On the Increasing Intensity of the Strongest Hurricanes

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Take Home Points

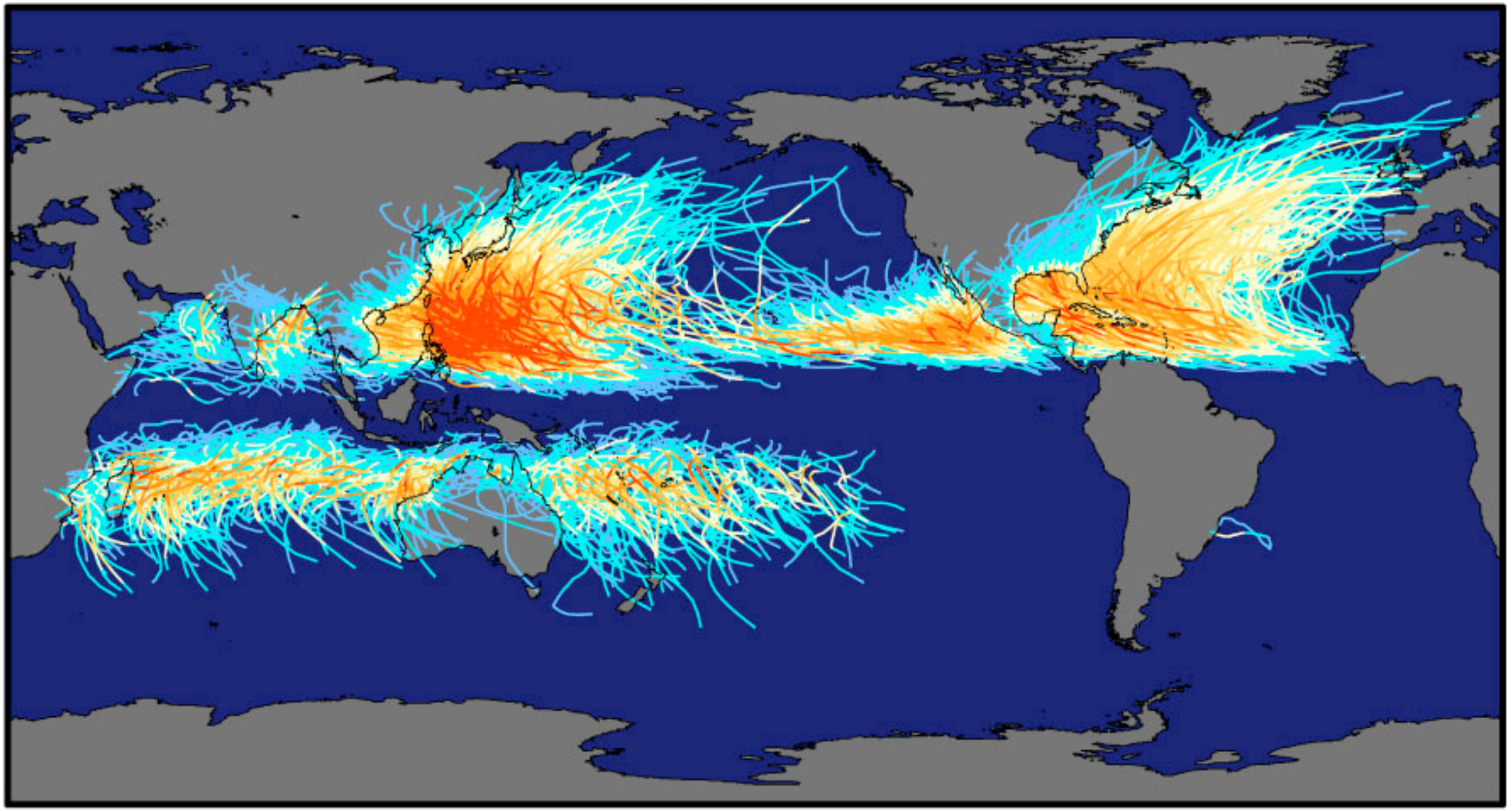
Strongest hurricanes are getting stronger worldwide.

Upward trends are related to rising ocean temperatures.

Upward trends are most pronounced over the Gulf of Mexico and the Caribbean Sea.

The 1-in-100 year hurricane from the 20th century would result in 36% [+/-15%] greater wind damage if it affects EAFB in 2100, solely as a consequence of projected warmer waters in the Gulf of Mexico.

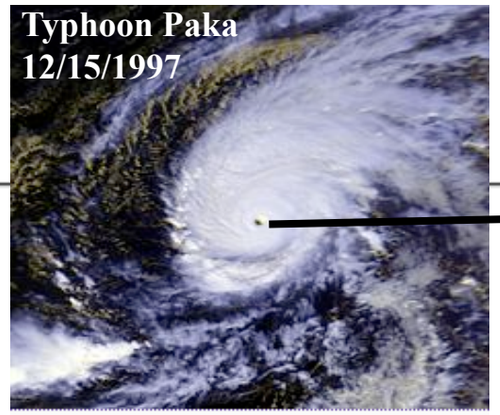
Tracks and Intensity of All Tropical Storms



