Trends in Global Tropical Cyclone Activity: 1990-2021

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Research Questions

- How has global (and individual basin) tropical cyclone activity changed since 1990?
- What have been the large-scale climate drivers responsible for the observed changes?

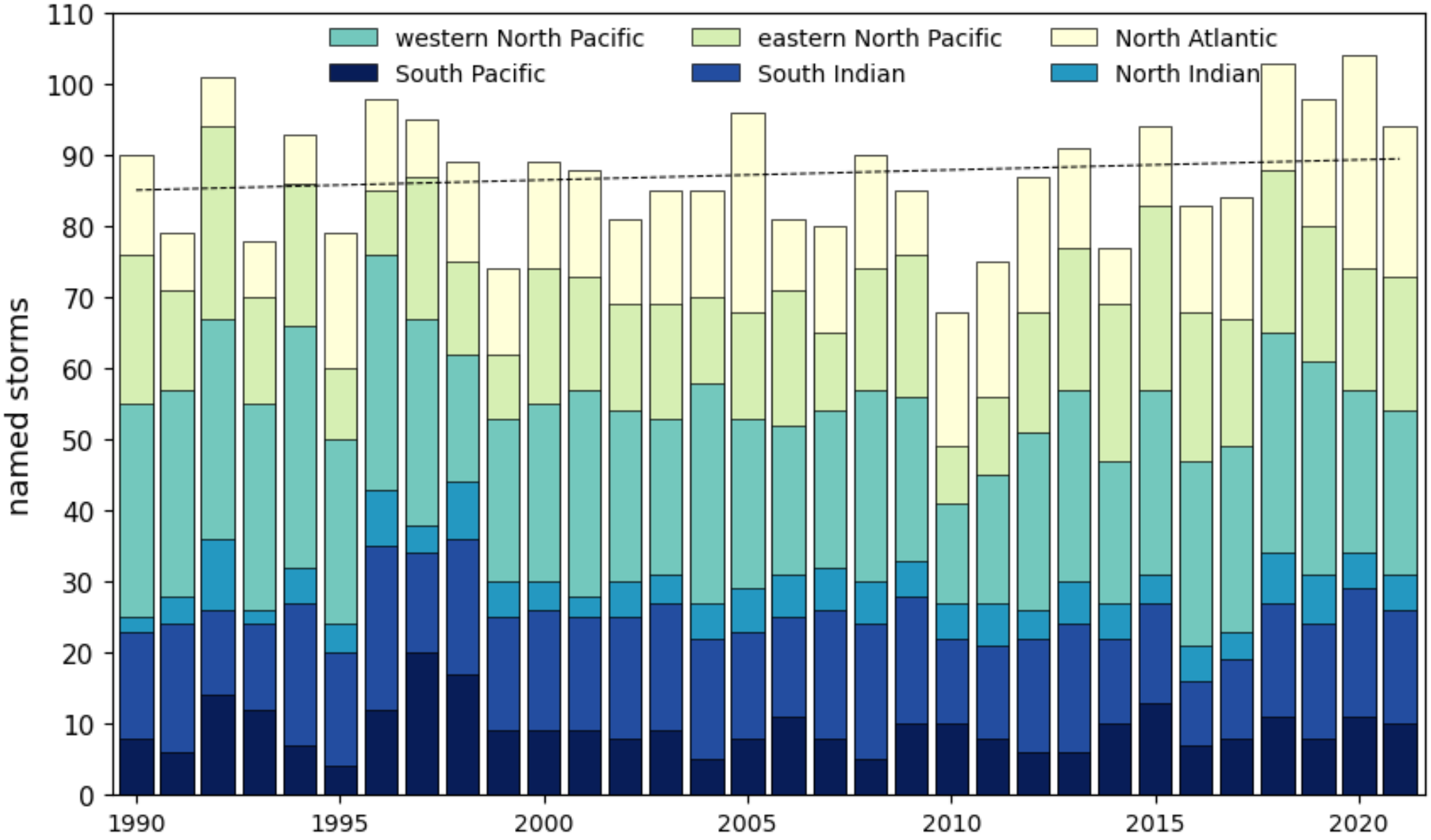
Data

- Tropical Cyclones: National Hurricane Center and Joint Typhoon Warning Center Best Tracks as archived in the International Best Track Archive for Climate Stewardship (IBTrACS)

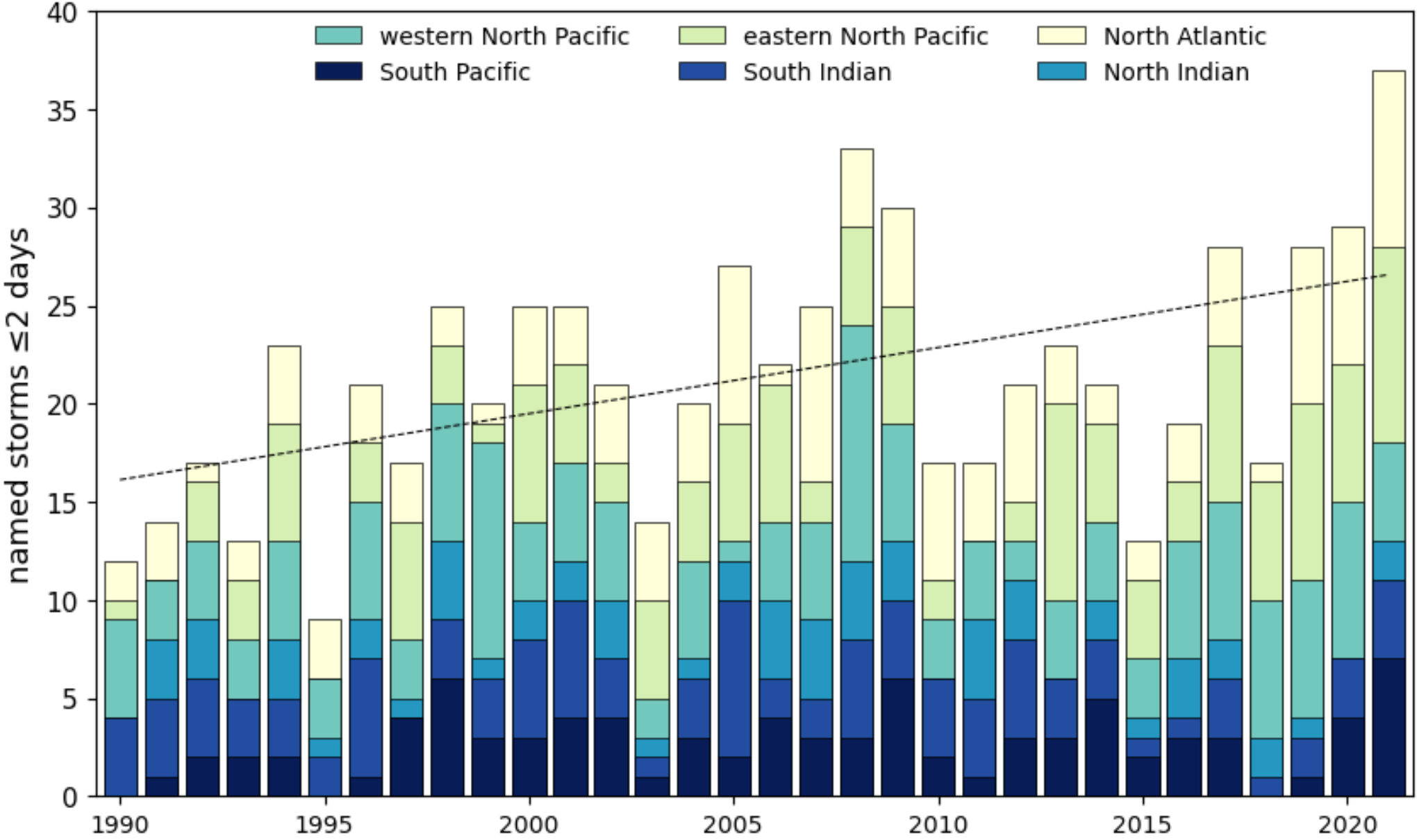
- Atmospheric/Oceanic Dataset: ECMWF Fifth Generation Reanalysis (ERA5)

- ENSO Dataset: ENSO Longitude Index (Williams and Patricola 2018)

