



**Pacific
Northwest**
NATIONAL LABORATORY

Increasing near-coastal Tropical Cyclone activity along the US East Coast in the satellite era

October 13, 2020

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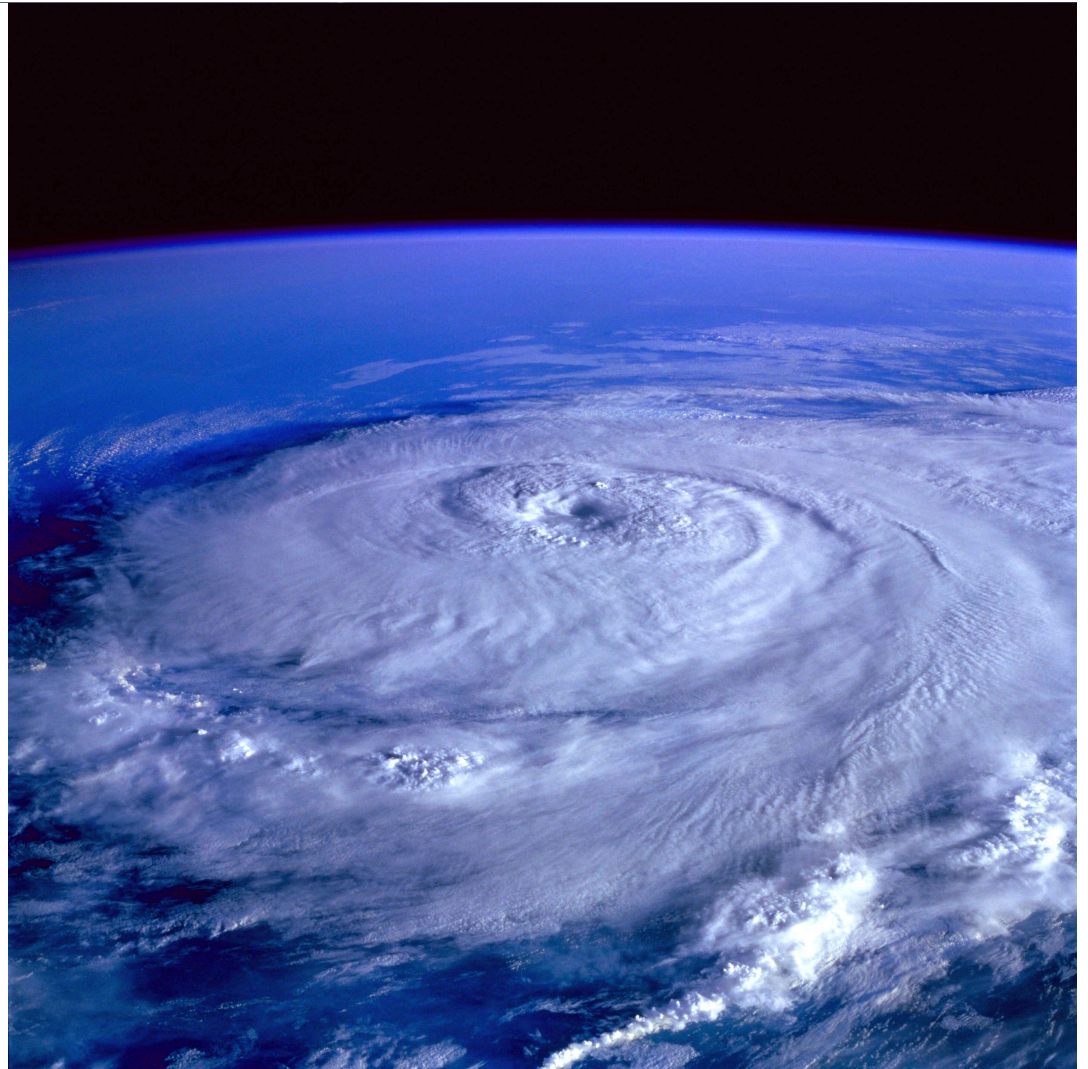
Wenwei Xu

