



Hurricanes: challenges and trends over time

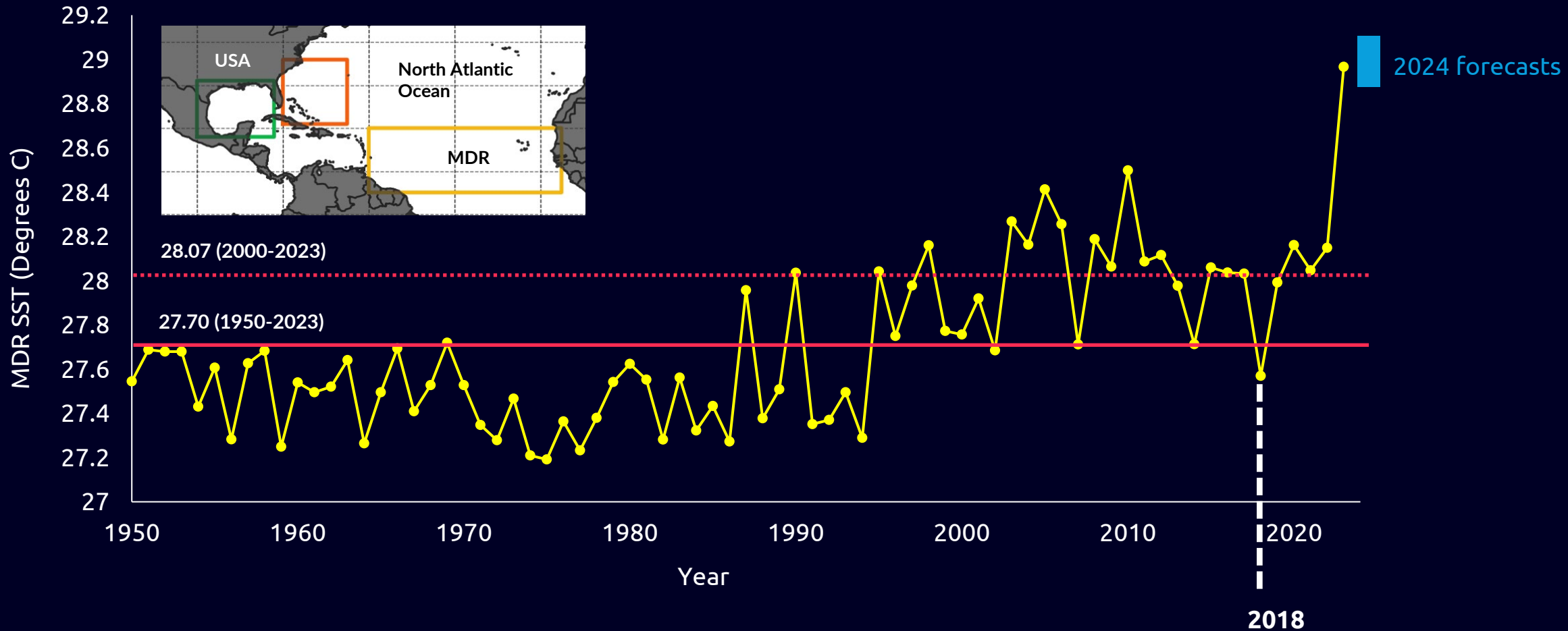
SUSTAINABILITY IN (RE-)INSURANCE CONFERENCE

Jamie Rodney, PhD | 3 October 2024



The changing climate is impacting hurricane conditions in never-before seen ways

Sea Surface Temperatures (SSTs) in the Main Development Region (MDR)