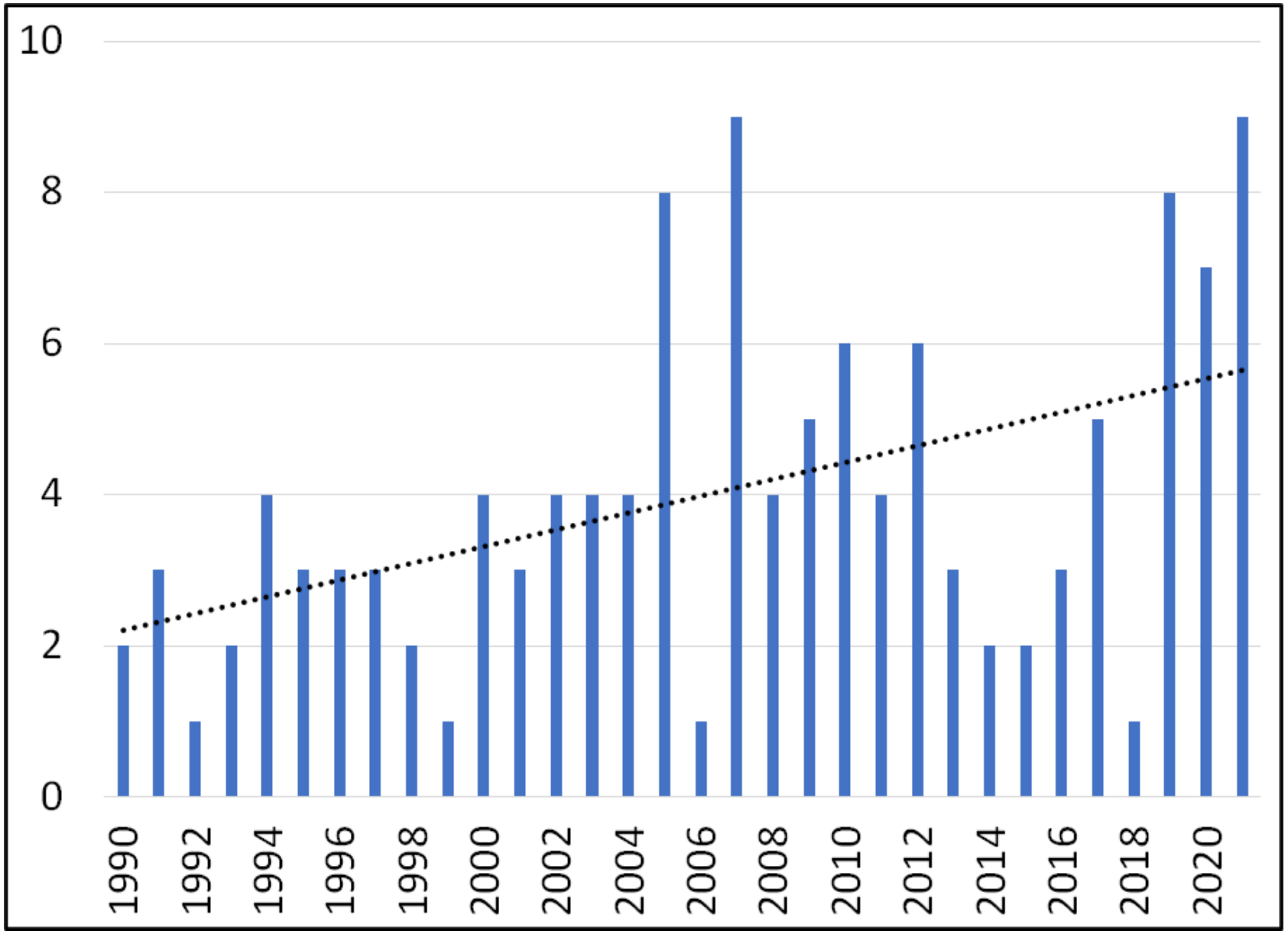
Global Named Storms

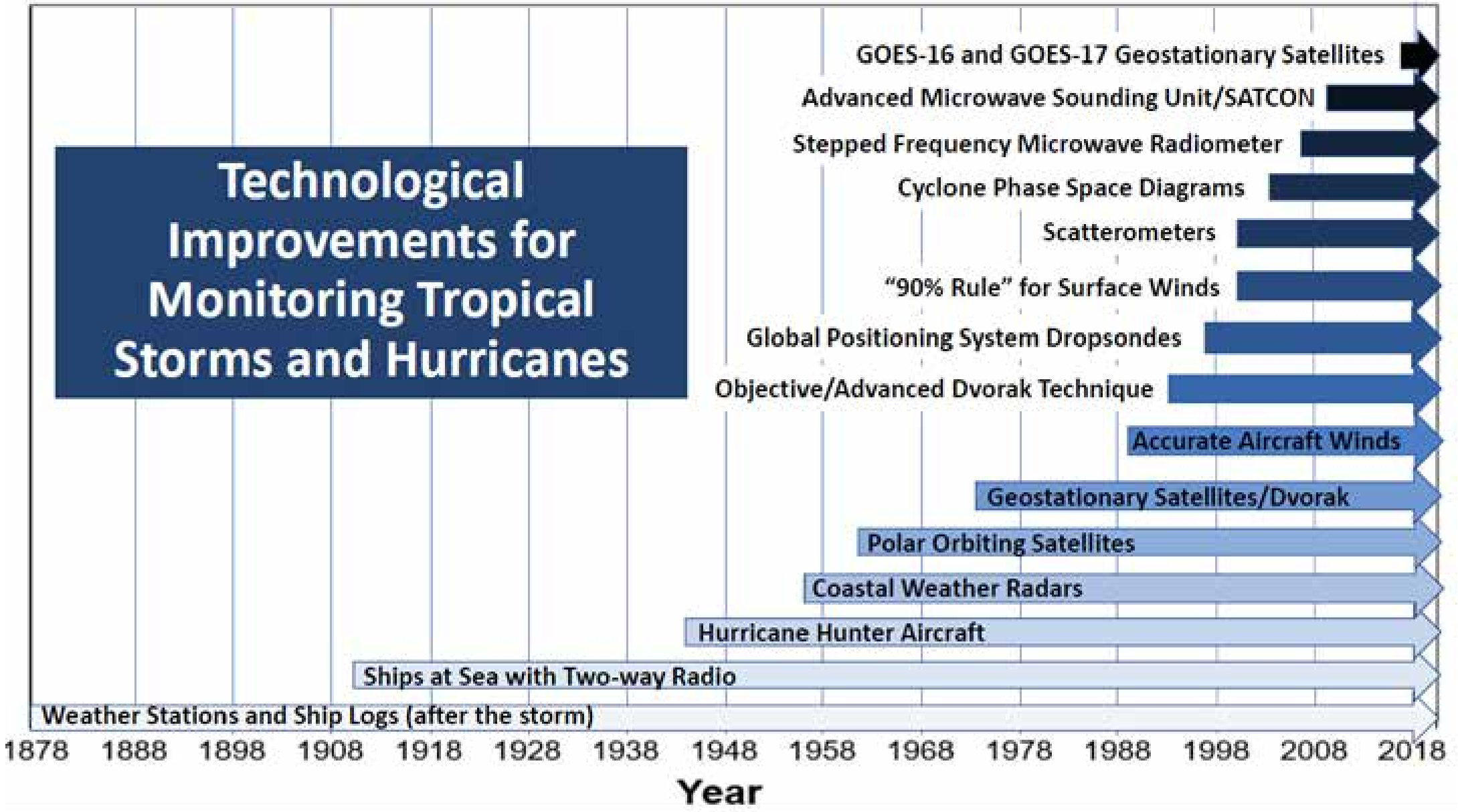


Short-Lived Named Storms (<=2 Days)



