

Before the Storm: Forecasting Hurricane Harvey

By Samantha de Leon



The mammoth Hurricane Harvey made landfall on the Texas coast around 10:00 p.m. on Friday, August 25, 2017.

Photo courtesy of the National Oceanic and Atmospheric Administration (NOAA).

For people living in southeastern Texas, hurricanes are guaranteed to make a few appearances. The colossal storms are inescapable and, in many ways, unpredictable. For nine years, no hurricanes made landfall in the Houston region after Hurricane Ike, which came ashore at Galveston in 2008. While those summers were calm, each one made Texans like me feel anxious, wondering when the streak would end. The question was not *if* another storm would come, but *when*.

The answer came on August 13, 2017, when a large wave emerged off of the West African coast and moved through the Lesser Antilles. Days later, on the afternoon of August 17, the wave evolved into a tropical storm as it crossed the Atlantic Basin, and the National Weather Service (NWS) gave it a name: Tropical Storm Harvey. The storm began to downgrade as it entered the Caribbean, dissipating and scattering so much that the NWS did not issue forecasts or advisories on Harvey for two days. Upon crossing the Yucatán Peninsula and arriving at the Bay of Campeche on August 23, the weakened storm again became a tropical wave, still a seemingly small threat. The National Hurricane Center (NHC) had originally expected Harvey to become either a weak Category 1 hurricane or a strong tropical storm upon landfall along the middle Texas coast.¹

That prediction changed dramatically less than twenty-four hours later on August 24, when the NHC called the new forecast “quite concerning.” Overnight, Harvey had strengthened and was expected to make landfall the next day as a major Category 3 hurricane (winds 111-129 mph). Besides strong winds, forecasters expected the storm to bring between fifteen and twenty inches of rainfall and life-threatening floods. Shortly before Harvey’s landfall, the NHC released another forecast more severe than the last, predicting up to forty inches of rain and a storm surge up to thirteen feet high.² At this point, it became clear that a catastrophic storm was headed towards Texas and that our hurricane drought had ended. One question, however, still remained: Was the new prediction true?

To find the answer, I spoke to Alan Lammey, a senior markets analyst in the energy industry who took part in the Resilient Houston: Documenting Hurricane Harvey project. In his profession, Lammey needs to know what kind of weather to expect as it directly affects the prices of natural gas and oil. As a result, he has worked alongside experienced meteorologists and become a weather guru of sorts, running the radio show *Energy Week* from 2006 to 2016, where he built a reputation around his weather credibility. He has been studying weather patterns for the past

twenty years and has lived through Tropical Storm Allison, and Hurricanes Andrew, Rita, and Ike. He thought he had seen everything until that August when Hurricane Harvey developed.³

Lammey indicated that meteorologists initially anticipated Harvey making landfall near Port Aransas, approximately 200 miles south of Houston; then, they predicted, the storm would head northwest towards San Antonio. However, Lammey believed that Harvey would follow the coastline towards Houston and the remaining Southeast Texas coastal areas.⁴

While Lammey was confident in the path of the storm, he was skeptical, along with other local meteorologists, about the unheard-of amounts of rainfall anticipated. He described the precipitation models as “off the charts outrageous.”⁵ The estimations of over forty inches of rain were sure to devastate Houston and many cities across Texas.

Lammey found the thought of that much rainfall so unnerving that he made several posts on Facebook to warn his friends of the potential catastrophic damage coming their way. He tried his best to provide an accurate timeline for Harvey, along with expected landfall dates, precipitation models, and facts about the storm. “Believe it or not, I came up against a lot of pushback and a lot of ridicule,” Lammey reported. “A lot of people called me a fearmonger.”⁶

At the time, I had not heard any of those predictions. As Harvey grew in the Gulf, I went to WalMart to purchase a shoe rack. To my surprise, I found the store absolutely packed on a weekday. My confusion blossomed further upon seeing the nearly empty shelves of bread and bottled water and long check-out lines. Only after eavesdropping in line did I learn of Harvey’s development in the Gulf and immediately felt annoyed. In my experience, forecasters often exaggerated predictions of these tropical systems.

One example that comes to mind is 2005’s Hurricane



Jonathan Vance with the Houston Fire Department (top) and Jeff Thibodeaux with Acadian Ambulance Service tracked the storm during Hurricane Harvey to properly position their resources.

Photo courtesy of James Sheffield.

Rita, which forecasters predicted would hit Houston. Rita developed into a tropical storm in the Caribbean, and within two weeks, had grown to a Category 3 hurricane in the Gulf of Mexico. Thirty-six hours later, the Gulf’s warm waters helped Rita blossom into a Category 5 storm that had its sights on the Texas coast. The intensification caused a wave of panic because it followed just three weeks after Hurricane Katrina’s massive devastation and loss of life in Louisiana, Mississippi, and Alabama. The National Oceanic and Atmospheric Administration (NOAA) estimated that local officials ordered and encouraged over two million people in Texas and Louisiana to evacuate for Rita, making it the largest mass evacuation in U.S. history. Additionally, hundreds of thousands of people in the Houston area who were not included in the evacuation order also chose to flee out of fear, leaving traffic at a complete standstill. Hurricane Rita changed course, landing in the Beaumont area, and 107 people died in the evacuation of the Houston region, most from heat-related problems while they sat stalled on roadways, many of them out of gas.⁷

This disastrous evacuation was one reason the City of Houston did not issue an evacuation order for Harvey. Houston Mayor Sylvester Turner did not want to impose an evacuation, saying that “you literally cannot put 6.5 million people on the road,” and that a mass evacuation of that magnitude would be a “major calamity.” Then Harris County judge Ed Emmett echoed the mayor’s sentiments, saying that evacuations are pointless since it is impossible to know exactly where rain will fall.⁸ Additionally, if people got caught on the road again, this time they could be stranded in high water with no means of escape.

