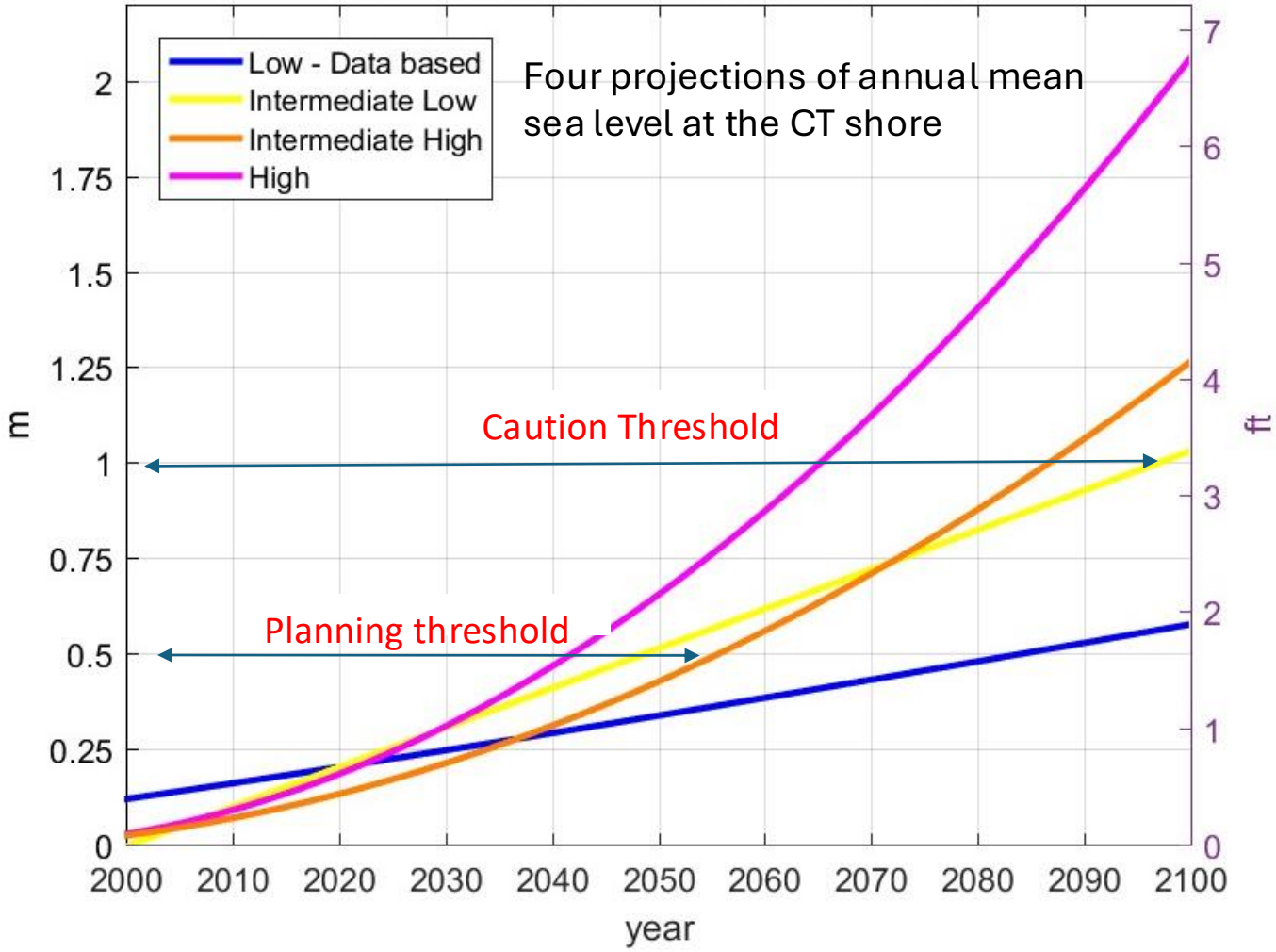


Figure 1. Sea level rise projections for Connecticut based on local tide gage observations (blue), the IPCC (2013) RPC 4.5 model simulations near Long Island Sound (yellow line), the semi-empirical model predictions are in orange and the magenta shows the ice mass balance projections.