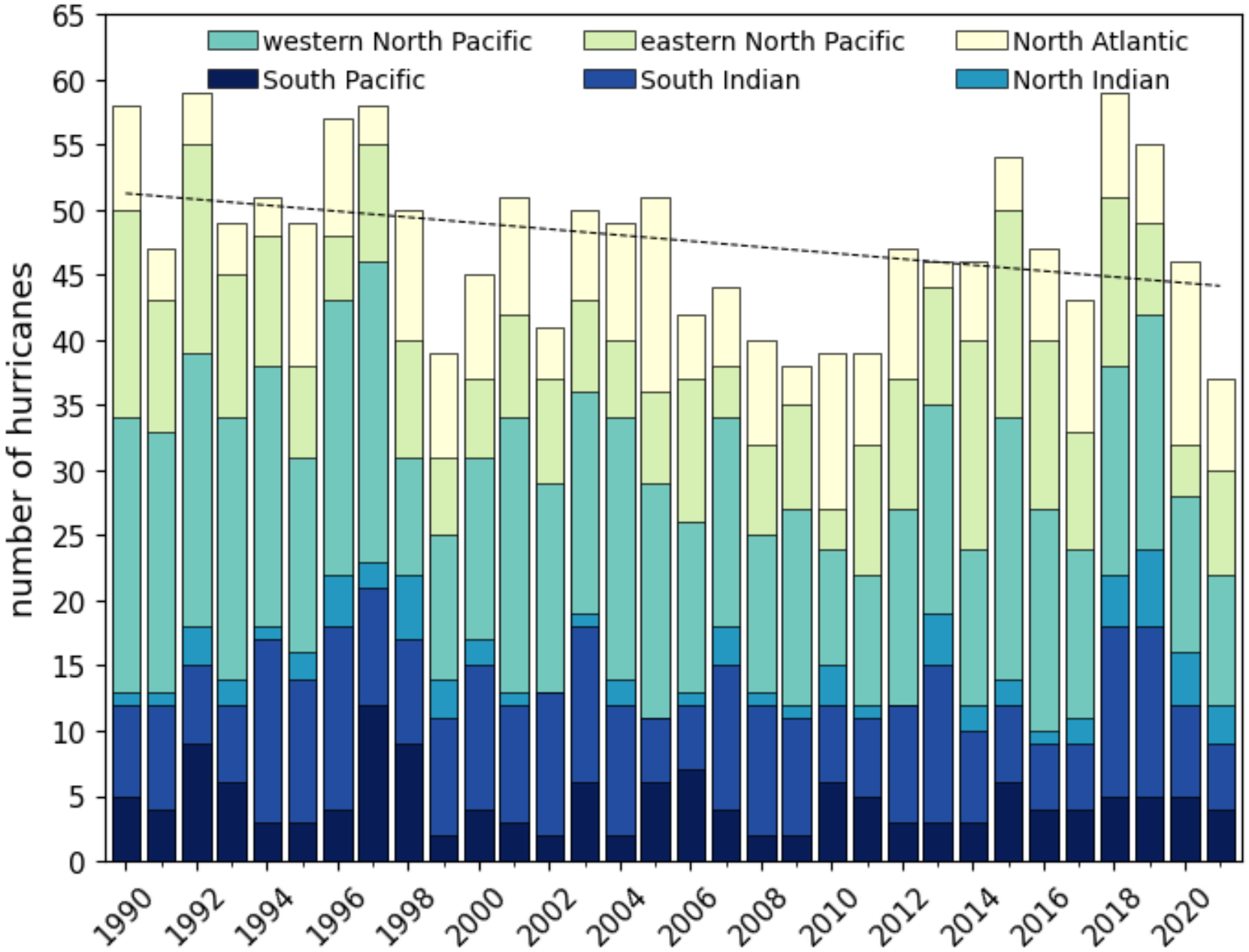
Atlantic Named Storms (<=2 Days)



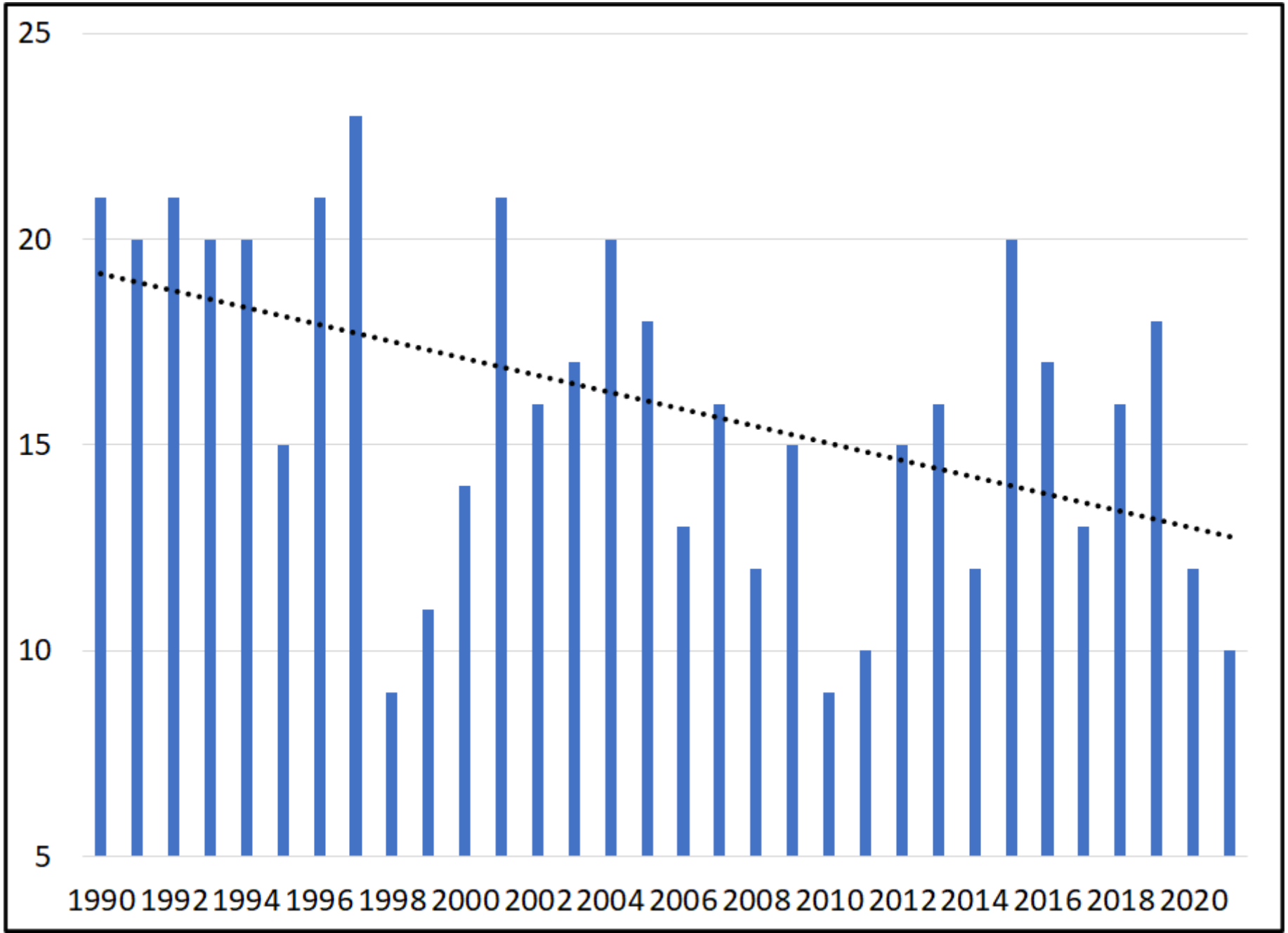


Chris Landsea (NHC)