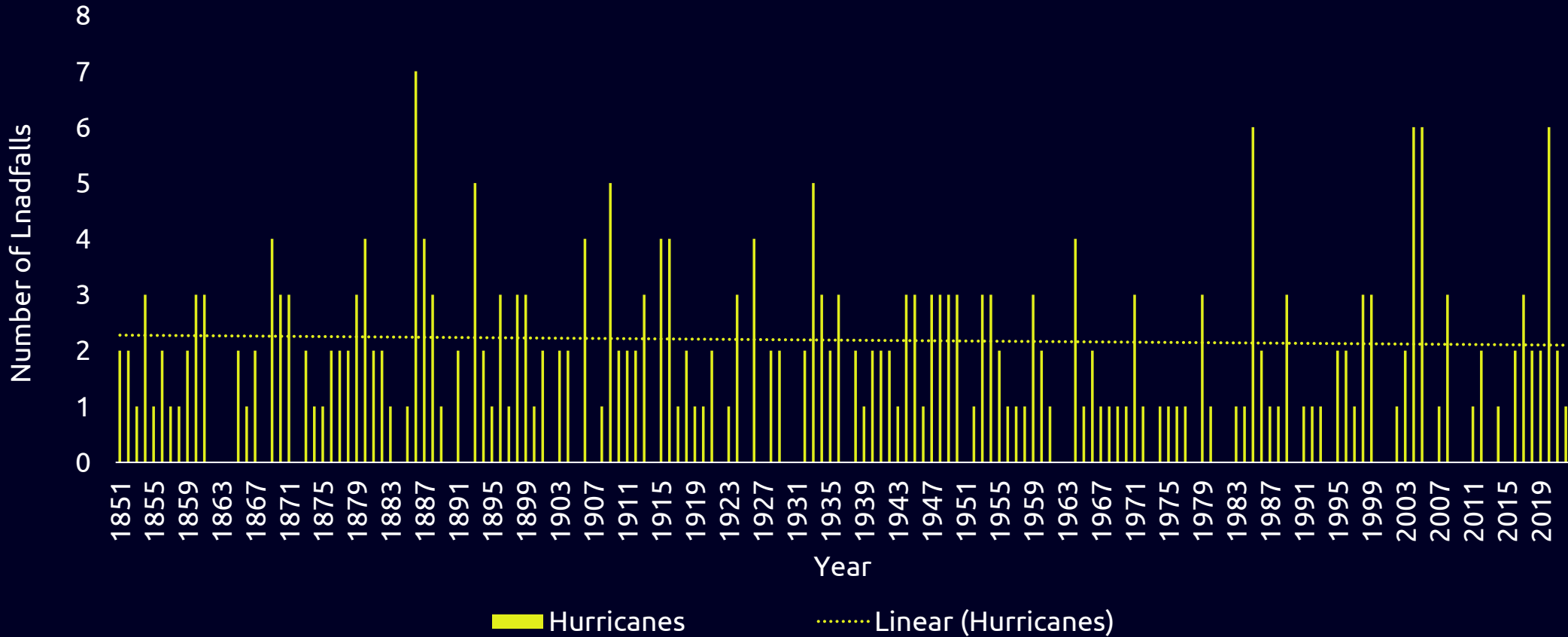




How is this change impacting hurricane landfalls in the US?

What's the trend?