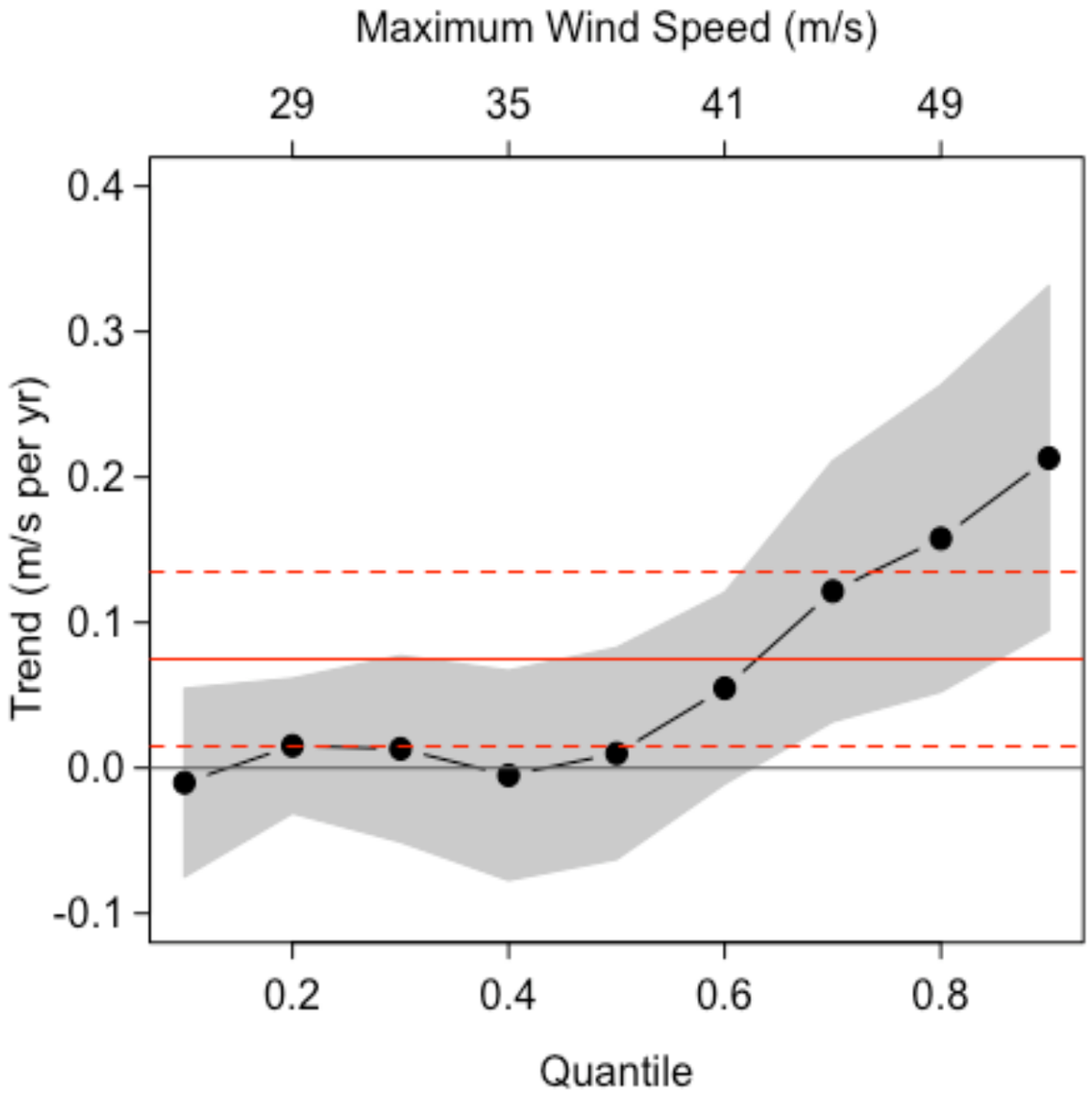
TD | TS | 1 | 2 | 3 | 4 | 5

Saffir-Simpson Hurricane Intensity Scale

Are hurricanes getting stronger?



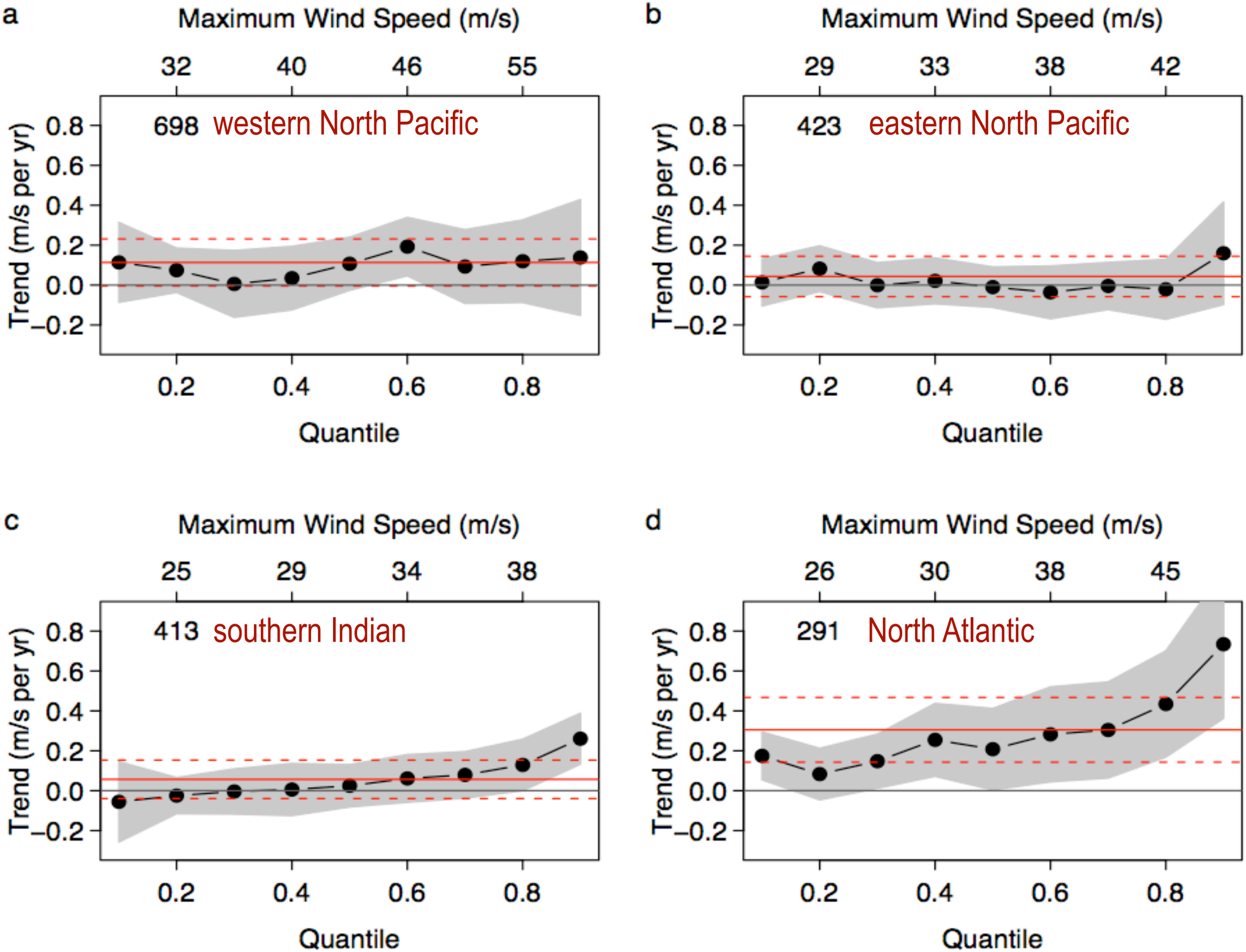
Boxplots of lifetime maximum wind speeds from tropical cyclones worldwide.



