

September 22, 2017

Destructive potential of cyclones increases with ocean warming, modelers find

The Atlantic hurricane season so far has seen a rash of historic extremes, between Harvey dropping up to 50 inches of rain, Irma generating talk of whether to add a category 6 to the intensity scale, and now Maria strengthening from a tropical storm to a category 5 hurricane in just two days. This recent activity has generated much speculation about the role of climate change in the progression of these and future storms.

Coincidentally, the IPRC's [Tim Li](#), a Professor of Atmospheric Sciences at the University of Hawai'i at Mānoa, guided a study recently published in *Scientific Reports* examining almost exactly that question: what is the impact of ocean warming on the size and destructiveness of tropical cyclones. The conclusion of the study was that with warmer sea surface temperatures, tropical cyclones become not only stronger, with higher maximum wind speeds, but also larger, with gale-force winds covering a greater area.

Li supervised the work by Yuan Sun of the National University of Defense Technology in Nanjing, China. Previous studies of climate change effects on tropical



Hurricane Irma (Category 5) looms large as it approaches Cuba and Florida on September 8, 2017. Credit: NOAA

cyclones only considered storm *intensity* changes (i.e. wind speed), assuming that storm *size* would remain the same. But Li's group wanted to examine how much cyclone size might be affected by increasing water temperatures, since potential destructiveness is greatly increased as storm size increases.

Using both long-term climate simulations and short-term, high-resolution simulations of different cases, the group found that for every degree Celcius increase of sea surface temperature, the size-dependent destructive potential of typhoons in the western North Pacific and hurricanes in the North Atlantic can increase by 340%

and 150%, respectively. The implication is that future storms in both ocean basins could become dramatically more destructive if ocean warming continues unabated. Texas, Florida, and many Caribbean islands have recently had a taste of this elevated destructiveness, first-hand.

“We were a little surprised by the result, but it is physically understandable,” Li said. “The strengthened tropical cyclone destructive potential poses a heightened threat to human society as well as terrestrial and marine ecosystems.”

Li did note that the results might be model-dependent, so further modeling efforts are needed to confirm the results. For future research, the group plans to incorporate other natural forcings and projected future sea surface temperature patterns derived by different modeling centers around the world.

Read more in the published paper at: dx.doi.org/10.1038/s41598-017-08533-6