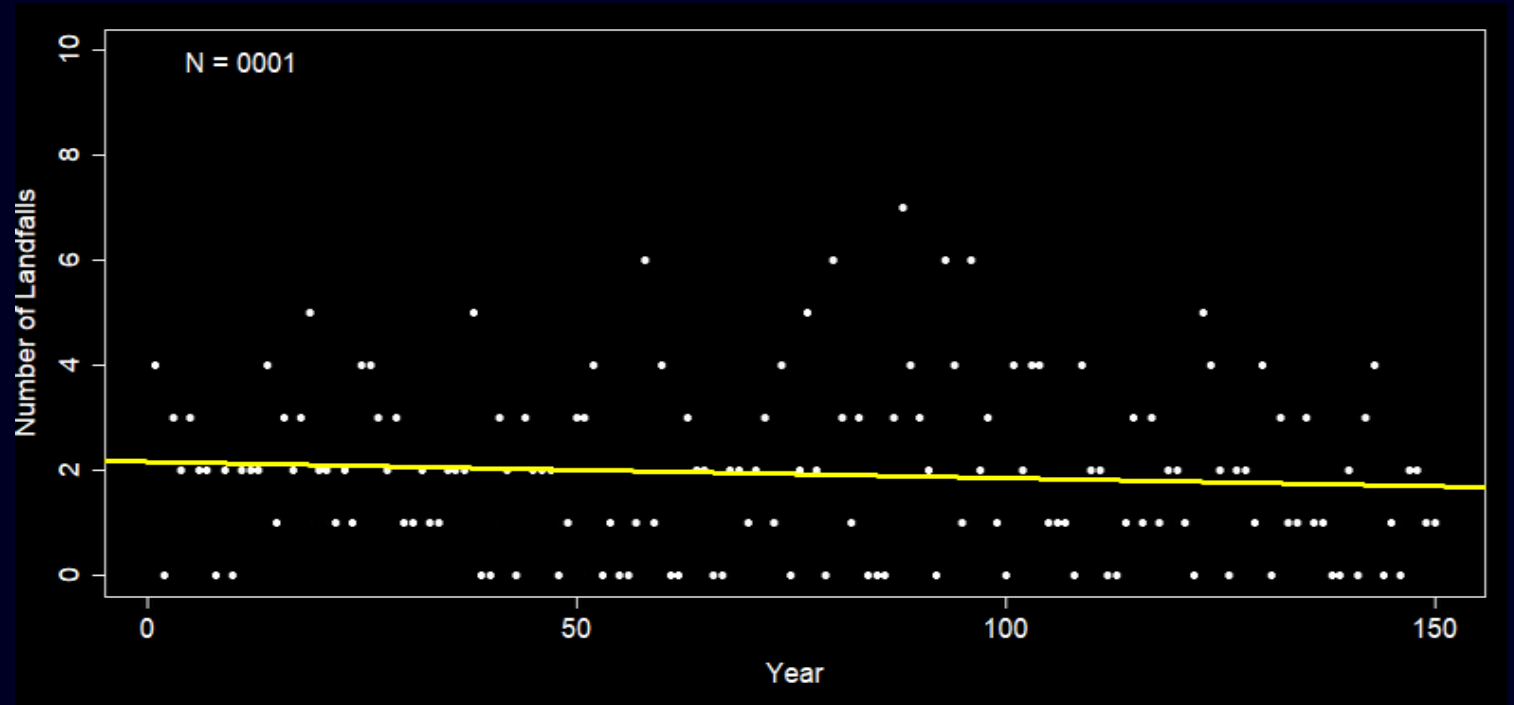
US Hurricane Landfalls





Don't be fooled by stationarity

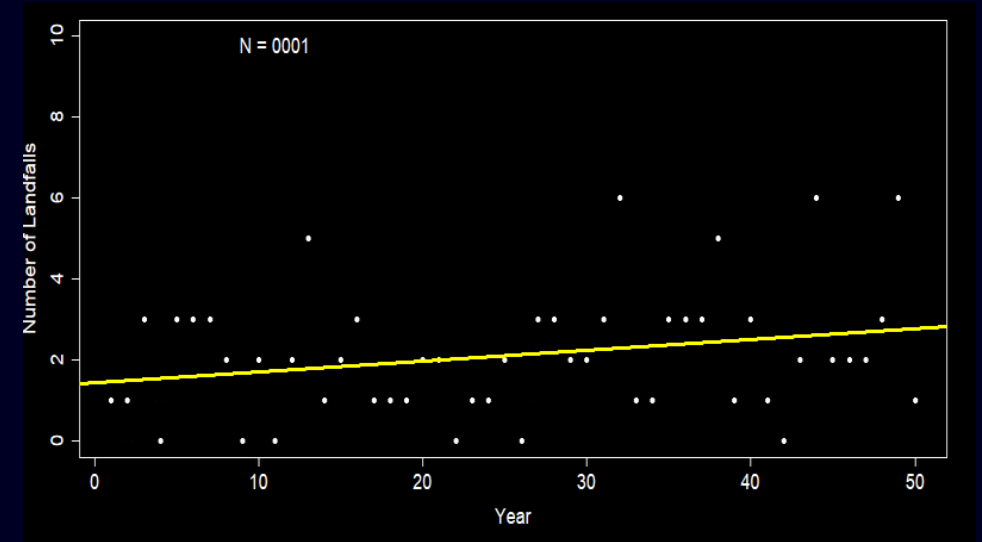
Simulating from a stationary Poisson landfall distribution gives both an “upward” trend and “downward” trend 50% of the time.