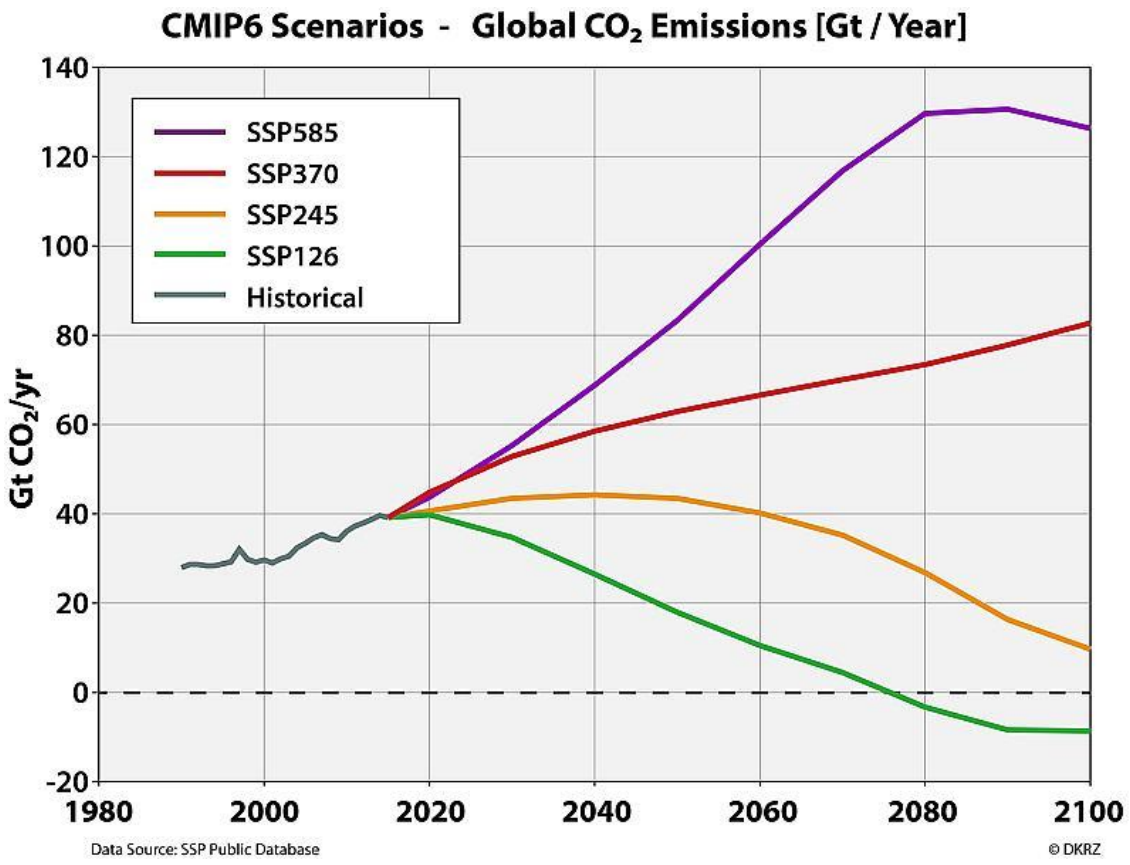
20in/50cm at 2050

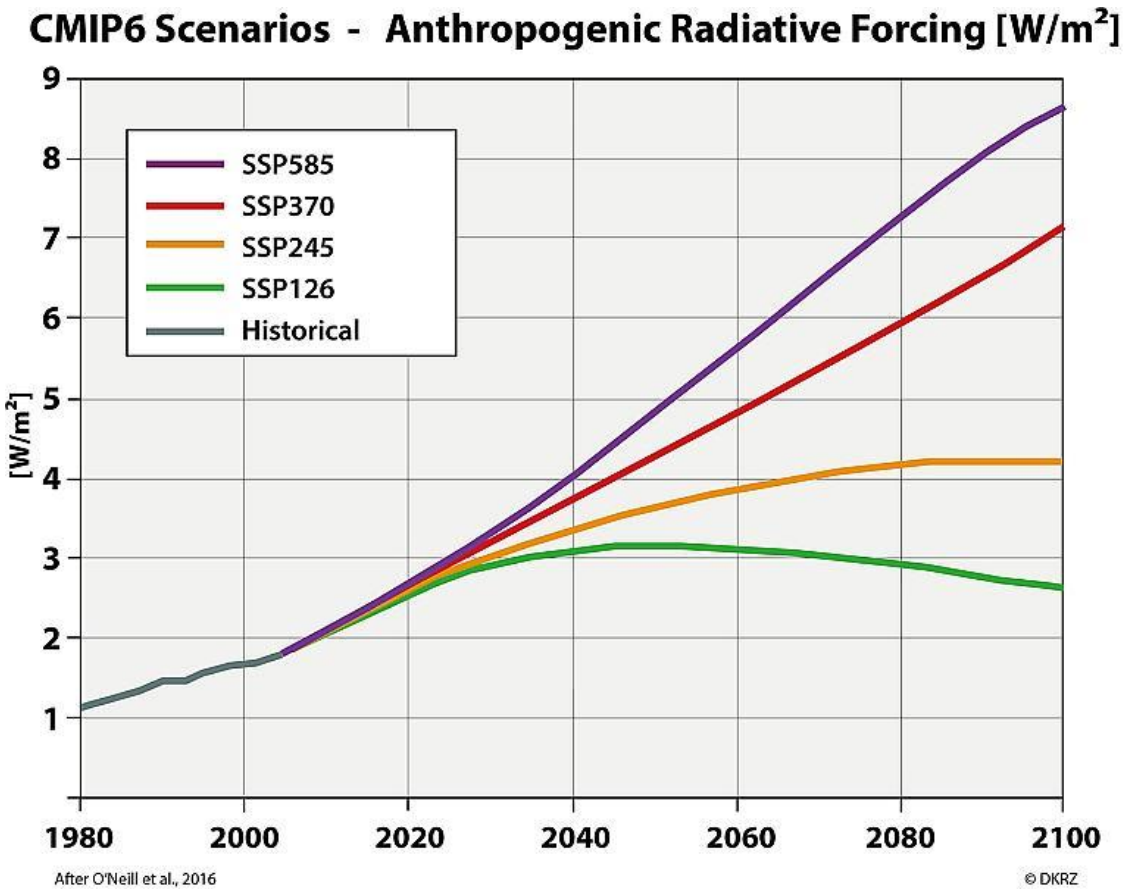
Decadal Review

Alert people about the prospect of 100cm by 2100

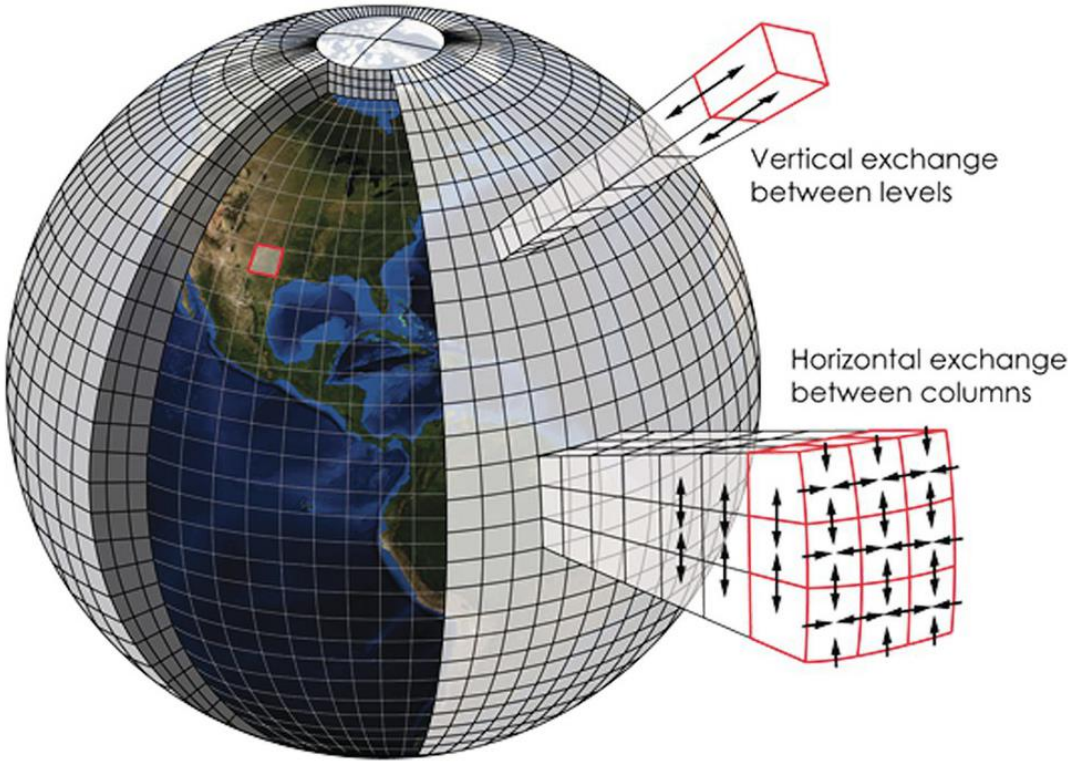
CMIP6 - Coupled Model Intercomparison Project Phase 6

ScenarioMIP – Projections of 30 different models forced by 4 GHG emissions scenarios (Shared Socioeconomic Pathway).





Model grids: 100-200km



From: Kotamarthi et al. (2021)
https://doi.org/10.1017/9781108601269

"Down Scaling"