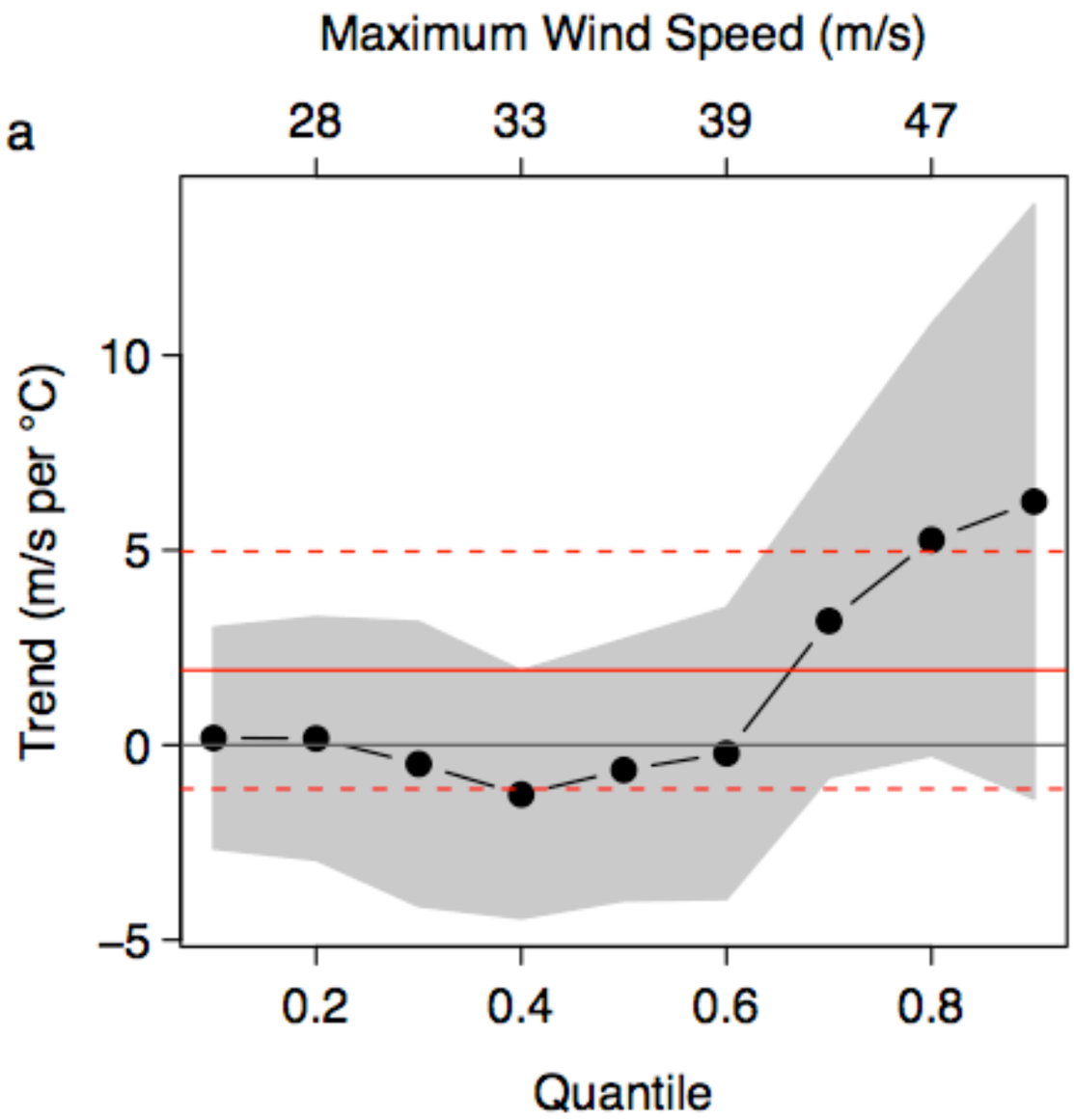
Quantile regression of lifetime maximum wind speed onto year.