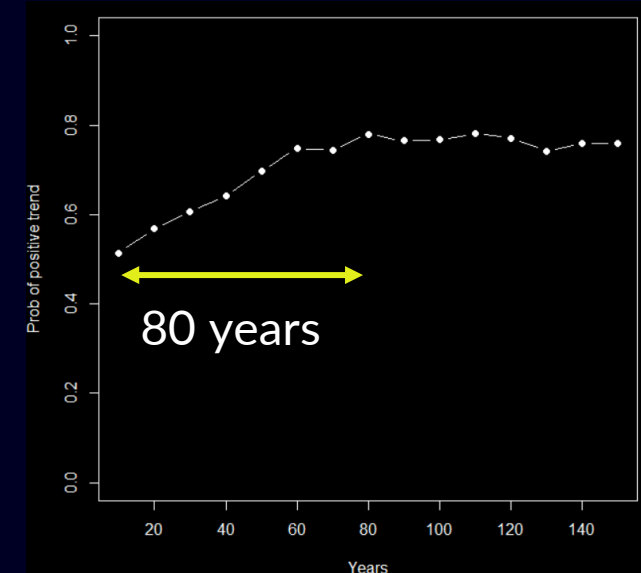


How can we make sense of all this?

1. Even simulating from a non-stationary Poisson with a 20% linear increase in rate over a 50-year period is still a bit noisy.
2. The timescales over which any sort of trend can be identified is limited by the observed record.



Probability of positive trend over the simulation

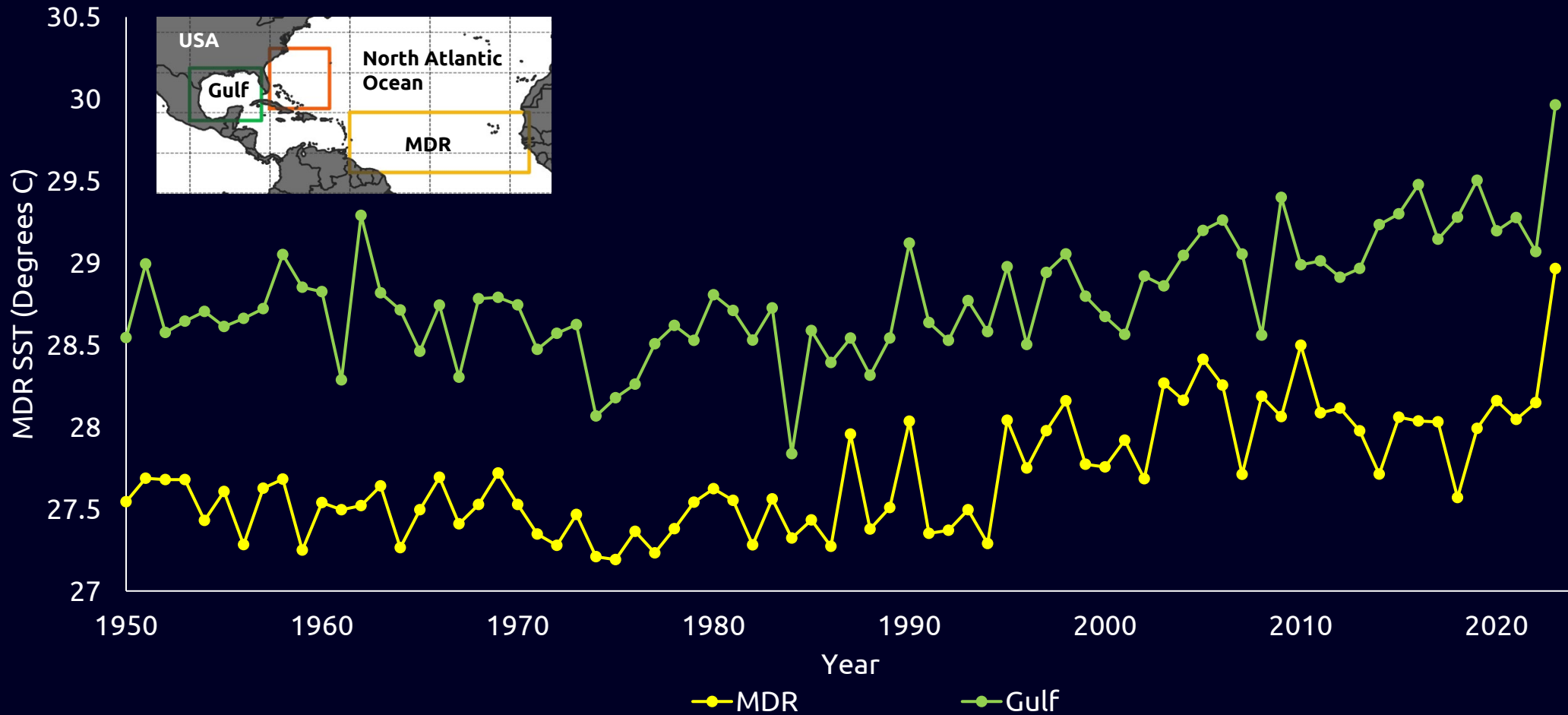




How can we make sense of all this?