$$Y_{SDS} = f(X_{GCM}; \theta(X_{GCM}^{hist}, Y_{OBS}))$$

METHODS

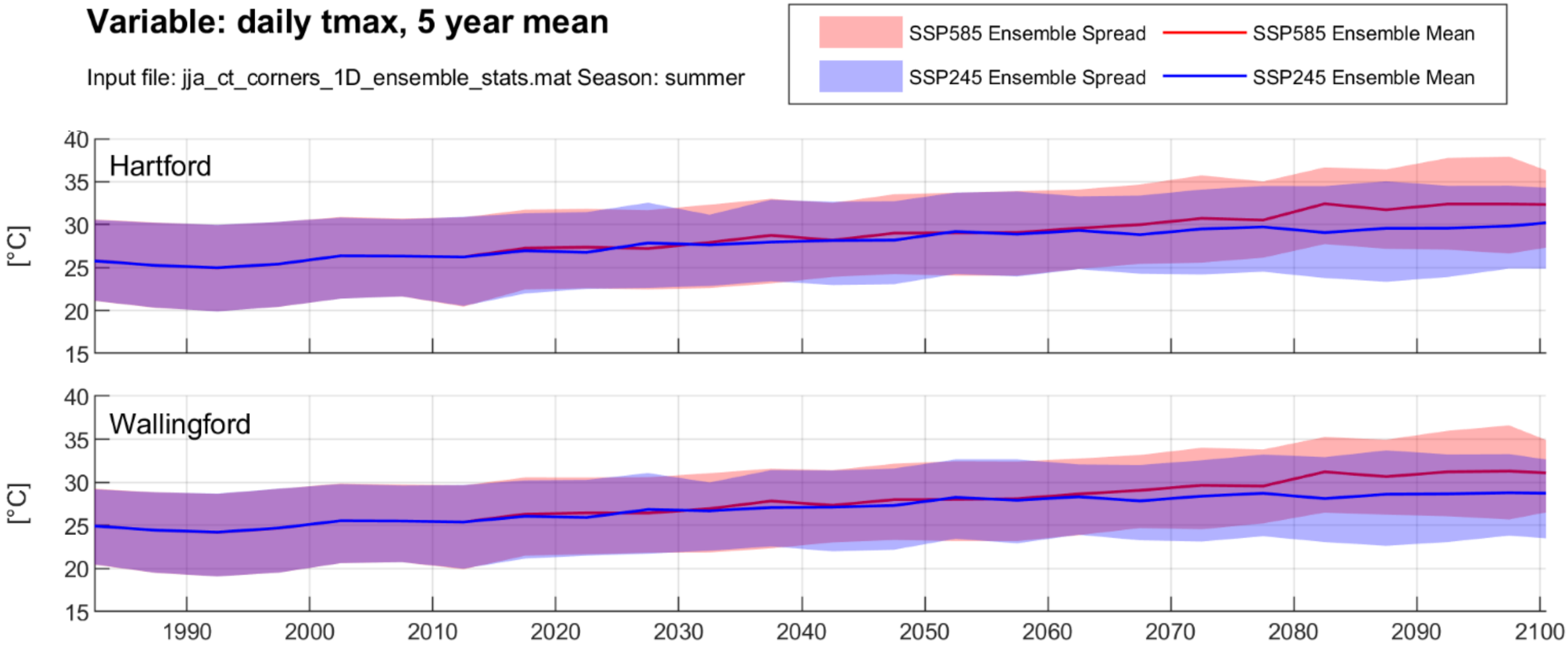
1. *NASA NEX-GDDP:* Thrasher et al. (2022) - 27 km