Elsner, Kossin, Jagger 2008

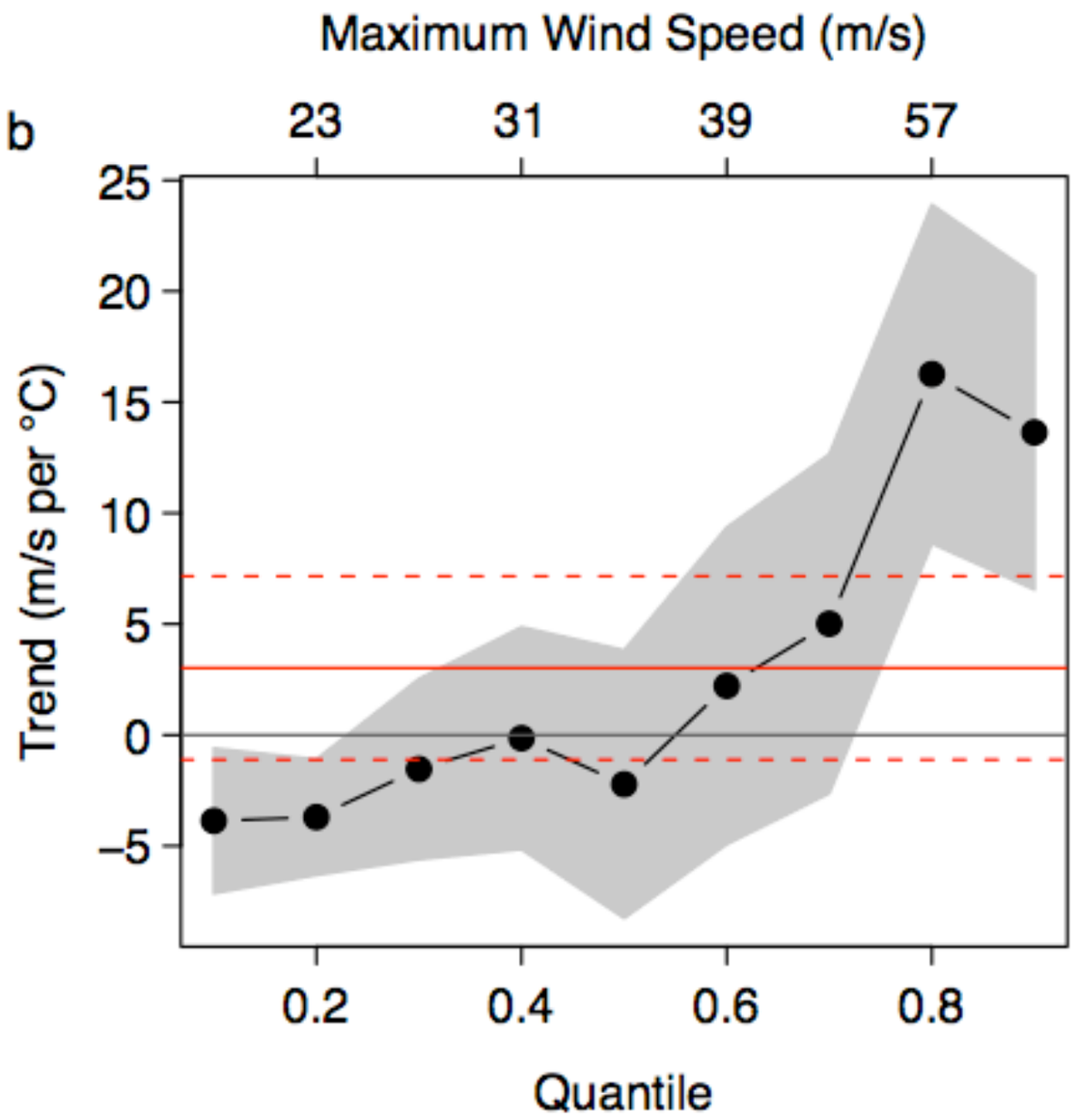
Does this occur everywhere?



Yes, but what about data reliability?