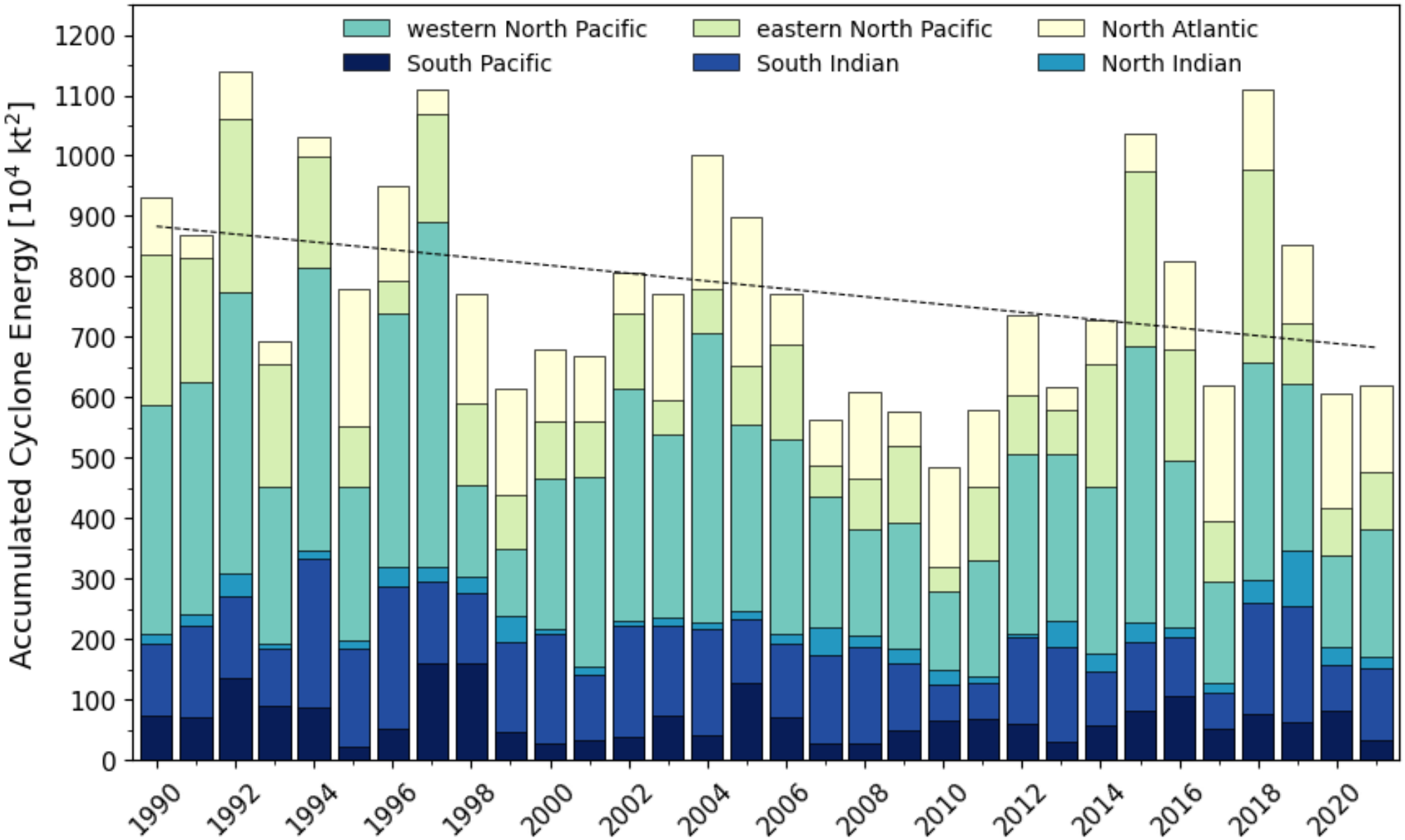
Global Hurricanes/Typhoons



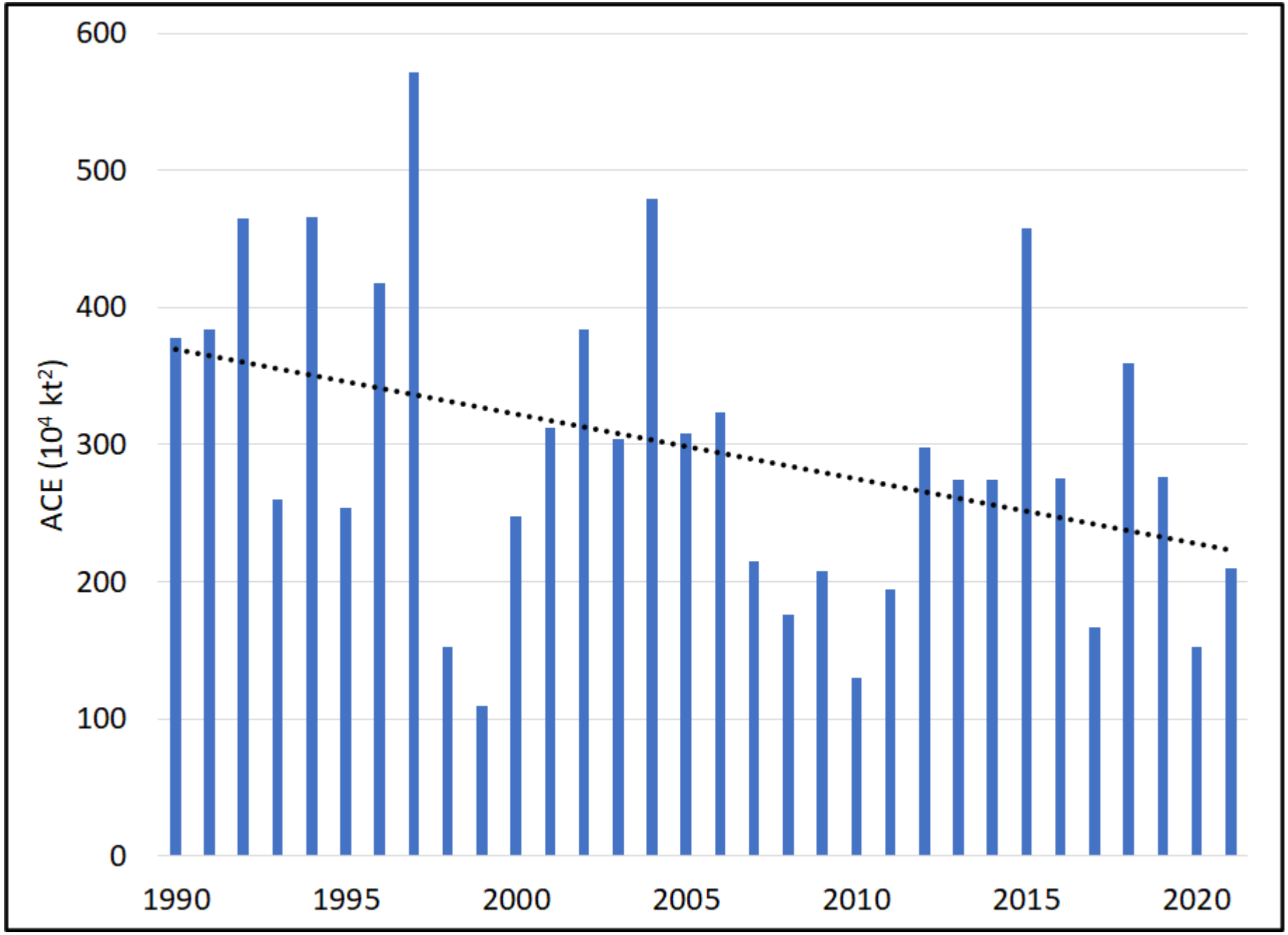
Western North Pacific Typhoons



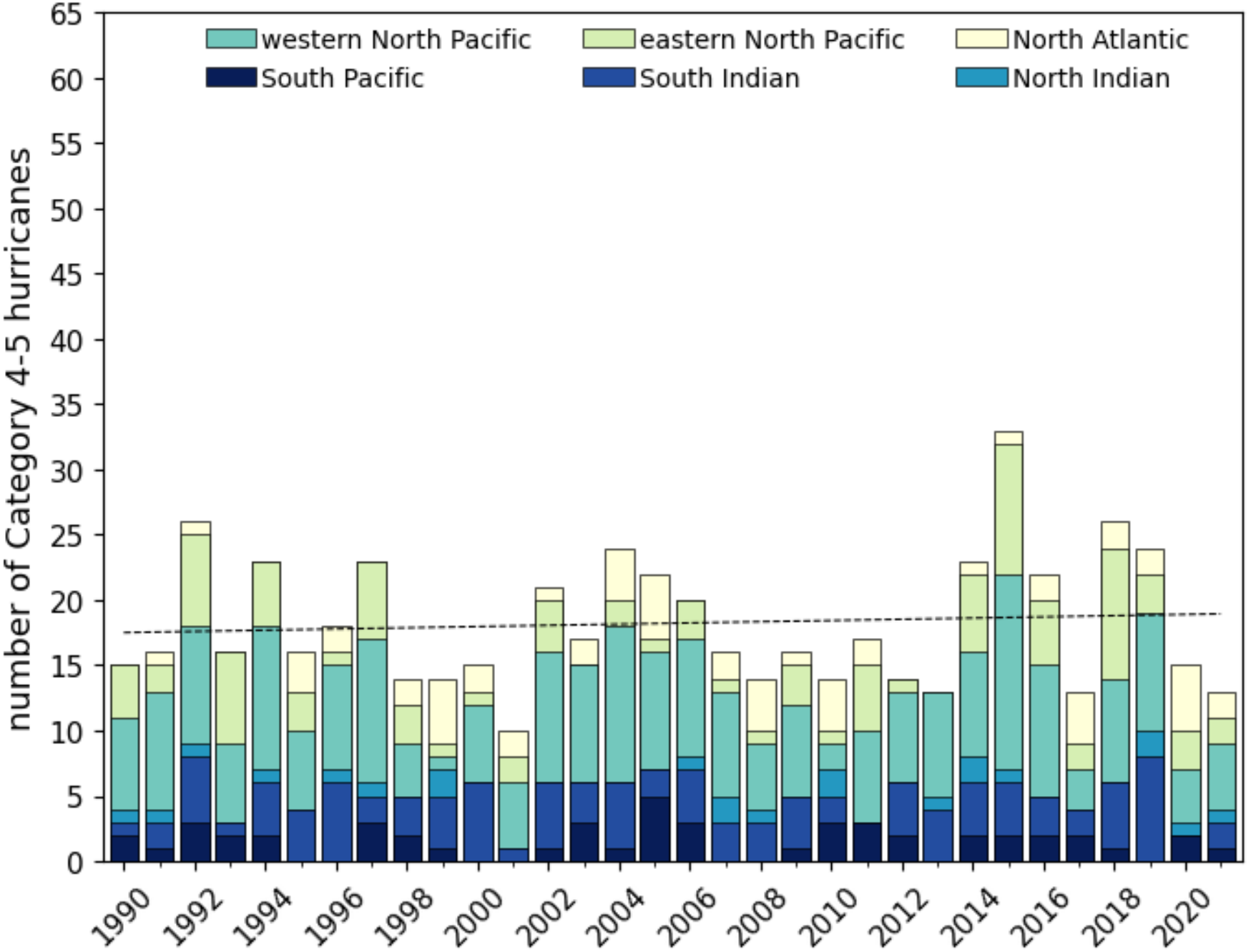