L. Ruby Leung

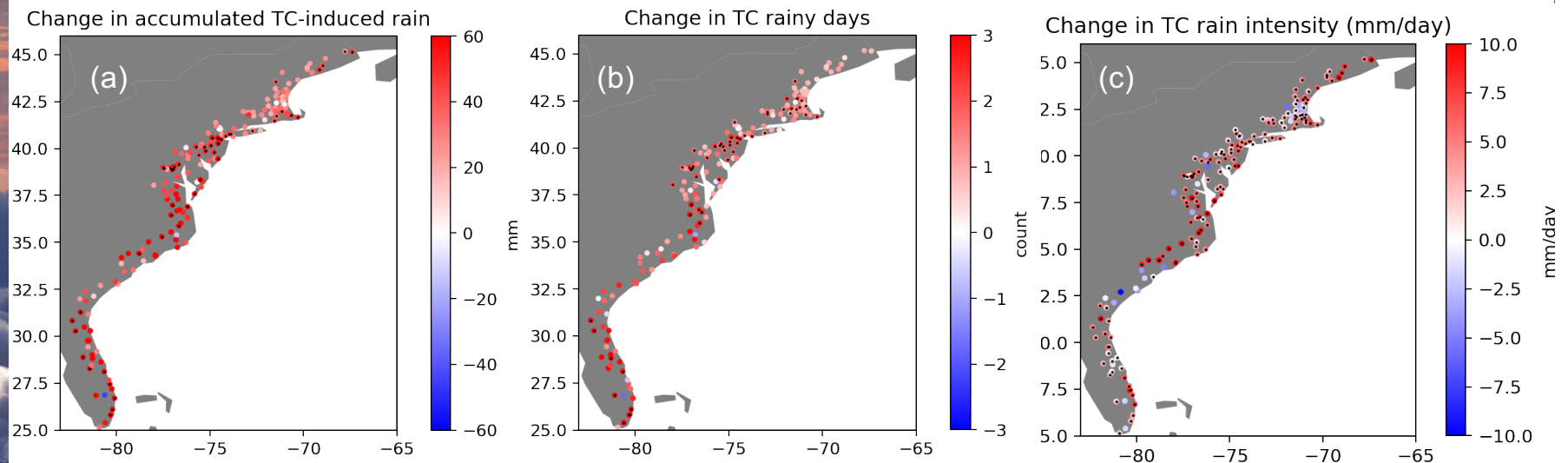
David R. Judi

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What is causing the increase in coastal TC-induced rainfall without a noticeable landfall change?

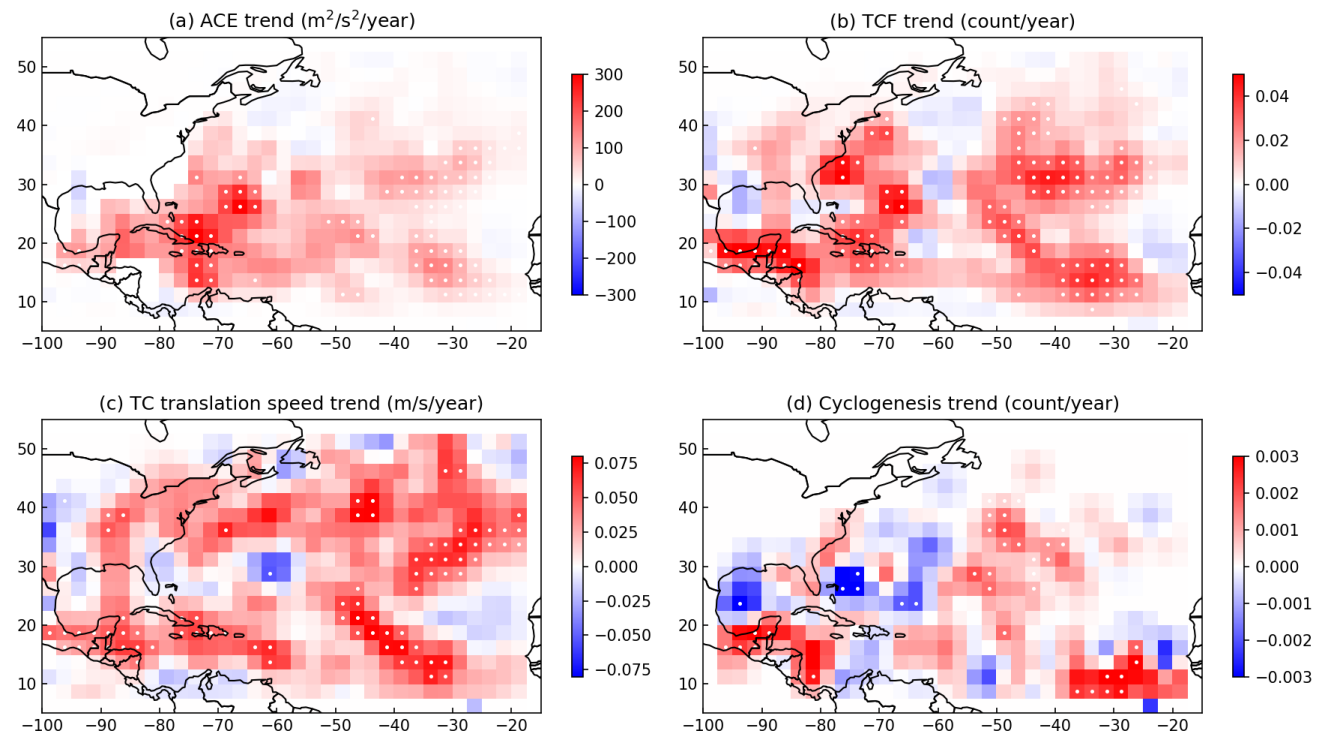


The change in (a) accumulated TC-induced rain (mm), (b) TC rainy days, and (c) TC rain intensity (mm/day) over 1982-2018 based on Global Historical Climatology Network (GHCN) precipitation gauge locations. Gauge locations with changes significant at the 90% level are marked with black dots.