2. *Oak Ridge Laboratory Multi-model Hydroclimate Projection:* Kao et al. (2024) - 3.5 km

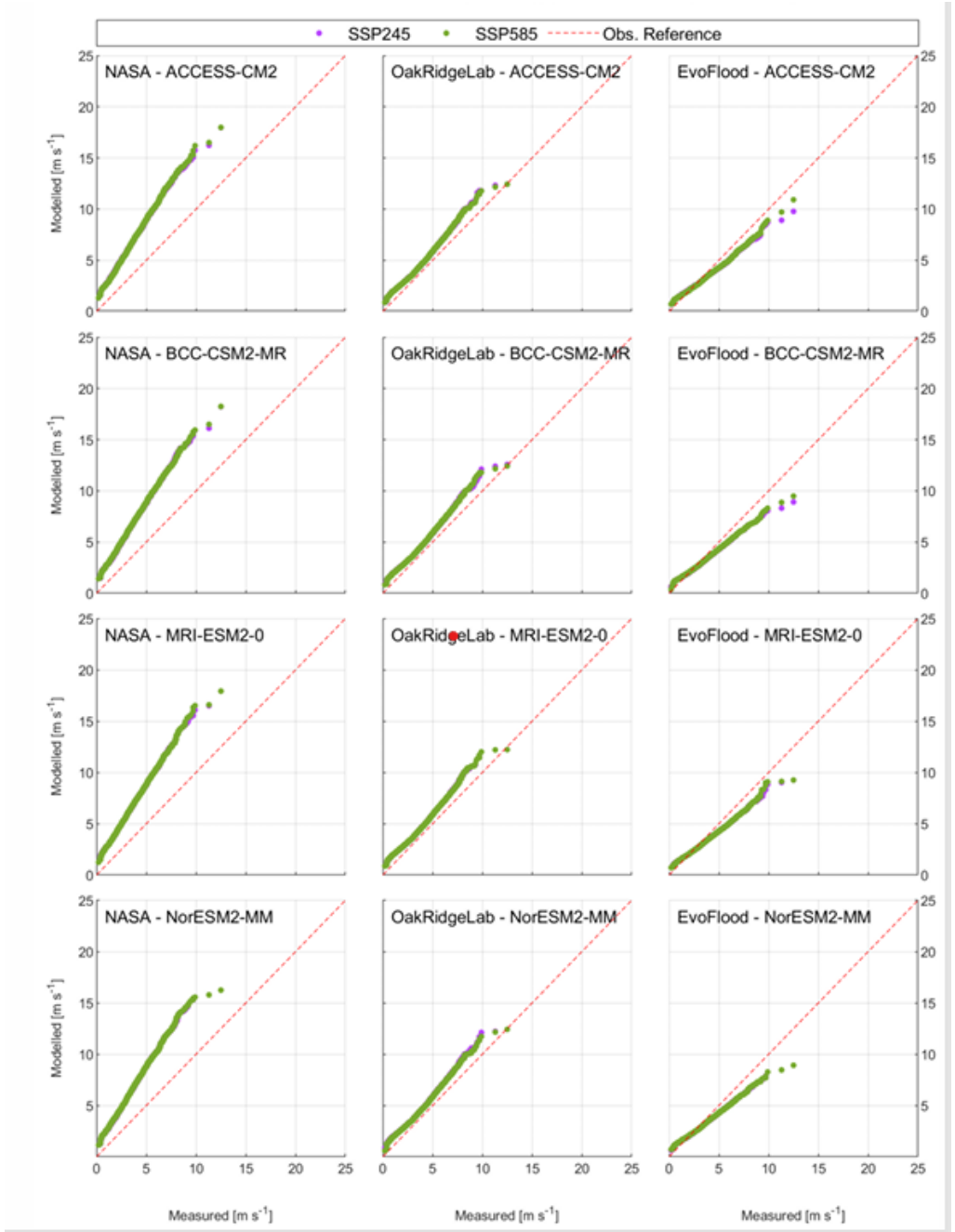
3. *EVOFLOOD* (University of Southampton) Gebrechorkos et al., 2023) -27km

