

ENVIRONMENT

Scientists Explain Why Harvey Was So Devastating

The storm lingered over Houston, dumping trillions of gallons of rain

By Daniela Hernandez

Updated Aug. 30, 2017 4:47 pm ET

Though the rain has subsided in Houston, parts of the metro area got more than 49 inches of rain from Tropical Storm Harvey. Some are calling this a once-in-800-years flood event.

So why was the storm so devastating?

The storm lingered over Houston for days, dumping more than 15 trillion gallons of rain on the city. That's more than double the amount of rain that New Orleans got in 2005 during Hurricane Katrina.

MORE STORM COVERAGE

- [Live Coverage: Tropical Storm Harvey](#)
- [Harvey Pounds Texas, and Louisiana Braces as Storm Moves](#)
- [Harvey Creates a Crisis in Health Care](#)
- [First Day of School Ends Up a Washout](#)
- [Rising Reservoirs Pose Possible Issue for Dams](#)
- [Gulf Coast Faces Billions in Damage](#)

Normally, when a hurricane or tropical storm hits land, it quickly weakens as it is separated from its fuel source—the ocean's warm waters. When Harvey made landfall in Texas, it was a Category 4 hurricane, and it became a tropical storm a day later. But wind currents didn't push the storm far enough away from the Gulf of Mexico quickly enough, so Harvey was continuously fed by warm water vapor, producing heavy rain.

The big problem was the storm just “stalled” in place, continuing to dump rain in one area, said Dalia Kirschbaum, research scientist at NASA Goddard Space Flight Center's Hydrological Sciences Lab.

“The flooding and the rainfall associated with this storm is epic,” she added, because of its unique position over the gulf.

What is the role of climate change in Harvey's severity?

There is some disagreement among scientists as to the role of climate change.

Judith Curry, president of weather risk-management forecasting group Climate Forecast Applications Network, wrote on her blog that, by most measures, Harvey isn't that different from other severe storms that have hit the U.S. in the historical record. Ranked by barometric pressure—a measure of storm severity—Harvey ranks No. 14 out of 25 hurricanes that made landfall in the U.S. since 1886. But the storm did signal the end of a 12-year-period in which few major hurricanes made U.S. landfall.

“Anyone blaming Harvey on global warming doesn't have a leg to stand on,” she wrote.

Penn State climatologist Michael Mann, on the other hand, said climate change worsened the impact of Harvey.

There are certain climate-change-related factors that “we can, with great confidence, say worsened the flooding,” he said in a detailed analysis posted on Facebook. Rising sea levels—more than half a foot over the past few decades—likely made the storm surge flooding measurably worse. He also said that sea surface temperatures in the region have risen about 1 degree Fahrenheit over the past few decades. That means there is 3% to 5% more moisture in the atmosphere, he said, which in turn creates the potential for much greater rainfall and flooding.

According to U.S. National Oceanic and Atmospheric Administration, waters in the Gulf of Mexico were 2.7 to 7.2 degrees Fahrenheit warmer than average as Harvey moved north, which strengthened the storm.

Scientists can't attribute “the slow moving nature of the storm or any one of the specific storm conditions in Tropical Storm Harvey to climate change,” Dr. Kirschbaum said. “However, increases in water vapor in the atmosphere resulting from a warming climate may lead to more extreme rainfall in some areas.”

What can scientists learn from Harvey?

Scientists at NASA are always striving to “better understand the mechanisms that drive these storms to move and intensify, and [to] provide better modeling and observations to improve the ability...to forecast these events,” Dr. Kirschbaum said. Researchers will use data gathered from satellites and other instruments to help improve computer models, which could help scientists understand how storms may change in the future, she said.

Photos: Tropical Storm Harvey Causes Record Flooding in Texas

The tropical storm dumped more than 50 inches of rain in parts of Texas in a new record for the contiguous U.S.



Floodwaters from Tropical Storm Harvey surround homes and businesses in Port Arthur, Texas, on Thursday. GERALD HERBERT/ASSOCIATED PRESS

1 of 21

— *Robert Lee Hotz and Heather Seidel contributed reporting*

Write to Daniela Hernandez at daniela.hernandez@wsj.com

Copyright © 2019 Dow Jones & Company, Inc. All Rights Reserved

This copy is for your personal, non-commercial use only. To order presentation-ready copies for distribution to your colleagues, clients or customers visit <https://www.djreprints.com>.