Global Accumulated Cyclone Energy



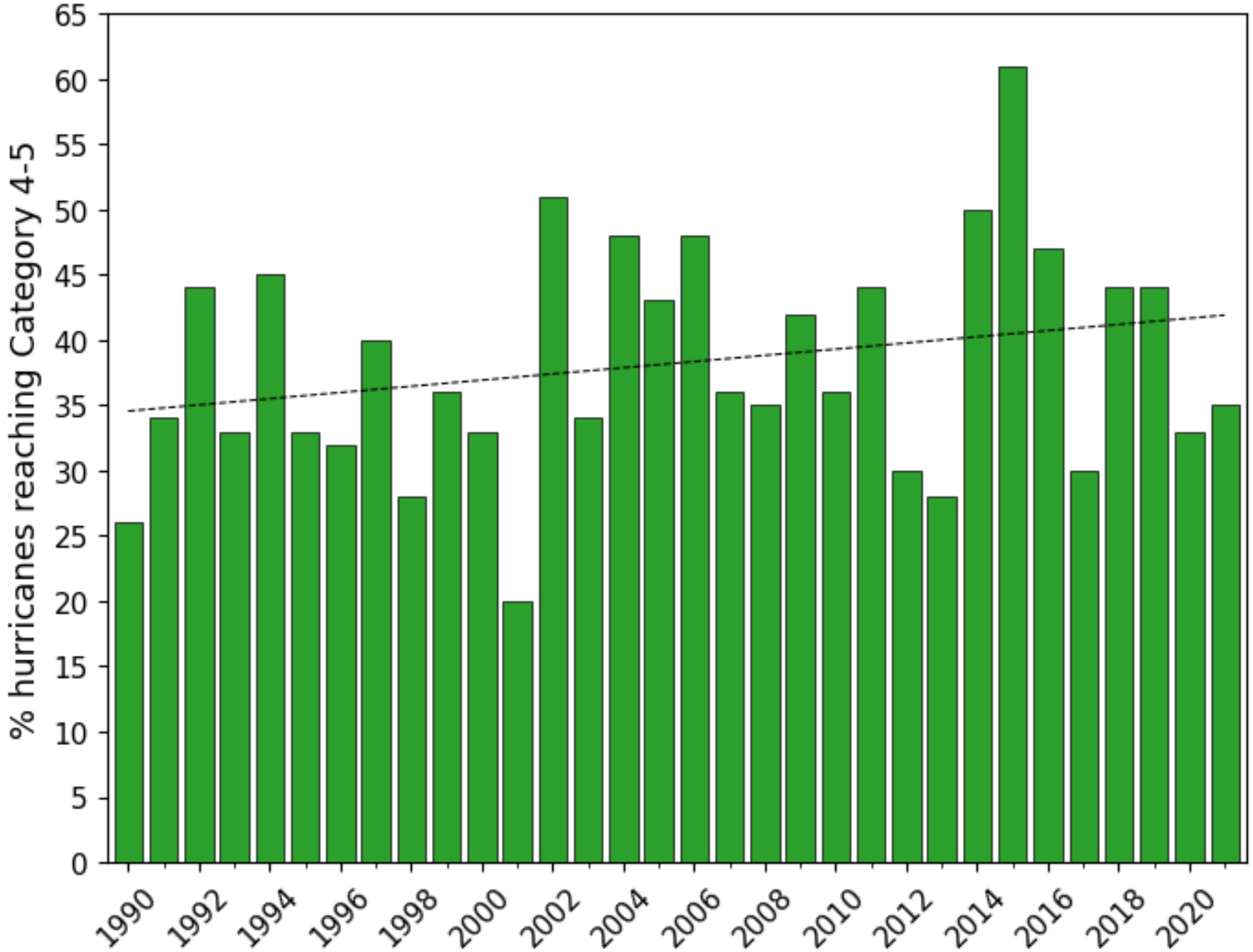
Western North Pacific Accumulated Cyclone Energy



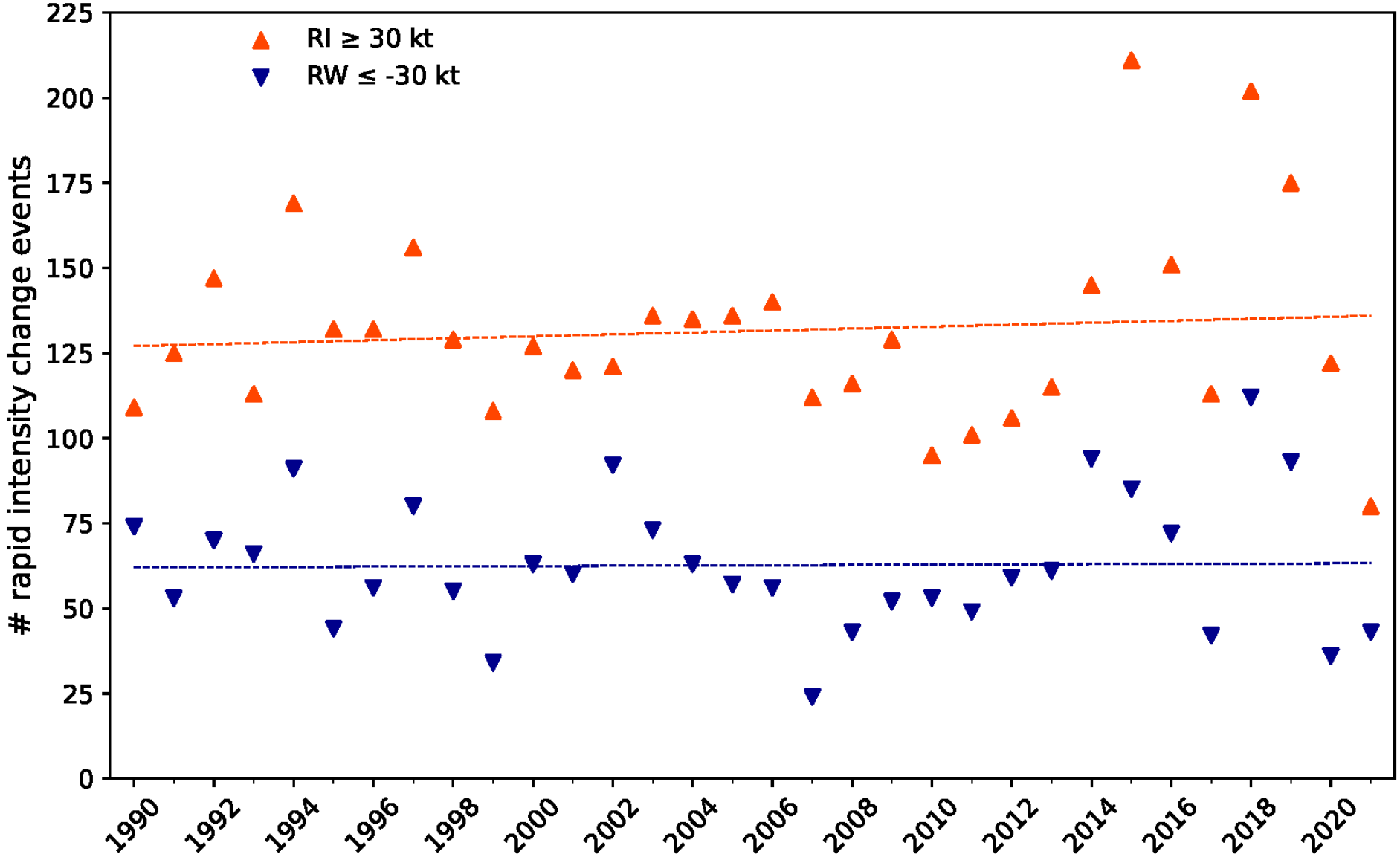
Global Cat. 4-5 Hurricanes (>=130 mph winds)