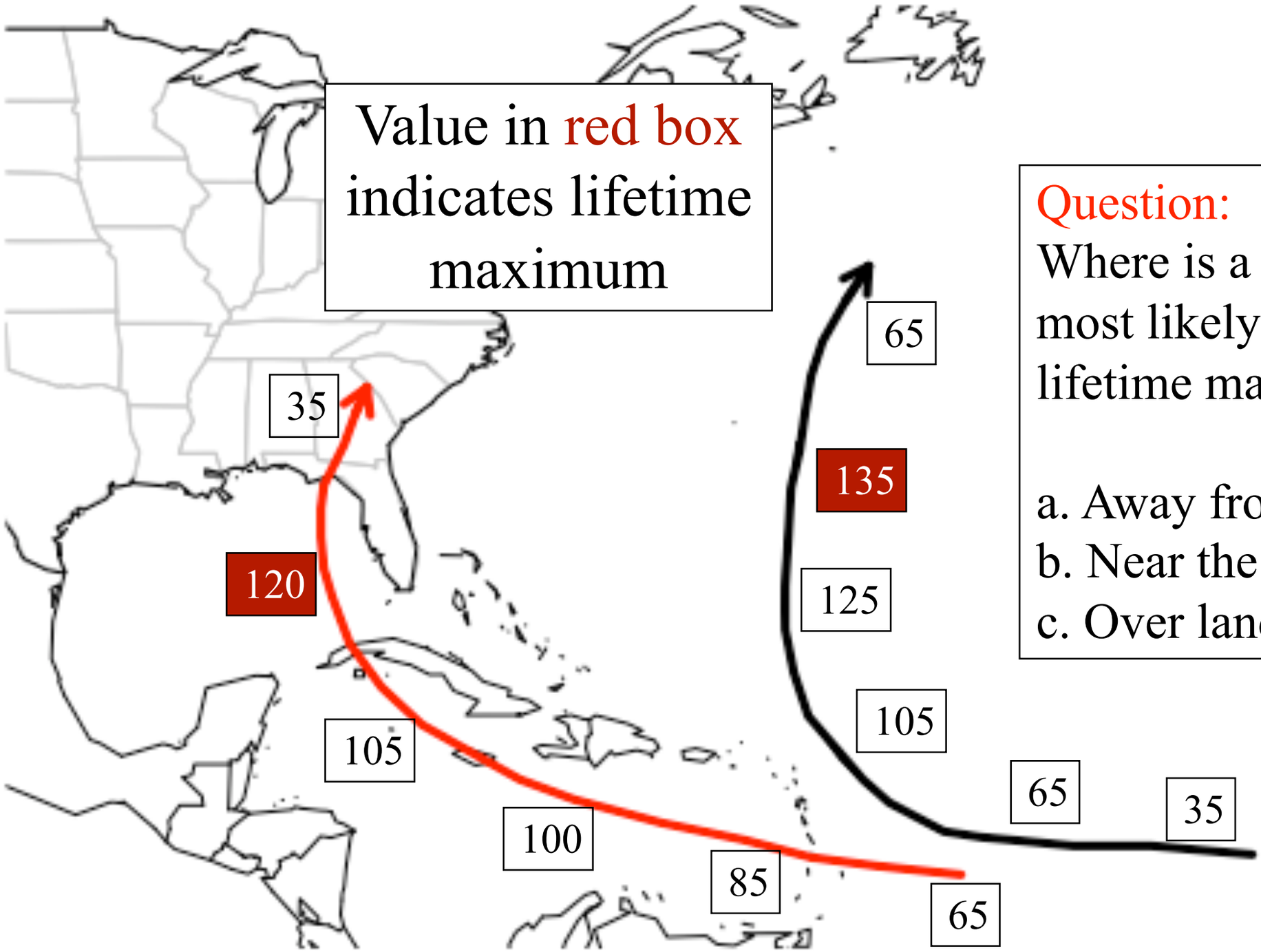


Regression of satellite-derived lifetime maximum wind speed onto global SST



Regression of best-track lifetime maximum wind speed onto global SST

Okay, but is the trend relevant to society?

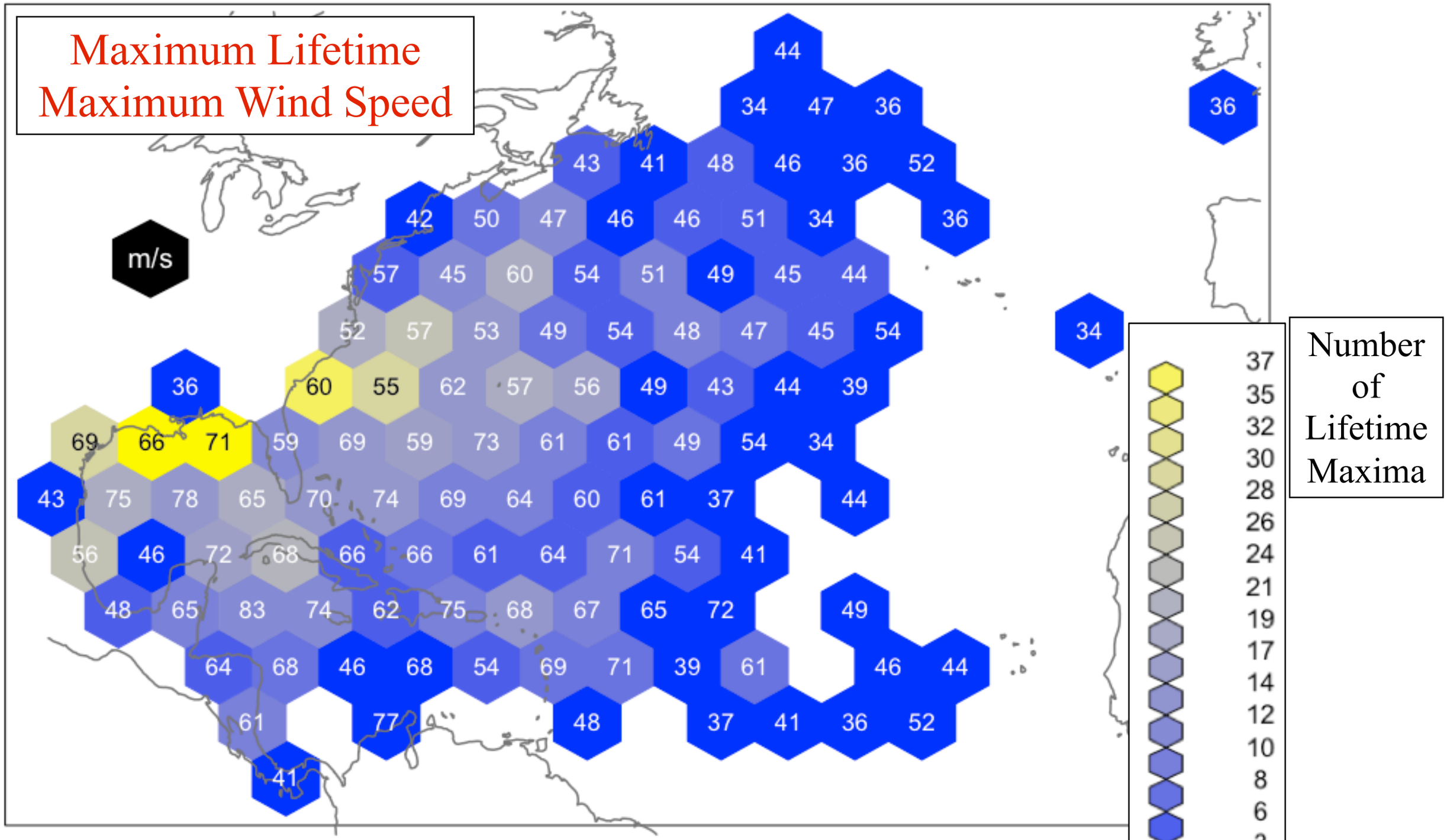


Question:
Where is a hurricane most likely to reach its lifetime maximum?

a. Away from the coast
b. Near the coast
c. Over land

Hurricane wind speeds (kt) along the path of two hurricanes.

