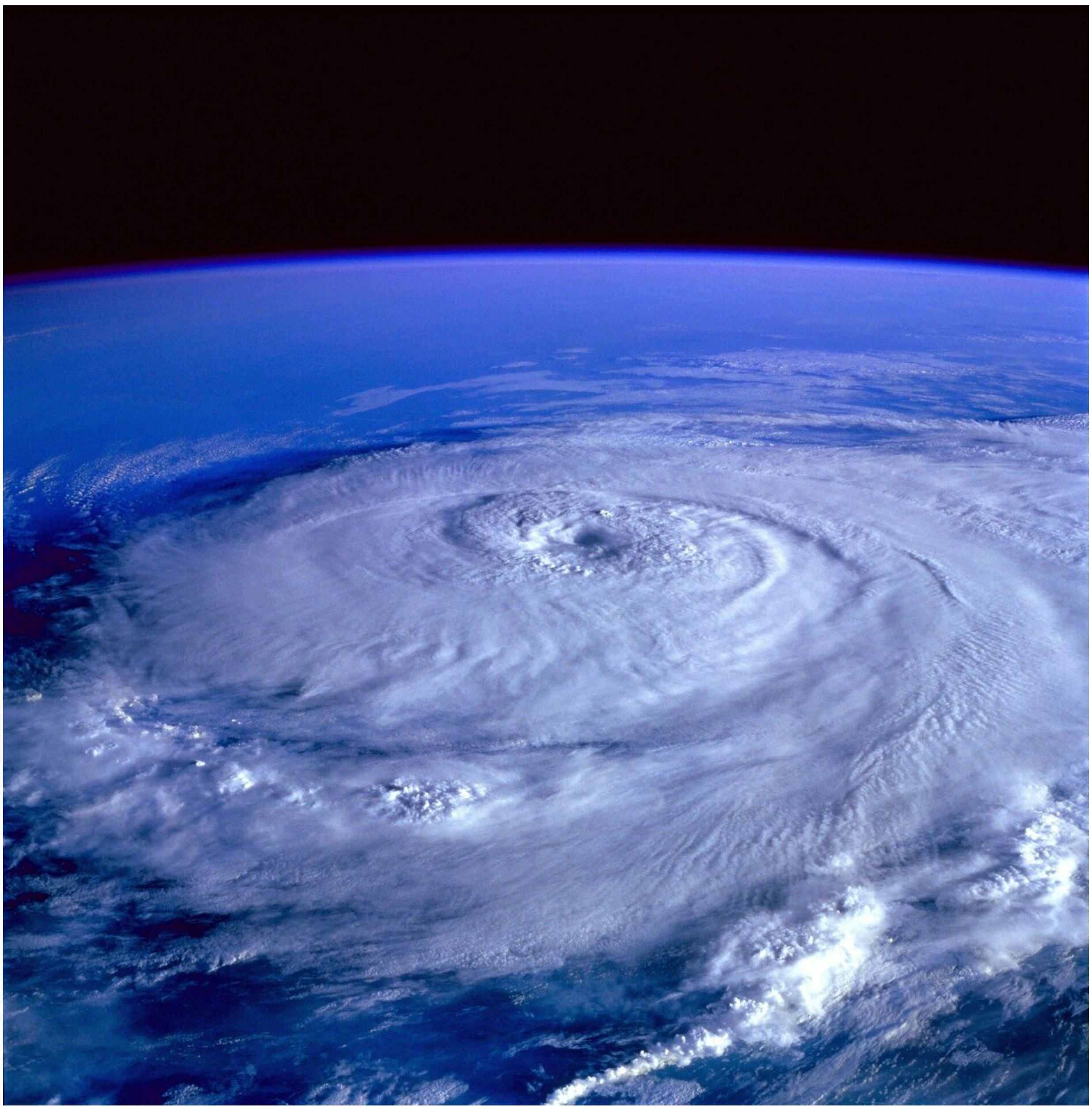
Hurricane Laura is the strongest storm to hit Louisiana in 160 years. How can communities defend themselves?

August 28 2020, by Khalida Sarwari



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Arriving as a Category 4 storm on the week of the 15th anniversary of a catastrophic hurricane that devastated the Gulf Coast, Hurricane Laura is the strongest storm to make landfall in Louisiana in 160 years, says a coastal engineer who teaches at Northeastern.