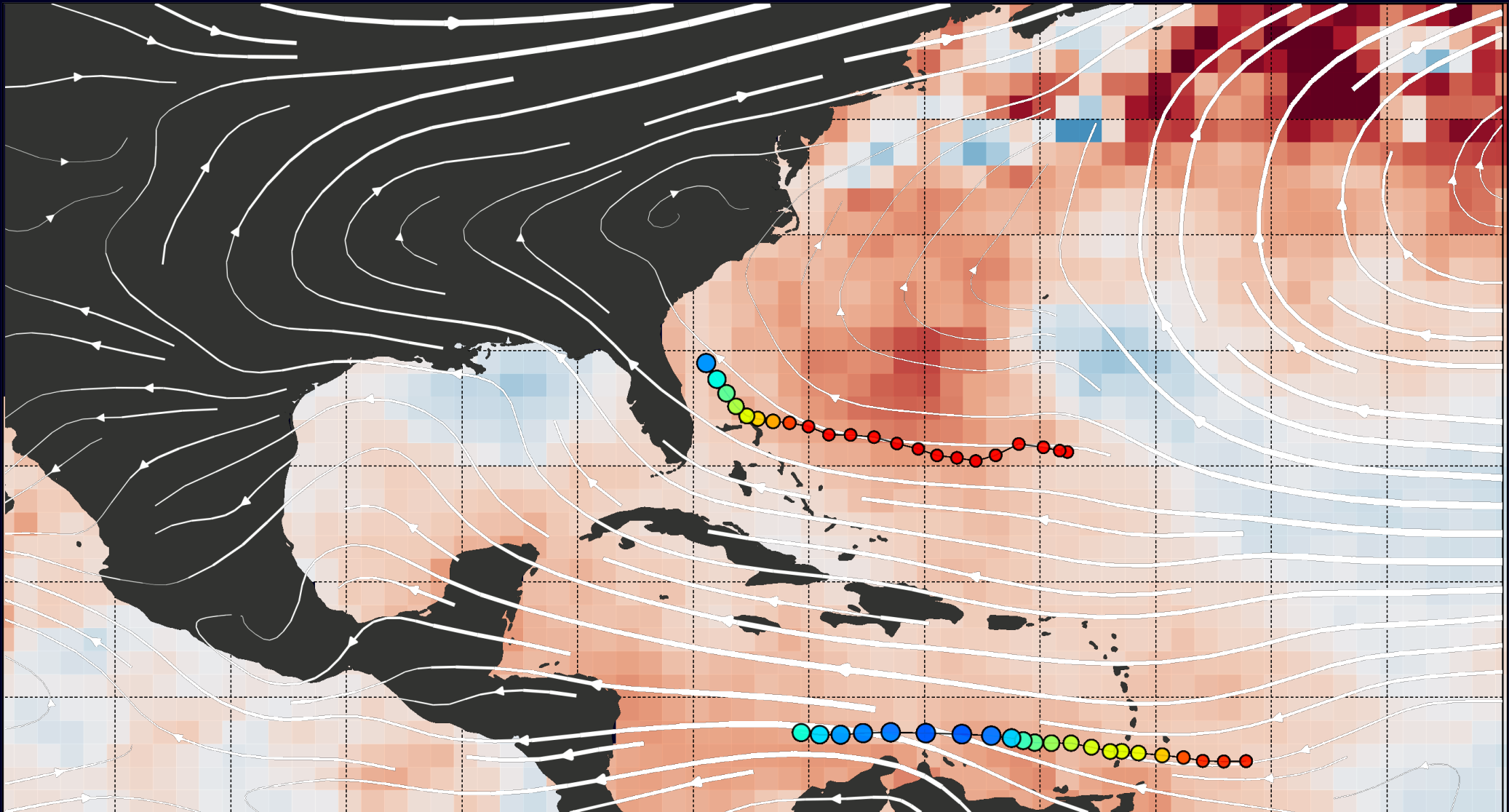
Combine known physics to quantify the extreme statistics