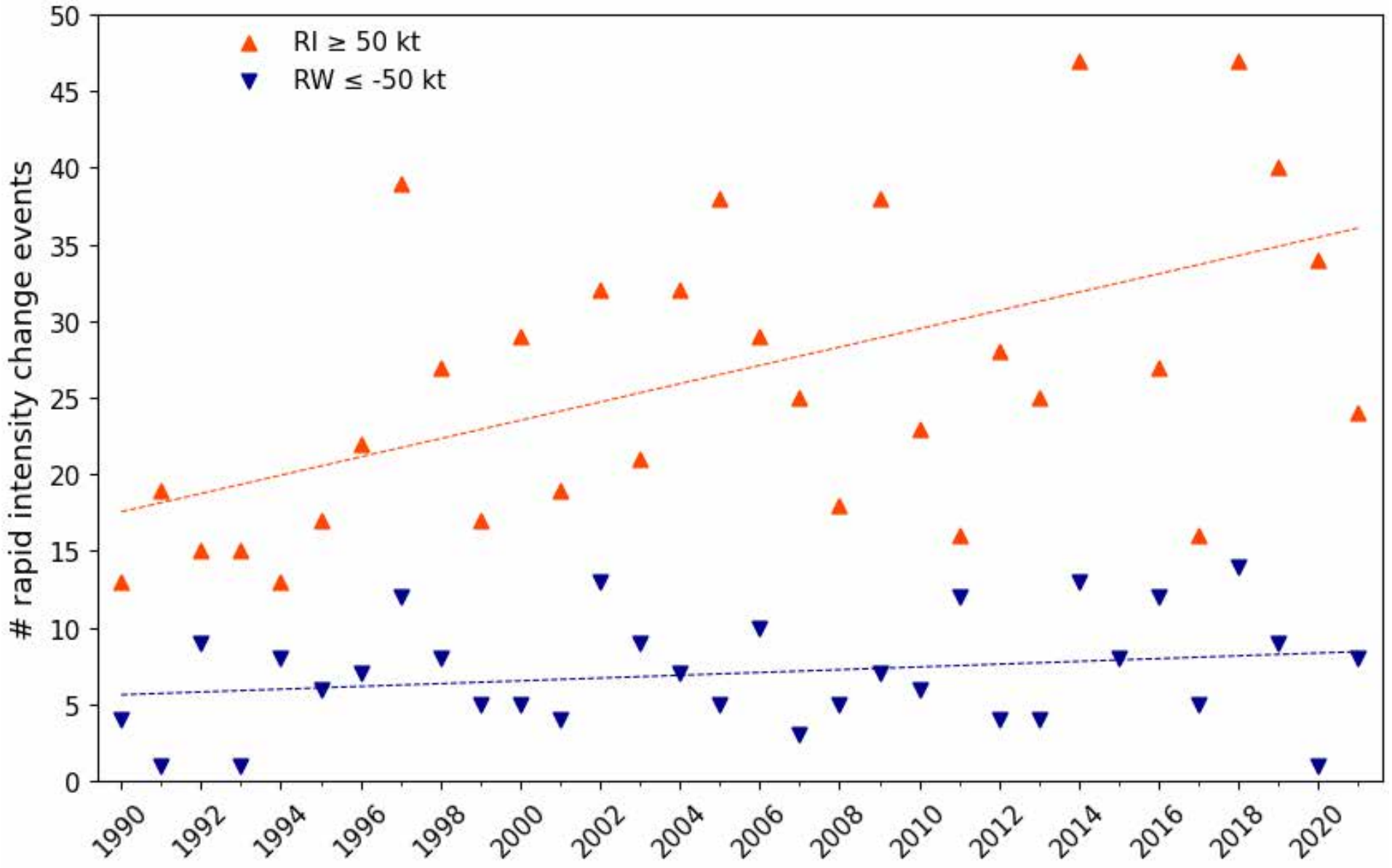
Global Cat. 4-5 Hurricane Percentage (>=130 mph winds)



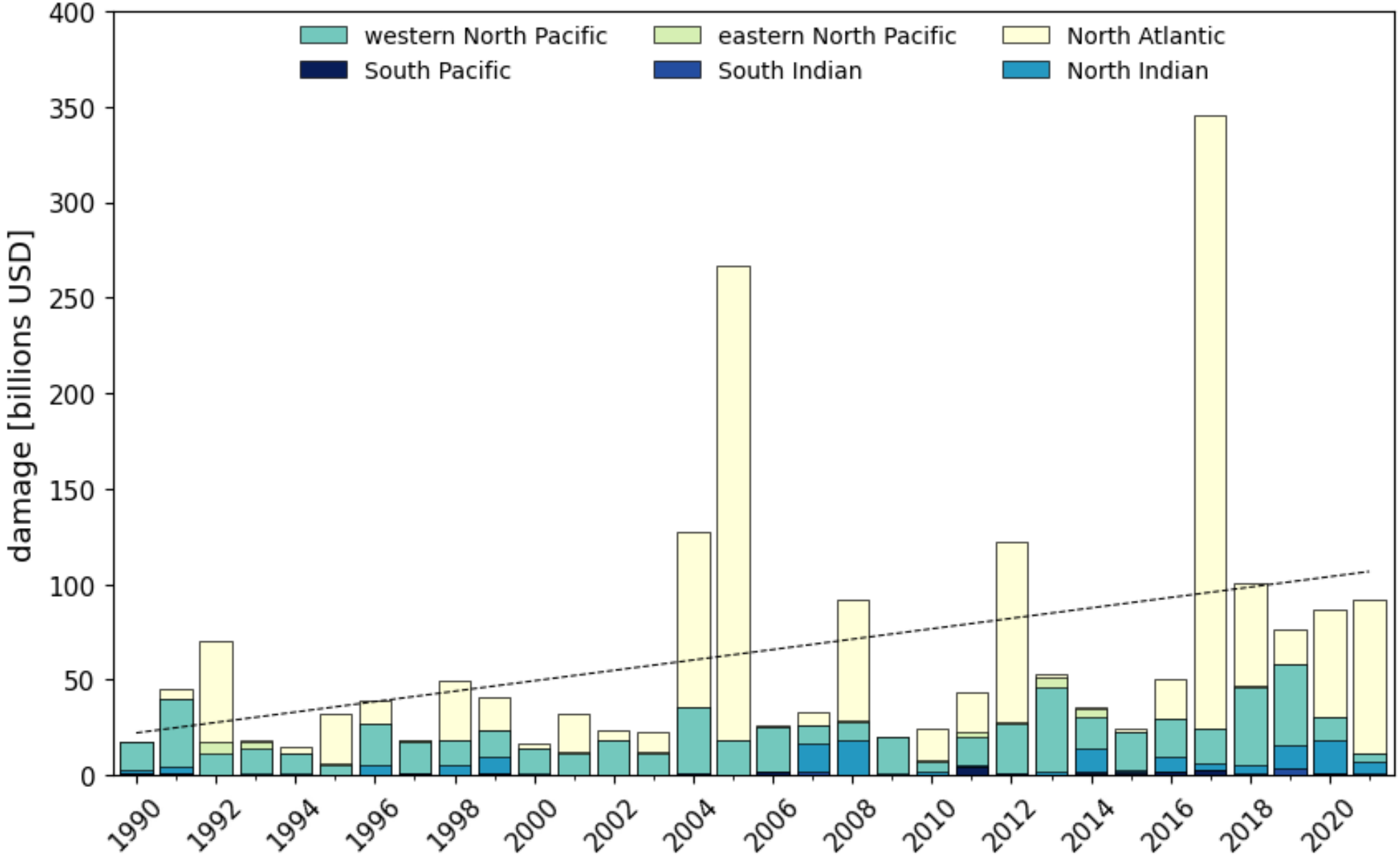
Rapidly Intensifying/Weakening Tropical Cyclones (>=35 mph 24 hr^{-1})