And the answer is; Near the coast

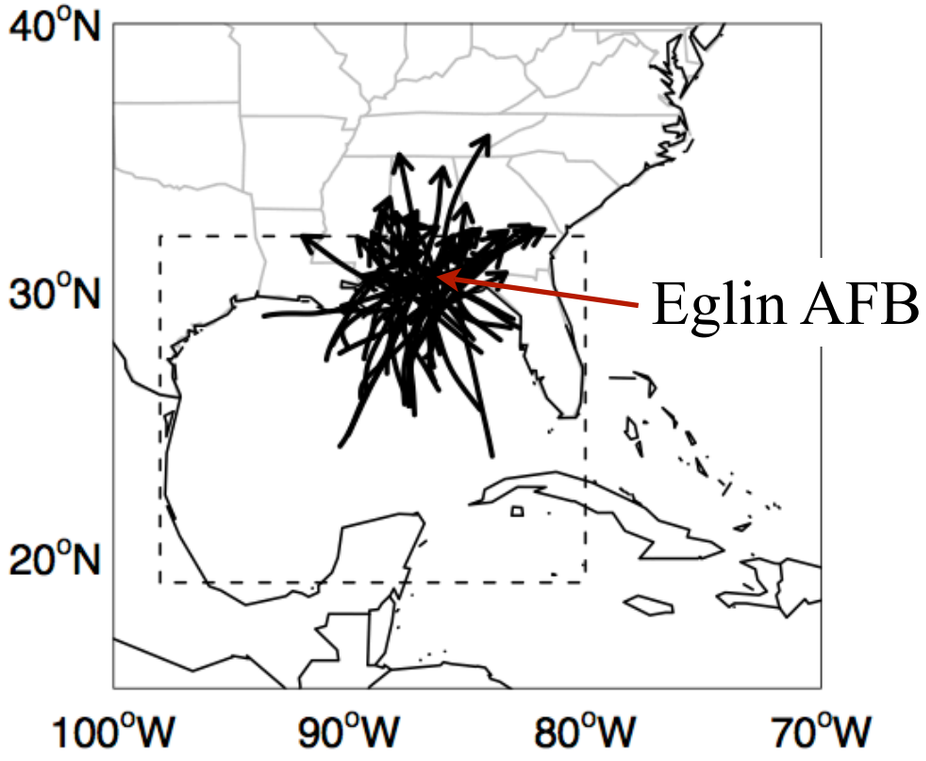


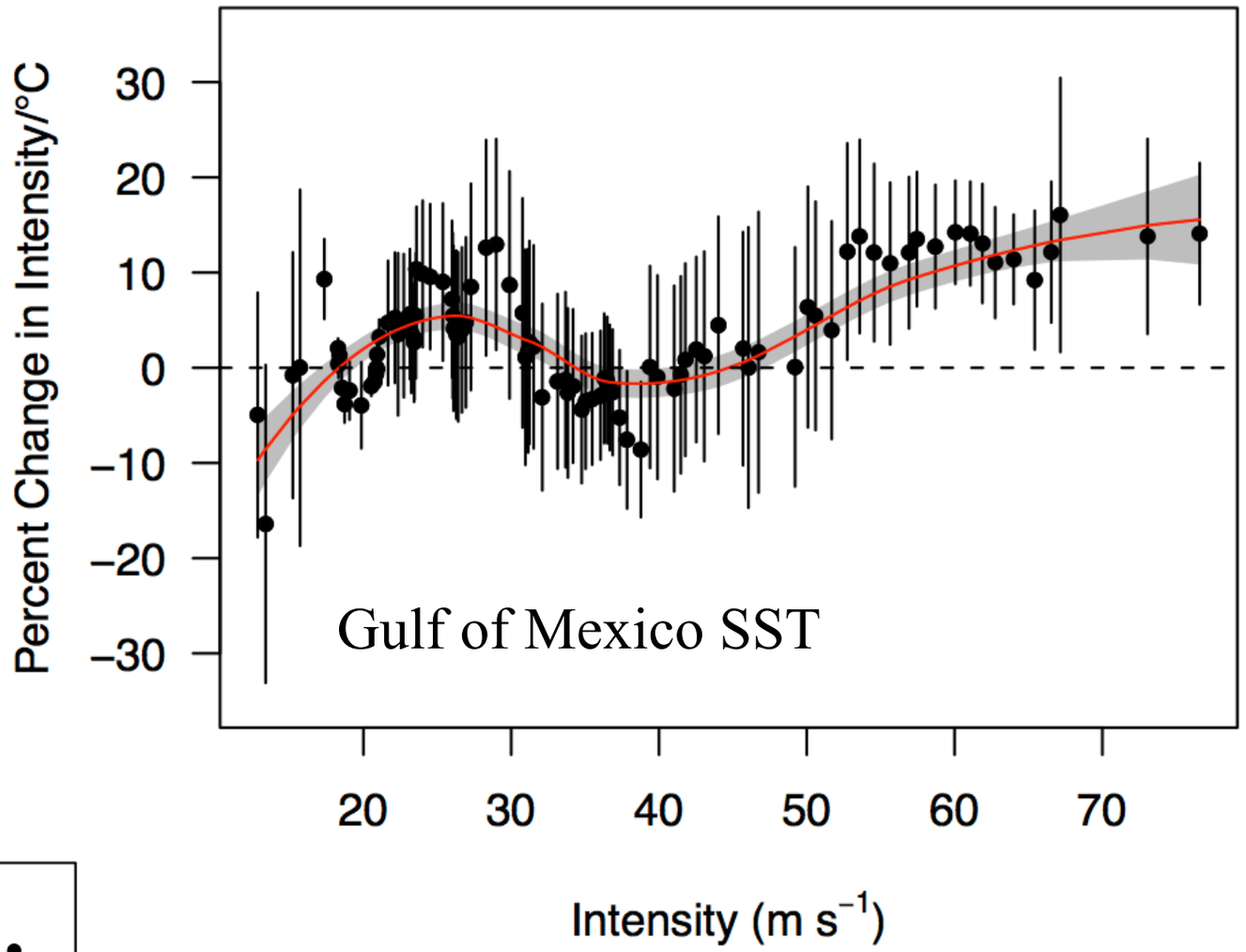
A hurricane is relatively more likely to reach a lifetime maximum near the coast of the United States & Mexico.