Sea surface temperature in the MDR and the Gulf



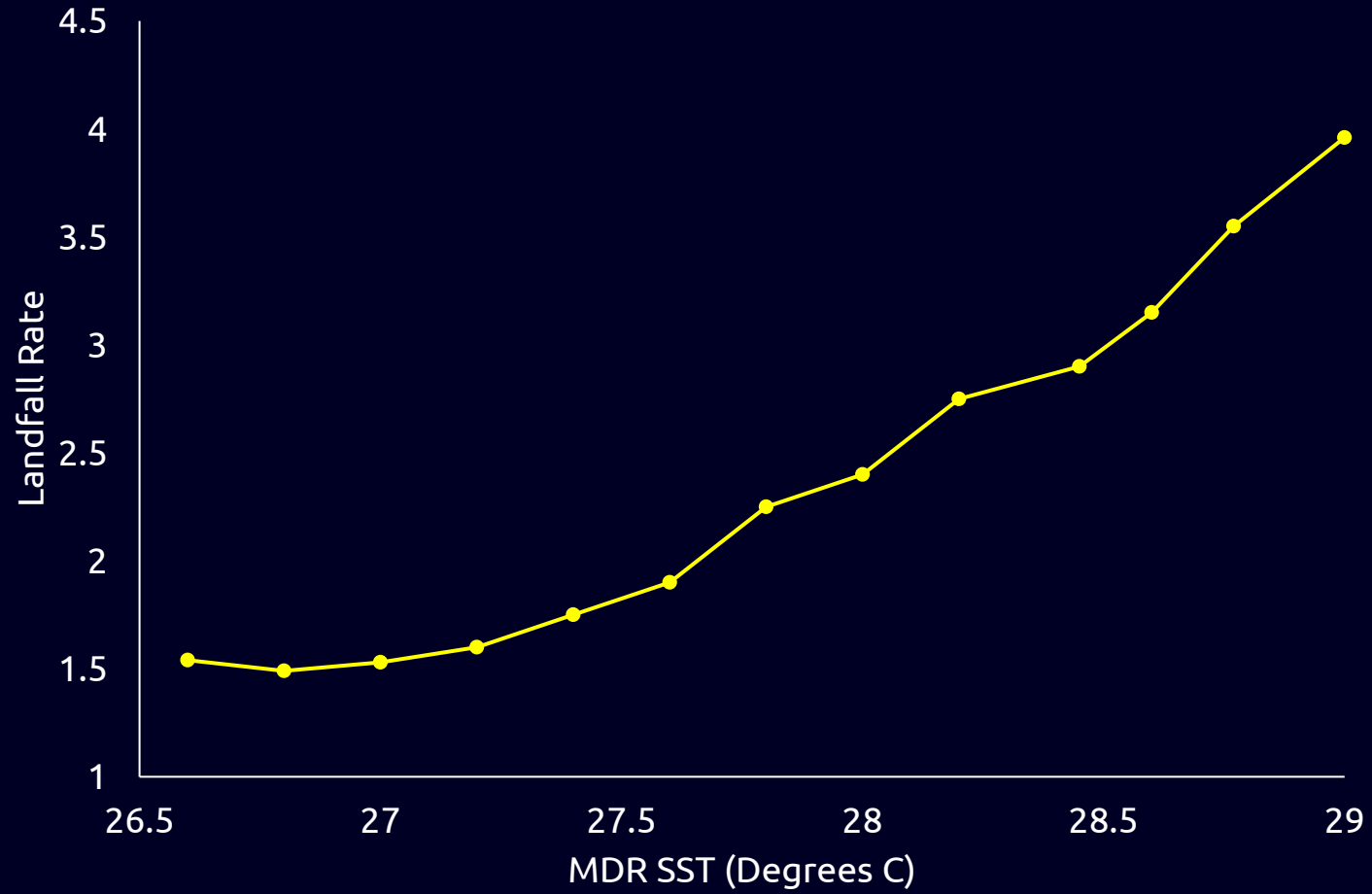


Simulate stochastic events that learn and feel the regional climate



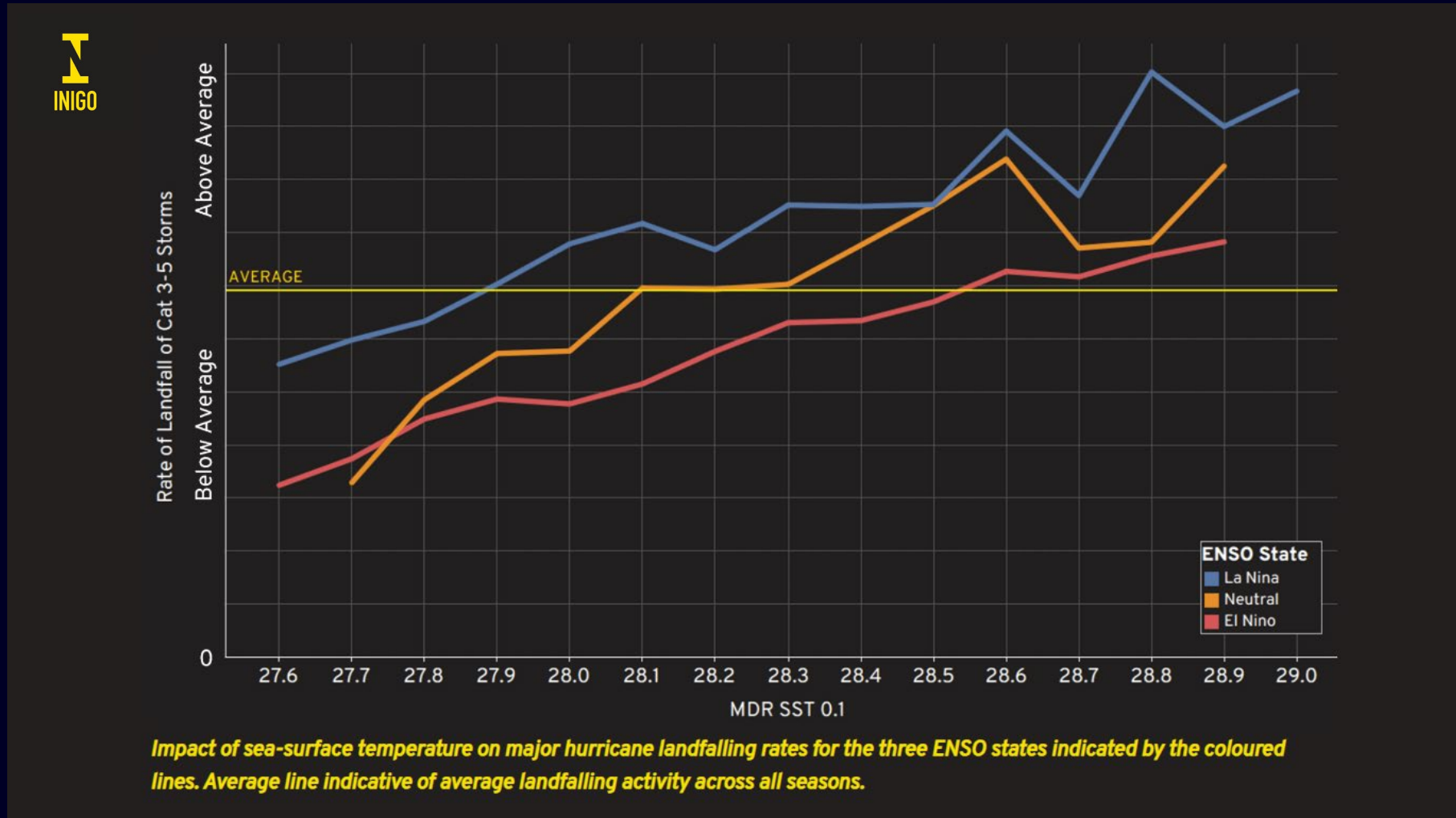