Packing winds of up to 150 miles per hour, the hurricane slammed into the Louisiana coast on Wednesday, killing at least six people, knocking down homes and businesses, and leaving at least one million people across the region without power.

Amid the COVID-19 pandemic, city and county officials in Texas and Louisiana issued evacuation orders affecting more than 500,000 residents, while Arkansas Gov. Asa Hutchinson declared an emergency. As state and local officials brace for Laura's impact, they rely on numerical weather prediction models developed by researchers like Qin Jim Chen, a professor of civil and environmental engineering at Northeastern, to help them make decisions about road closures, flood monitoring, and evacuation orders, along with other life-and-death matters.

Chen, whose research focuses on coastal engineering and science, develops and applies numerical models to address how coastal communities can strengthen their resilience against powerful storms. These models, a combination of theoretical frameworks and field measurements, forecast phenomena such as storm surge and the impact on landscapes and vegetation.

During hurricane season, Chen, who also teaches marine and environmental sciences at Northeastern, spends the summer traveling to locations and coordinating with partners on the East Coast and the Gulf Coast, before storms make landfall, to deploy sensors and study the storms. While he normally flies to these areas, this year, because of the pandemic, he had to drive to the Gulf Coast, traversing a 1,000-mile radius in two days.

Prior to teaching at Northeastern, he studied hurricanes along the Gulf Coast for a number of years starting with Hurricane Isidore in 2002 and including Hurricane Katrina in 2005.

Since mid-August, Chen has worked with collaborators to deploy more than 20 sensors in the areas that are expected to be hardest-hit ahead of Laura. Once the area is reopened, he and his colleagues will retrieve the sensors and survey the damage to the coast and then use the data to improve the accuracy of their computer models and understanding of storm surges and waves generated by a storm of Laura's magnitude.

Chen predicts this hurricane season will be "quite active," though he says that with the exception of Laura, most of the storms will likely be weak. Unlike most storms which tend to weaken before landfall, Laura has continued to strengthen as it approached the coast. While unusual, this is not atypical for storms that begin over warm seawater, as the strength of a hurricane depends on upper level wind speeds and water temperature, says Chen.

"It's a unique hurricane that strengthened so fast to a Category 4 making landfall," he says. "The likely path of this storm is that it makes landfall in a location that is not populated. There's a lot of wetlands."

Although there remains uncertainty as to the effectiveness of coastal wetlands in preventing storm surge and wave energy, Chen says that these habitats are proven to at least provide some natural barrier to storm intensity. Mostly this uncertainty exists because scientists haven't been able to recreate comparable conditions in a laboratory setting, says Chen. Still, he suggests that these environments have demonstrated measurable effectiveness in decreasing storm intensity by acting as natural surge barriers that reduce wave energy.

Chen warns that while wetlands can absorb energy, they are also prone to damage. It is more important than ever to protect and preserve these natural barriers, he says, especially as climate change and its impacts become increasingly manifest.

Man-made barriers can complement natural defenses in protecting against flooding and storm surge, Chen says, which is a critical task in safeguarding communities and key infrastructure, including Louisiana's tens of thousands of miles of natural gas pipeline, which are vital to the state and the region.

While Laura packs stronger winds, it is not predicted to wreak as much havoc as Hurricane Katrina, which was a disaster primarily because of the failure of the levees, says Chen. Though Cameron Parish, a community in the southwest corner of Louisiana, has borne the brunt of Laura's wrath thus far, there is comparatively less threat to its levee system, he says.

Chen's work is crucial to understanding how coastal communities can become more resilient to climate change. The models he develops can be used to measure the long-term impacts of sea level rise, extreme weather, and heavy rain—among other hazards—on infrastructures, people, and the environment. And the data he and his colleagues collect can help communities anticipate, plan, and adapt to the changing climate.

"The data can help us make better informed decisions and plan better to deal with the increasing frequency and intensity of storms," Chen says.

The sooner that existing models are updated to take into account sea level rise and the changing climate conditions that contribute to rain and tropical storm hazards, Chen says the better equipped researchers will be aiding local agencies to protect areas that afford communities the greatest protection against the threats of severe weather damage.

Provided by Northeastern University

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