East coast landfall count: 1982-1999: **32**; 2001-2018: **33**

Trends in North Atlantic TC activity (1982-2018)

- Overall increase in TC activity in the North Atlantic.
- Noticeable TCF increase near the East Coast.
- No evidence of TCs slowing down near the East Coast, contrary to *Hall & Kossin 2019* and *Kossin 2018*.
- Significant increase in cyclogenesis near the eastern MDR.

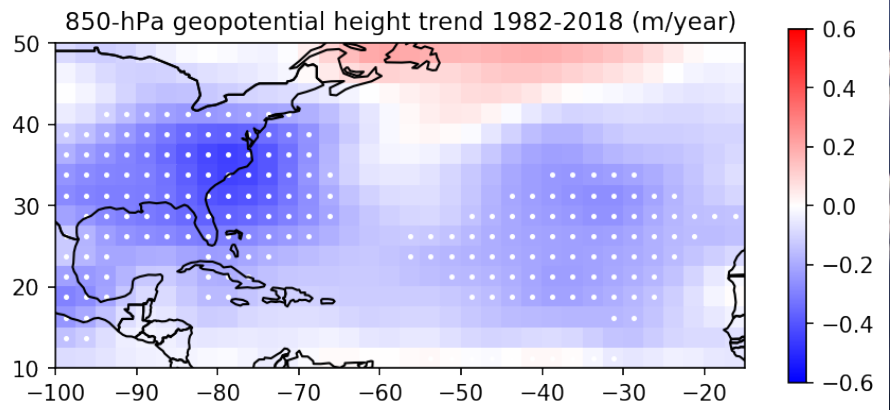
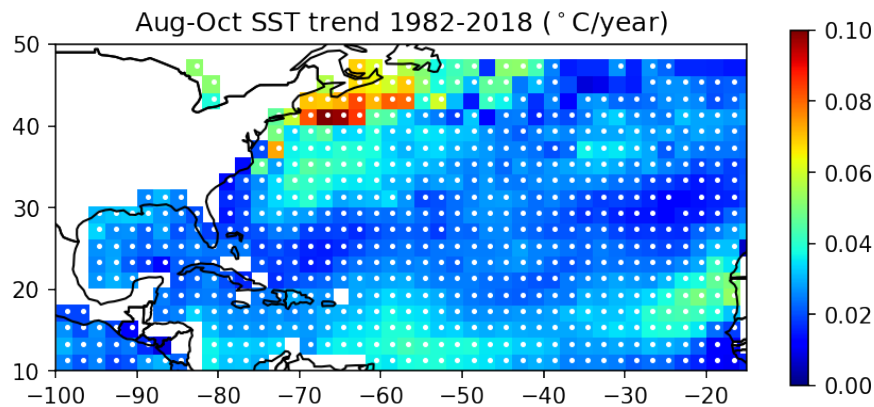
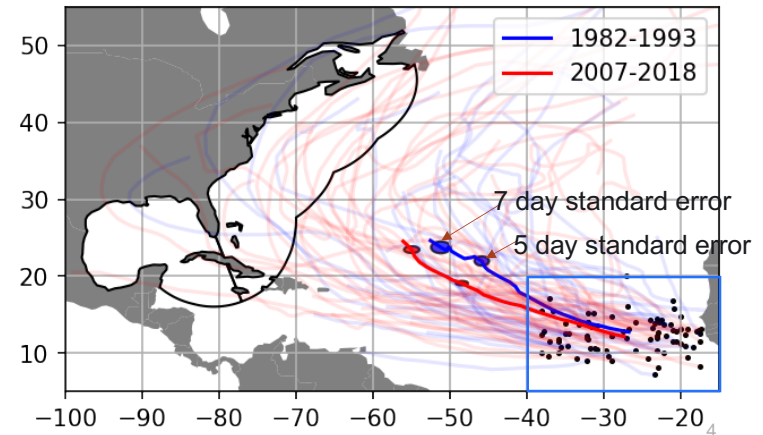


Raw data are smoothed using a 9-point smoother. Trends significant at >90% are marked with white dots.



Enhanced cyclogenesis over the eastern MDR and a westward shift in TC tracks

- 30% of TCs that approach the East Coast form to the east of 40W (1982-2018) (56% increase in cyclogenesis)
- Westward shift of tracks associated with a strengthening of the NASH.
- Sensitivity experiments with our synthetic TC track and intensity model will be performed.



Grand research challenges

- Current well-known metrics such as TC landfall count, ACE, PDI etc. may not capture TC impacts (eg. rainfall) accurately near the coast.
- TC rainfall near the coast results from a combination of several large-scale processes.
- Metrics that can accurately represent these complex processes must be developed in future to better understand TC impacts near the coast and to evaluate model fidelity.