Dynamically model the direct impact of SSTs in the MDR on hurricane landfall rates in the US





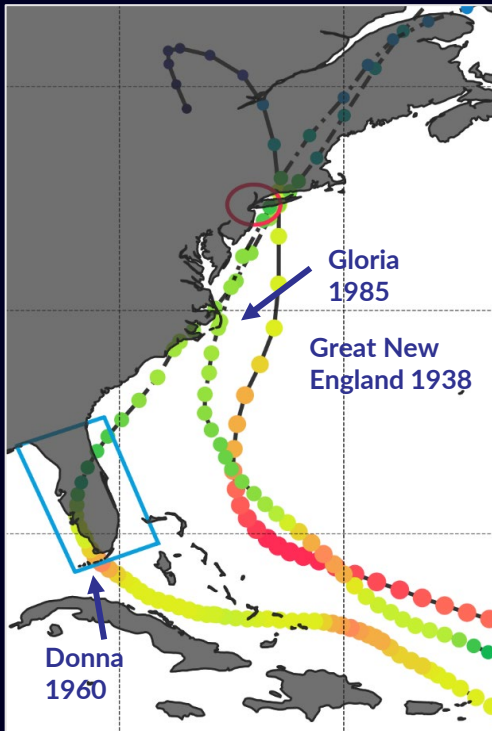
Quantifying tipping points and climate volatility