Rapidly Intensifying/Weakening Tropical Cyclones (>=60 mph 24 hr^{-1})



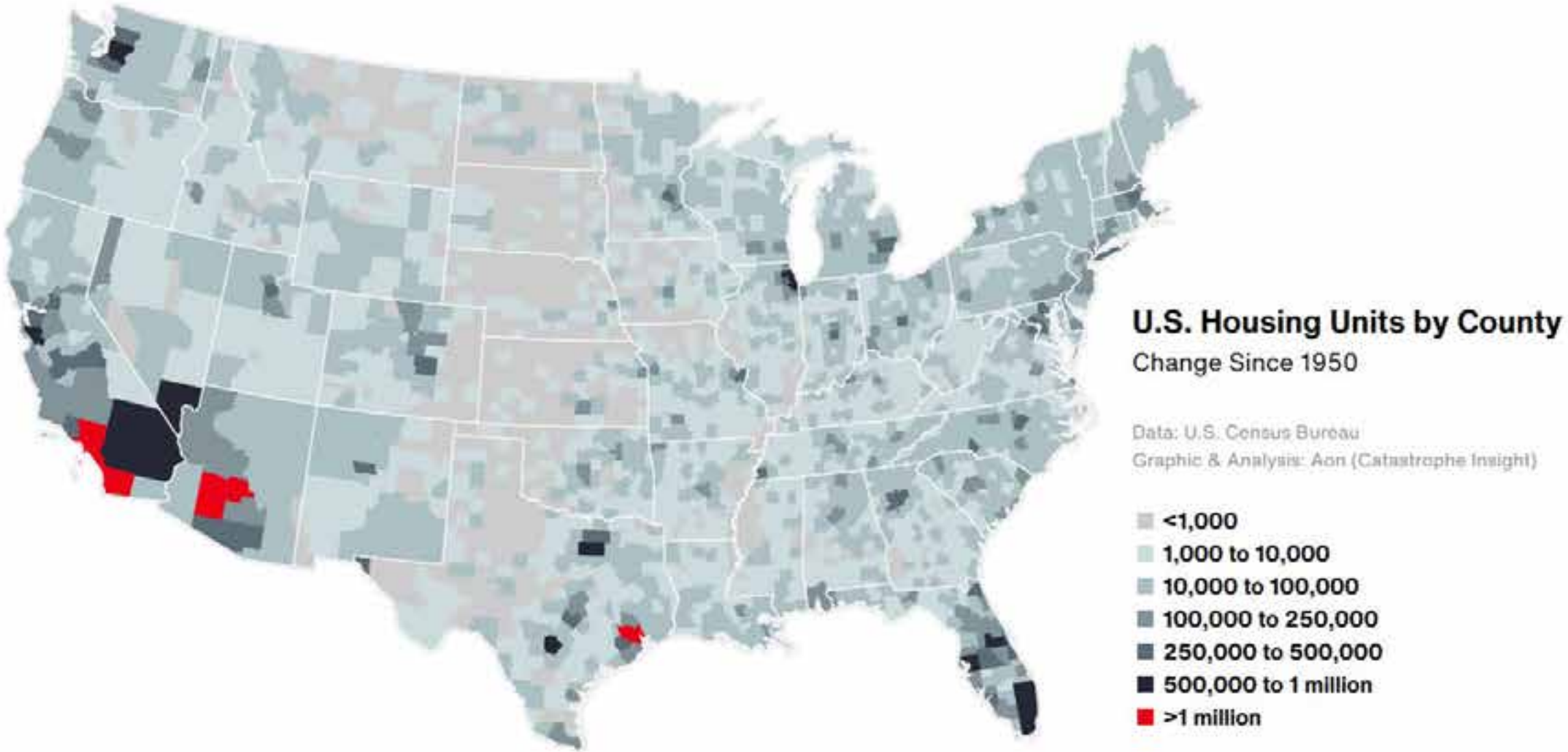
Global Inflation-Adjusted Damage



US Coastal Population Change Since 1900

Steve Bowen (Gallagher)

US Housing Units by County (Change Since 1950)



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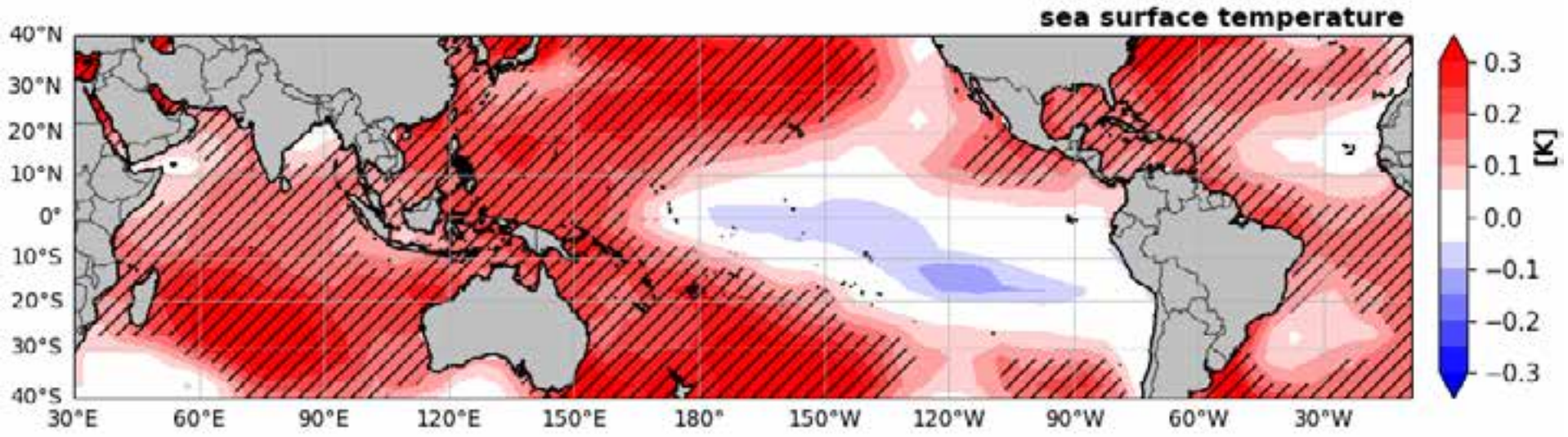
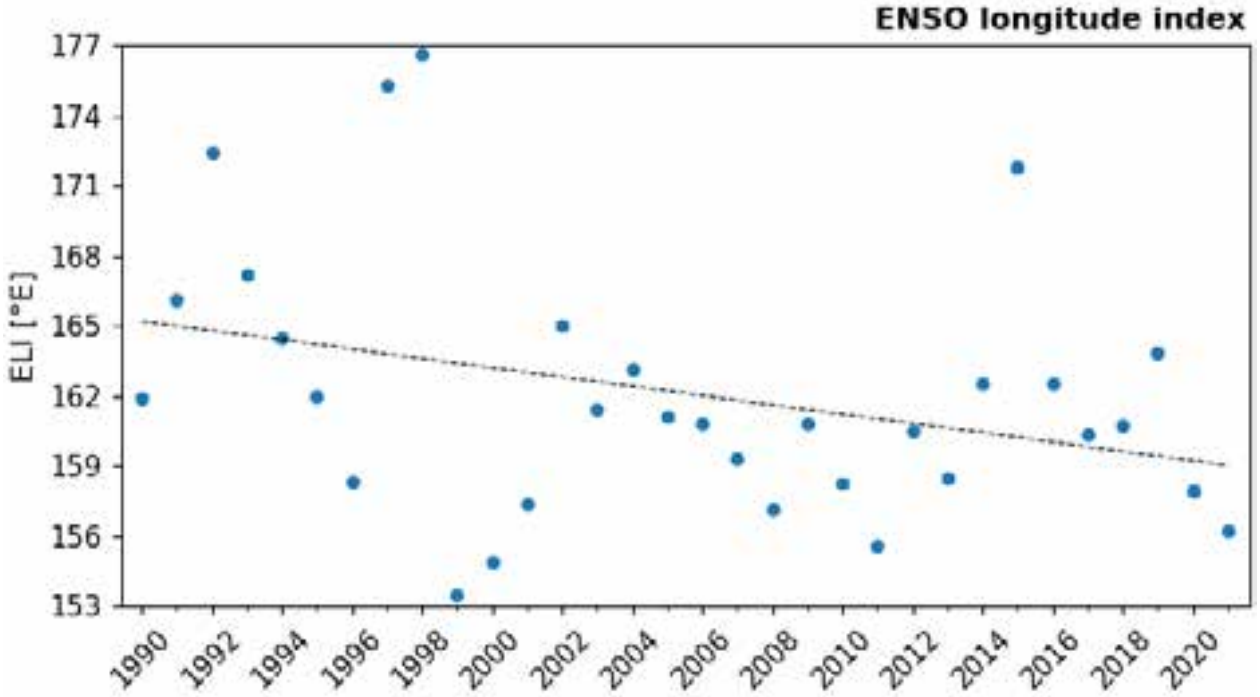
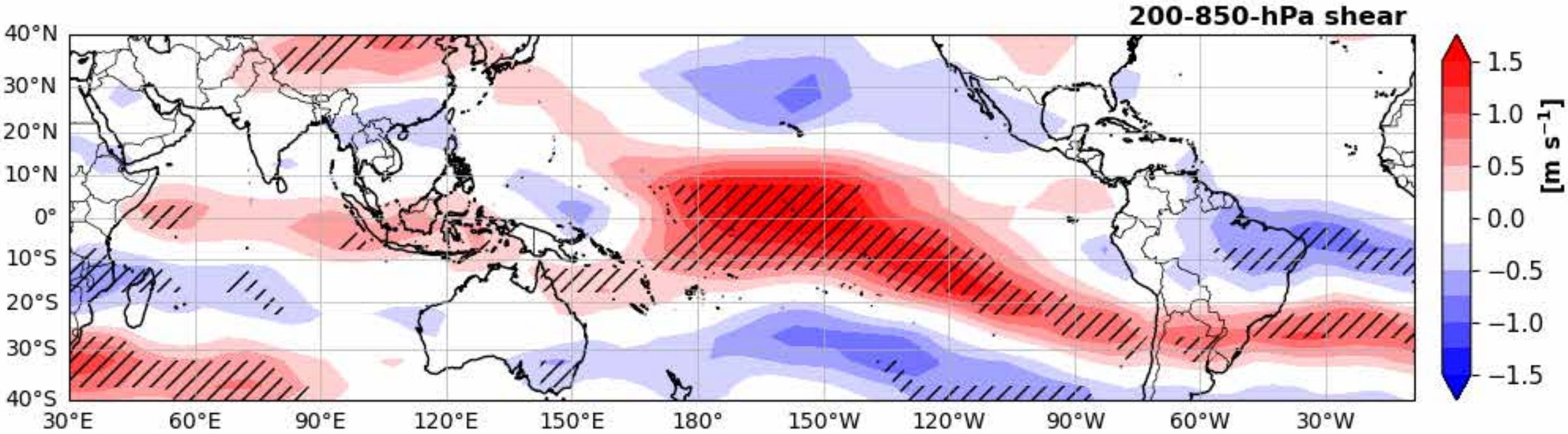
Trend Towards More La Niña-Like Environment since 1990