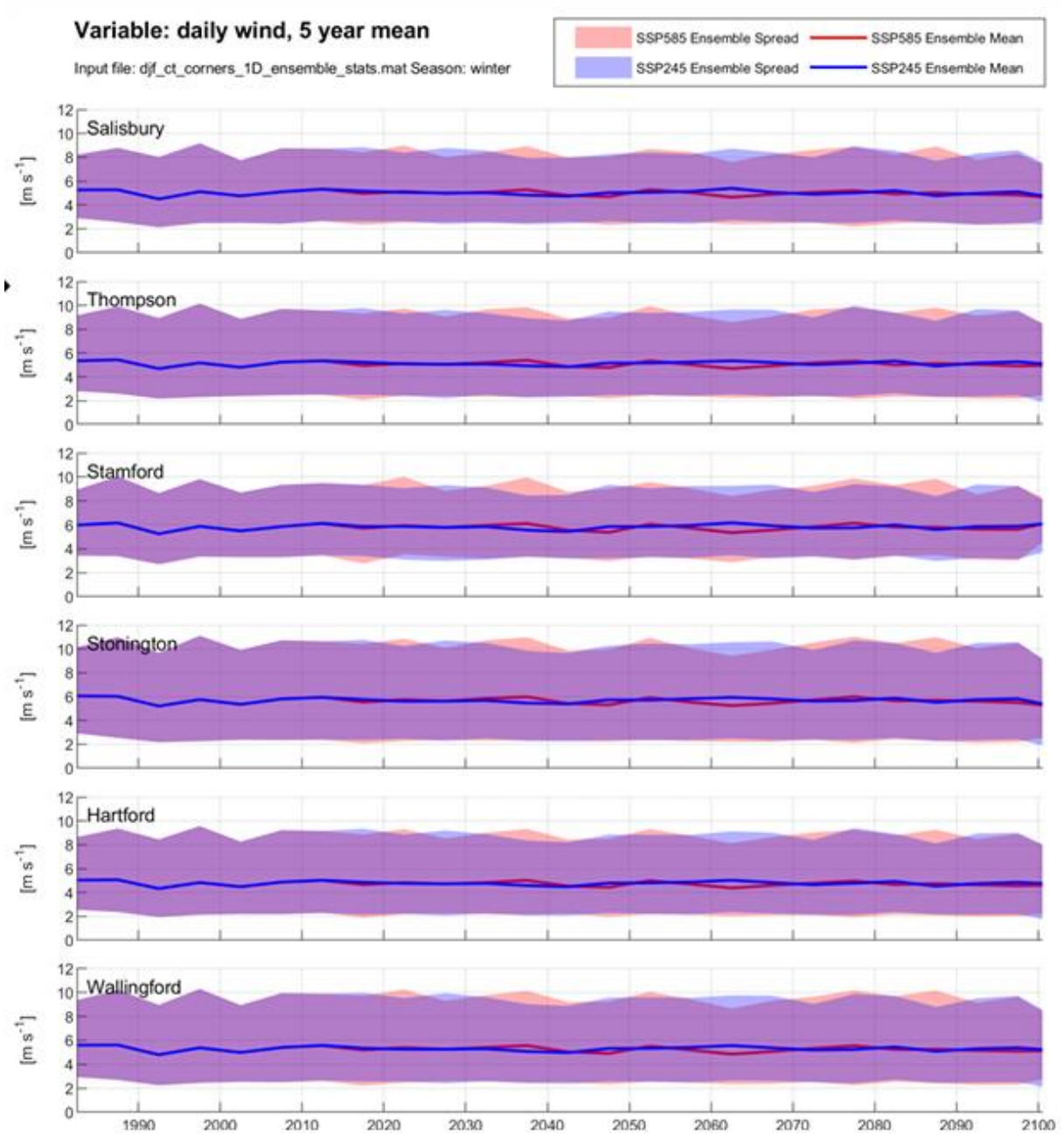
Variable: daily tmax, 5 year mean

Input file: jja_ct_corners_1D_ensemble_stats.mat Season: summer



Evaluation of Winter Wind Speeds





Models That Resolve Tropical Cyclones

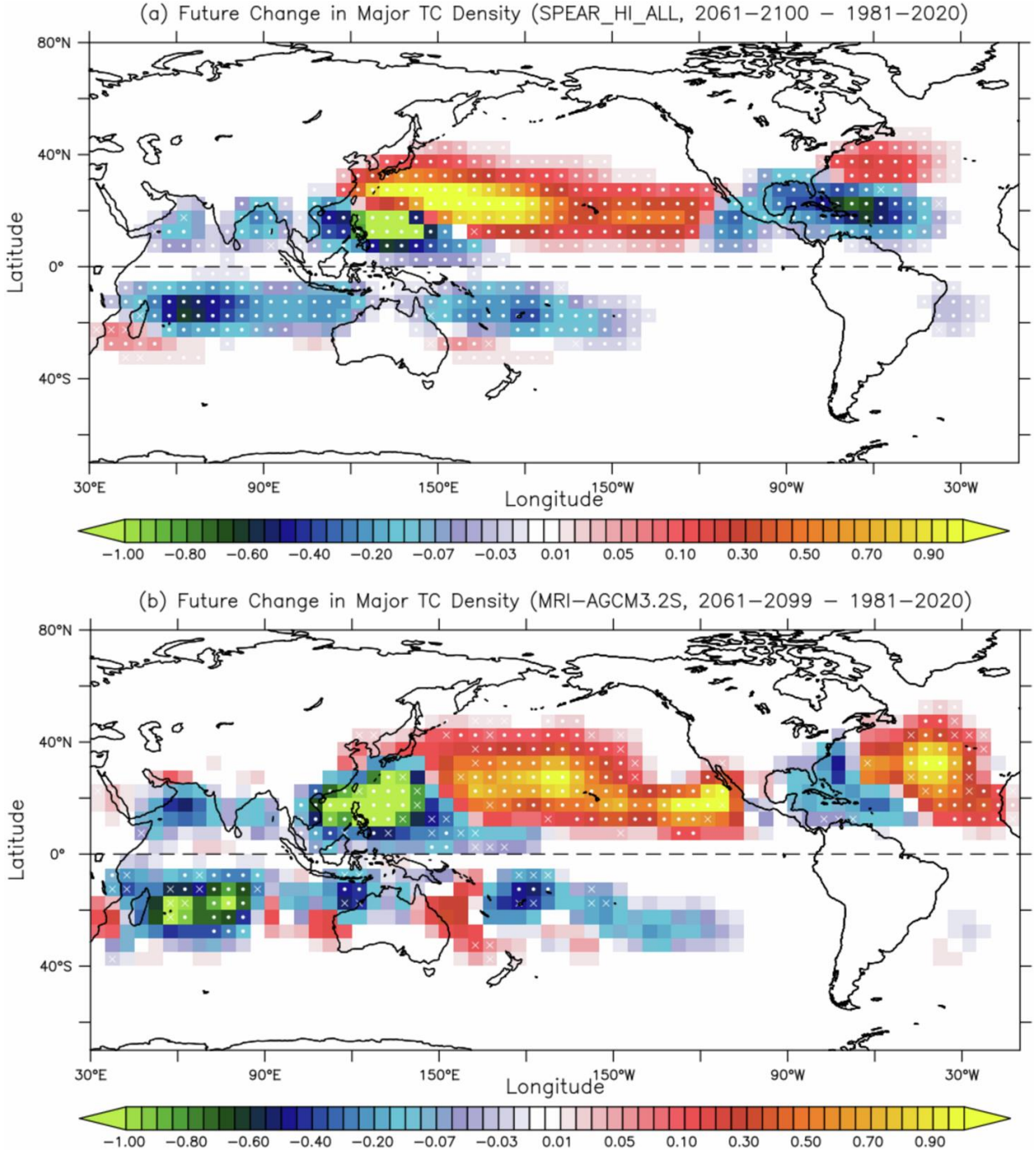
Murakami, H., Cooke, W.F., Mizuta, R. *et al.* Robust future projections of global spatial distribution of major tropical cyclones and sea level pressure gradients. *Commun Earth Environ* **5**, 479 (2024). https://doi.org/10.1038/s43247-024-01644-9

1. Seamless System for Prediction and Earth System Research (**SPEAR_HI**) developed at the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluid Dynamics Laboratory (GFDL). Delworth et al. (2020) *J. Adv. Model. Earth Syst.* **12**, e2019MS001895 (2020).