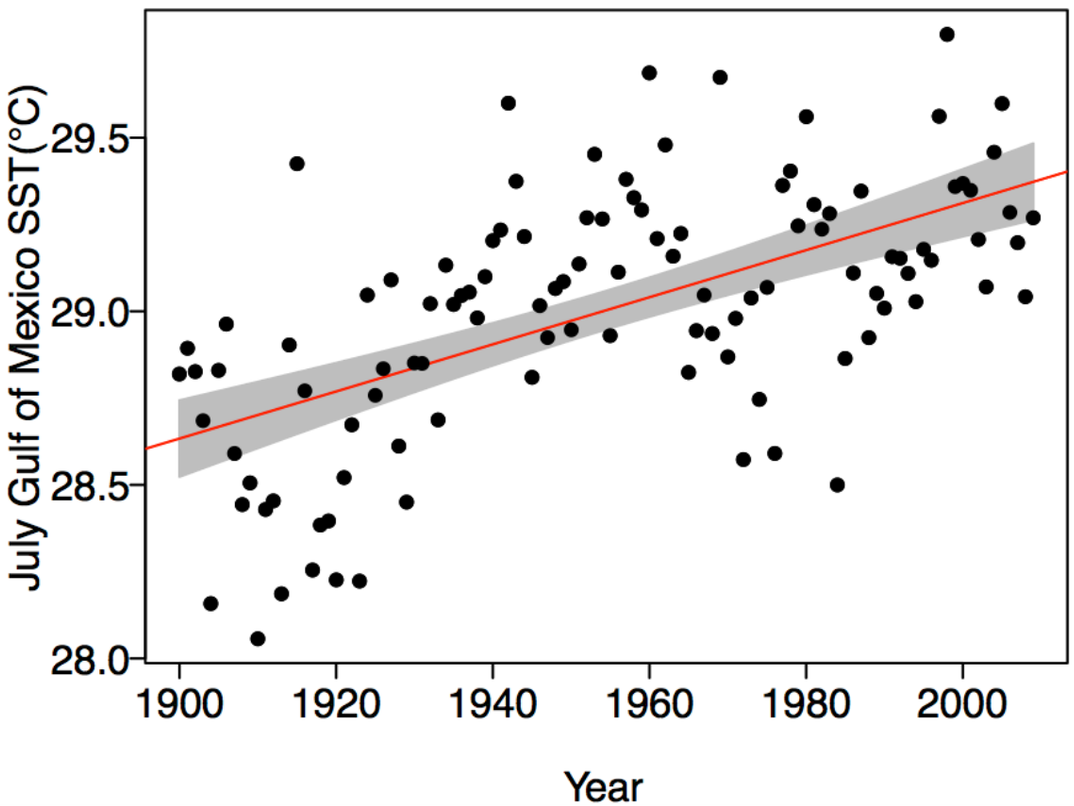
Surprising?

Blogger: “storms rarely make landfall at their peak intensity...”

Can we quantify future impacts?