Conditional probabilities

How does climate change impact the correlation between different risk locations?

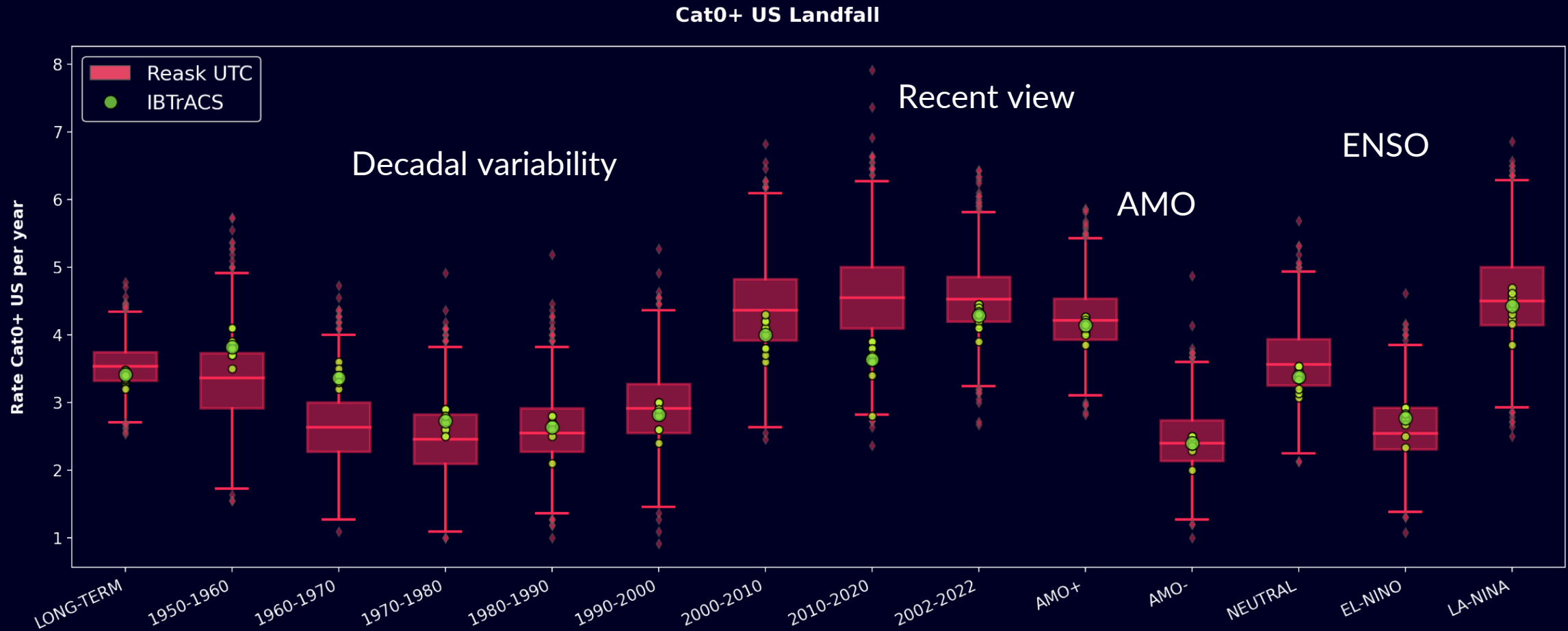


In a +2C warmer world the likelihood of experiencing catastrophic winds and correlated events is expected to double

Events	Return Period (years)	
	Current	+2C warming
New York Cat 1 and above	20	13
New York Cat 2 and above	60	30
Cat1 and above in New York and Cat3 and above in Florida	200	100
Cat2 and above in New York and Cat3 and above in Florida	645	295



Using history to validate not calibrate





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