As Harvey approached the lower Texas coast, many unsubstantiated reports surfaced from random sources on social media predicting that thousands of Houston homes would be under water from torrential rainfall. This prompted local news station KHOU 11 to report on the rumors on August 24, 2017, saying that Emmett and meteorologist Jeff Lindner from the Harris County Flood Control District



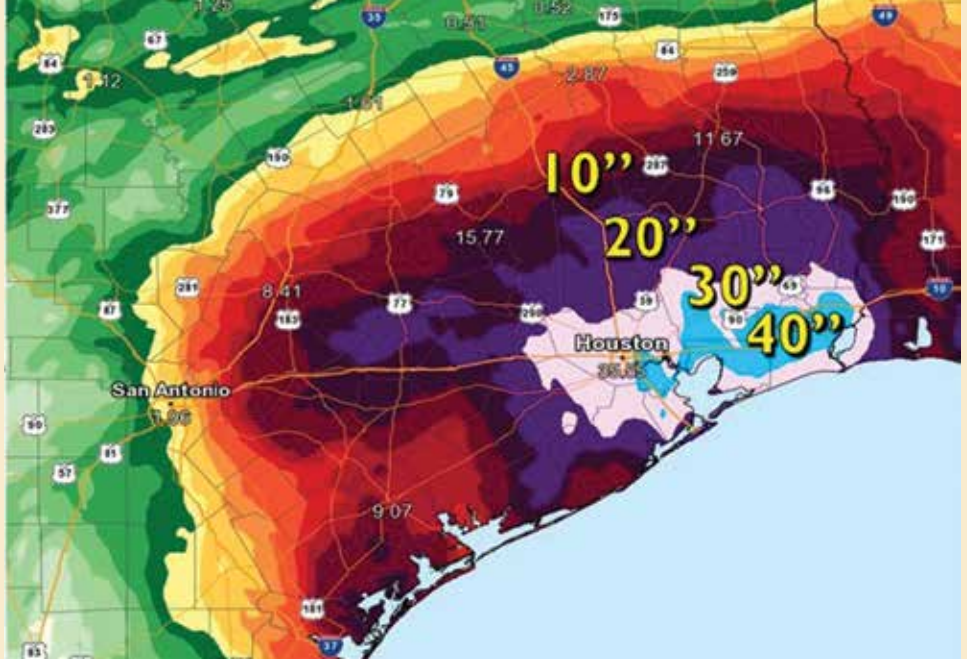
The storm track map shows the movement of Hurricane Harvey across the Caribbean Sea and into Louisiana, where it diminished before its rains moved northeast.

Photo courtesy of Jim Williams.

called the rumors false, adding that the viral posts had not come from official sources. Mayor Turner also released a statement begging Houstonians not to rely on unofficial weather reports and debunking the rumor that the city had called for an evacuation, which it had not. “Rumors are nothing new,” Turner said, “but the widespread use of social media has needlessly frightened many people today.” Although the unsubstantiated reports seemed outrageous, just like Lammey’s predictions, many of the warnings heeded true — not only about Hurricane Harvey’s intensity but also about the city’s lack of preparedness.⁹

Nevertheless, Houston did what it could to prepare. One of the earliest reports on Harvey from the City of Houston appeared on August 22 from Houston’s Emergency Operations Center, in which forecasters warned a “significant amount of rainfall [was expected] over the next five days, which [would] likely lead to flooding.” Two days later, the City of Houston released an update reporting that over twenty inches of rain were expected and that officials had positioned resources to help. For example, the Houston Fire Department had evacuation boats ready to go while the Houston Police Department and the Public Works and Engineering Department had mobilized their high-water evacuation vehicles. The update also advised Houstonians to use caution in areas prone to flooding. Additionally, prior to Harvey’s arrival, FEMA “pre-positioned supplies and personnel in [Texas]” to help as needed. Lastly, in anticipation of the storm’s severity, President Donald Trump issued a major disaster declaration on August 25, shortly before the storm made landfall, which freed federal funding for local governments and nonprofits, such as the Red Cross.¹⁰

The storm that had materialized so quickly arrived just as fast. Houstonians held their breath as schools cancelled classes, people emptied grocery shelves, and drivers lined up for gas. The once bustling city came to a complete and utter halt. Houston had done all it could on a few days’ notice and had no choice but to hope for the best. On August 25, many



Total rainfall for Hurricane Harvey, from August 25 to August 30, 2017, reached record heights, forcing the National Weather Service to use new colors to represent the amount of total rainfall.

Photo courtesy of the National Weather Service.

of us wondered what was to come when Hurricane Harvey made landfall near Rockport, Texas, at 10:00 p.m. on that fateful Friday.

The outrageous claims of over forty inches of rain were hard to fathom, and even when the rain began to fall, it still felt impossible. *Texas Monthly* reported that 1.2 trillion gallons of rainwater fell and that over forty inches of water had accumulated in Houston, which was “more than the annual accumulation [of precipitation] in the United States [in 2016].” The magazine indicated that over 300,000 residences and more than 300,000 vehicles were affected, with property damage exceeding \$200 billion dollars. The rainfall was enough to fill NRG Stadium more than fourteen times and run Niagara Falls for fifteen days.¹¹

Although battered, the city had clearly survived the storm, and the devastating tempest that many Texans like me had feared had finally come to pass. As Houston began its recovery efforts, I could not help but ask myself the same burning questions that had haunted me for almost a decade: *When* will it happen again, and will we be ready? Only time will tell.

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As the skies begin to clear over a flooded White Oak Bayou by Stude Park, downtown Houston remains shrouded in clouds.

Photo courtesy of Sarah Rodriguez.