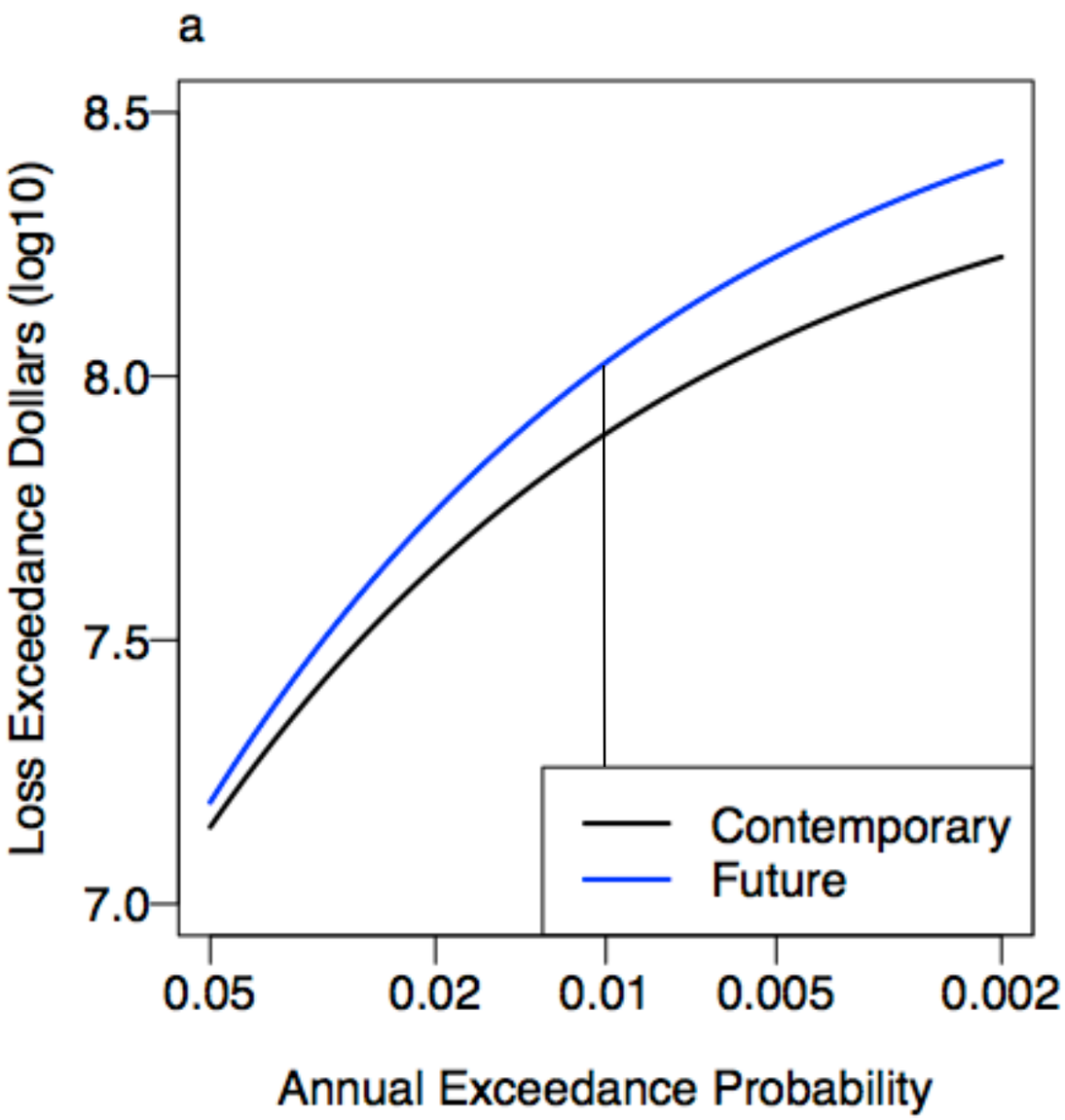


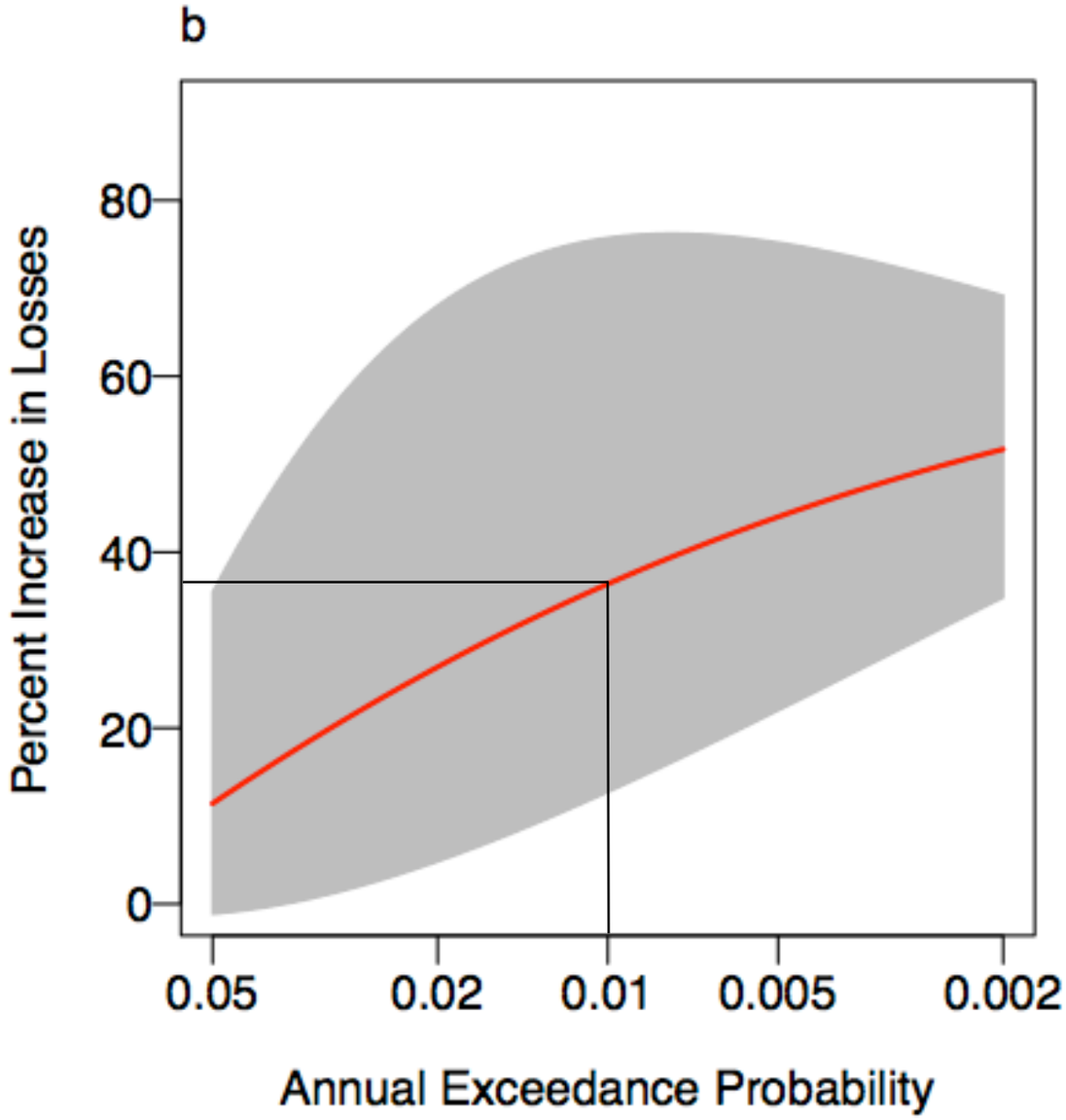




$$w_{2100} = [1 + \Delta w(w) \cdot \Delta \mathrm{SST} \cdot 90] \cdot w$$

More wind damage in the future





Summary

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