2. High-Resolution Meteorological Research Institute (MRI, Japan) atmospheric general circulation model (AGCM) version 3.2 (**MRI-AGCM3.2S**). Mizuta, R. et al. *J. Meteor. Soc. Japan* **90A**, 235–260 (2012).

> …. consistently project an increase in major TC occurrence in the Central Pacific region near Hawaii and the eastern/northern North Atlantic and a reduction in major TC occurrence in the Southern Hemisphere, the westernmost portion of the tropical western North Pacific, Gulf of Mexico, and Caribbean Sea.

…. consistently project an increase in major TC occurrence in the Central Pacific region near Hawaii and the eastern/northern North Atlantic and a reduction in major TC occurrence in the Southern Hemisphere, the westernmost portion of the tropical western North Pacific, Gulf of Mexico, and Caribbean Sea.



What are we doing about it

- Policy changes
  - 20 inches by 2050 in HMP CMP
  - Storm-water Management District;
  - Resilience Bond Funds;
  - Green Bank Resilience Programs

- CIRCA Conducted Regional Assessments of Municipal Vulnerability
  - Water Treatment Plants
  - Drinking water systems
- Alert Network for Reducing Impacts

- Developed Project Pipeline for Municipal and State Infrastructure

- Funding Initiatives State **DCRF; FEMA BRIC; NOAA Resilience Fund**