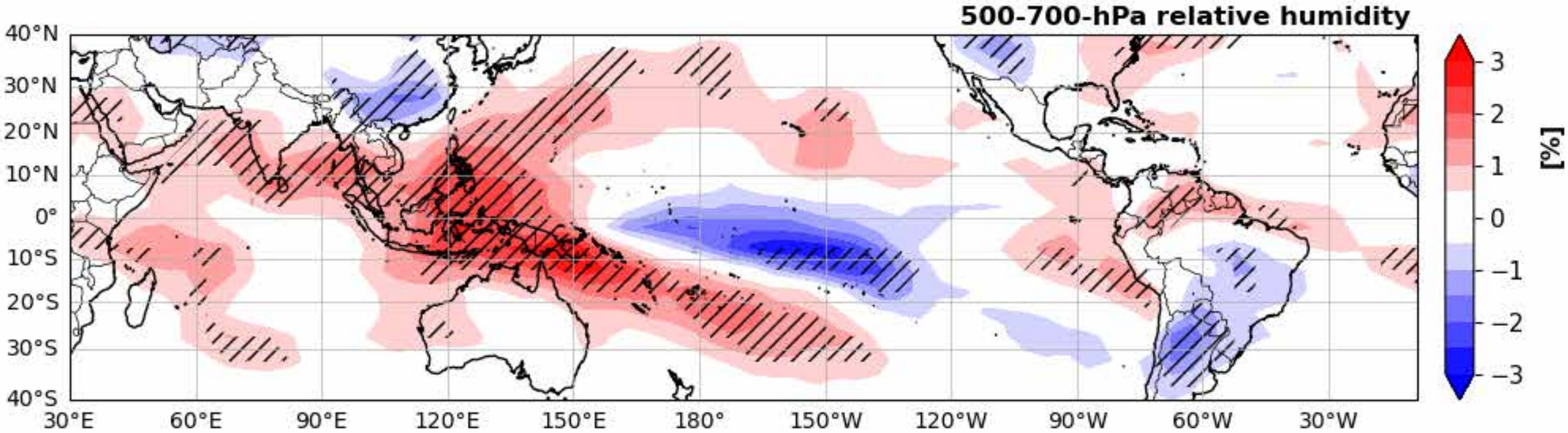




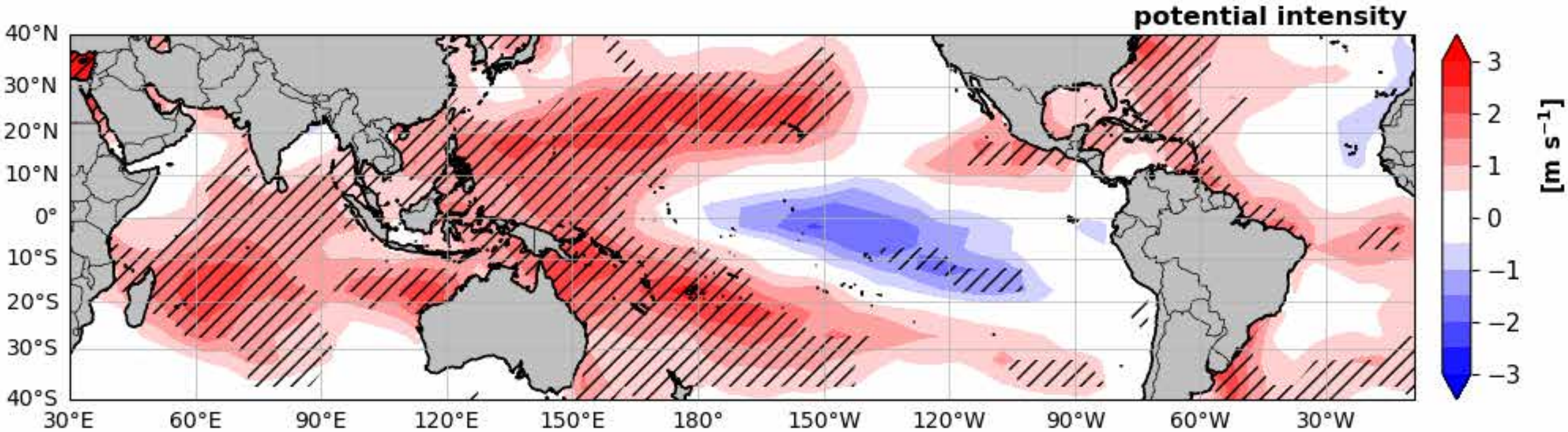
Vertical Wind Shear (200-850 hPa) Trend since 1990



Mid-Level Relative Humidity Trend Since 1990



Potential Intensity Trend Since 1990



Summary

- Short-lived named storms, tropical cyclones intensifying by >=60 mph 24 hr^{-1} and damage have significantly increased since 1990
- Hurricanes and Accumulated Cyclone Energy have significantly decreased since 1990
- Observed trends are likely due to the trend towards a more La Niña-like basic state

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