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Global Warming/Climate Change

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<https://www.gannett.com/~mm/db74b540ebb1d35aa48a03863d167b65f24505c/c=74-0-1263-894&r=x404&c=534x401/local/-/media/2017/08/25/USATODAY/USATODAY/636393005517241307-GTY-839306812.jpg>



Houston, We've Got A Problem. It's Called Global Warming.

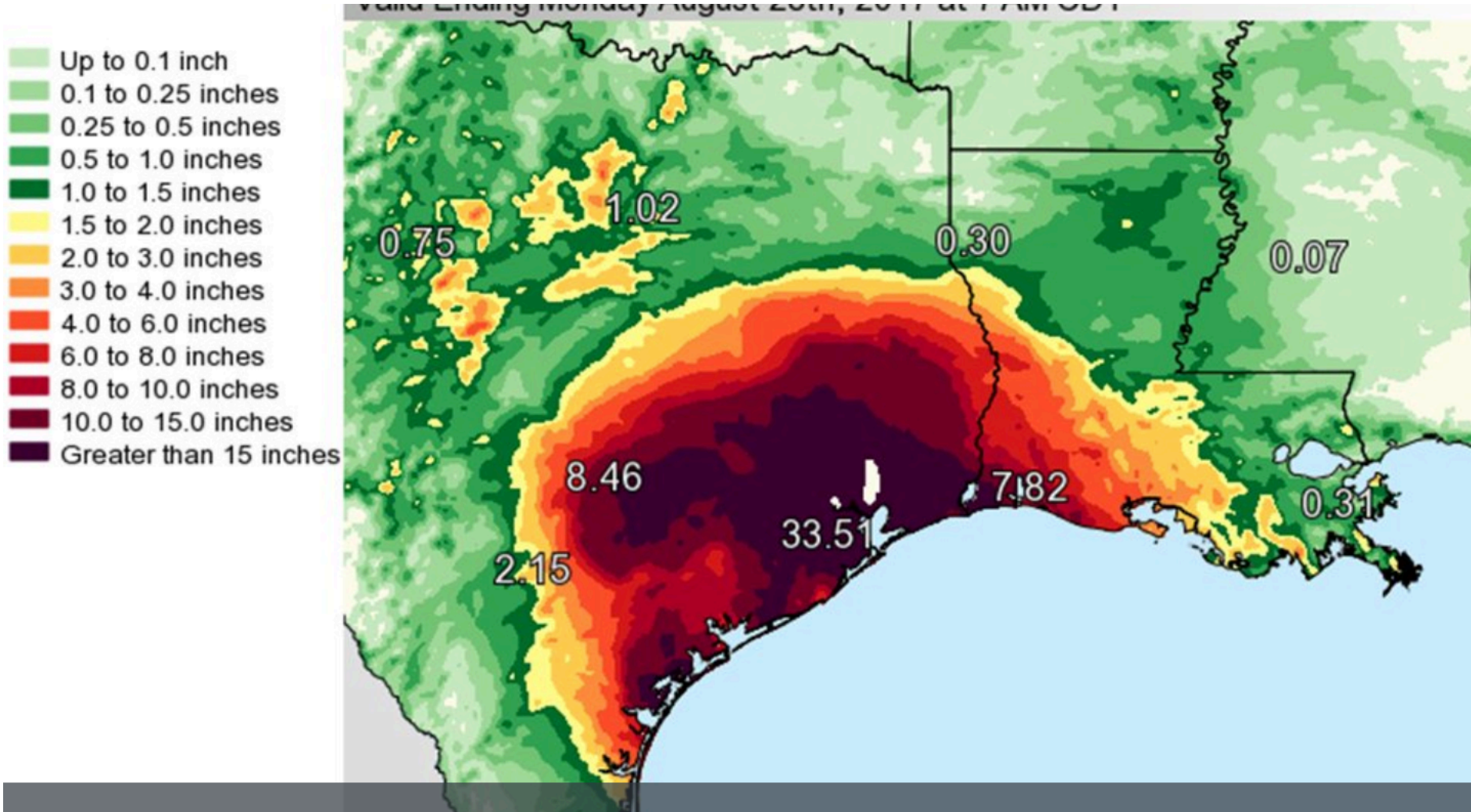


Steven Salzberg, CONTRIBUTOR

[FULL BIO](#) 

Hurricane Harvey poured more rain on Texas and Louisiana last week than this country has ever seen from a single storm. The city of Houston is now suffering from historic flooding, with many calling this a "1000-year flood."

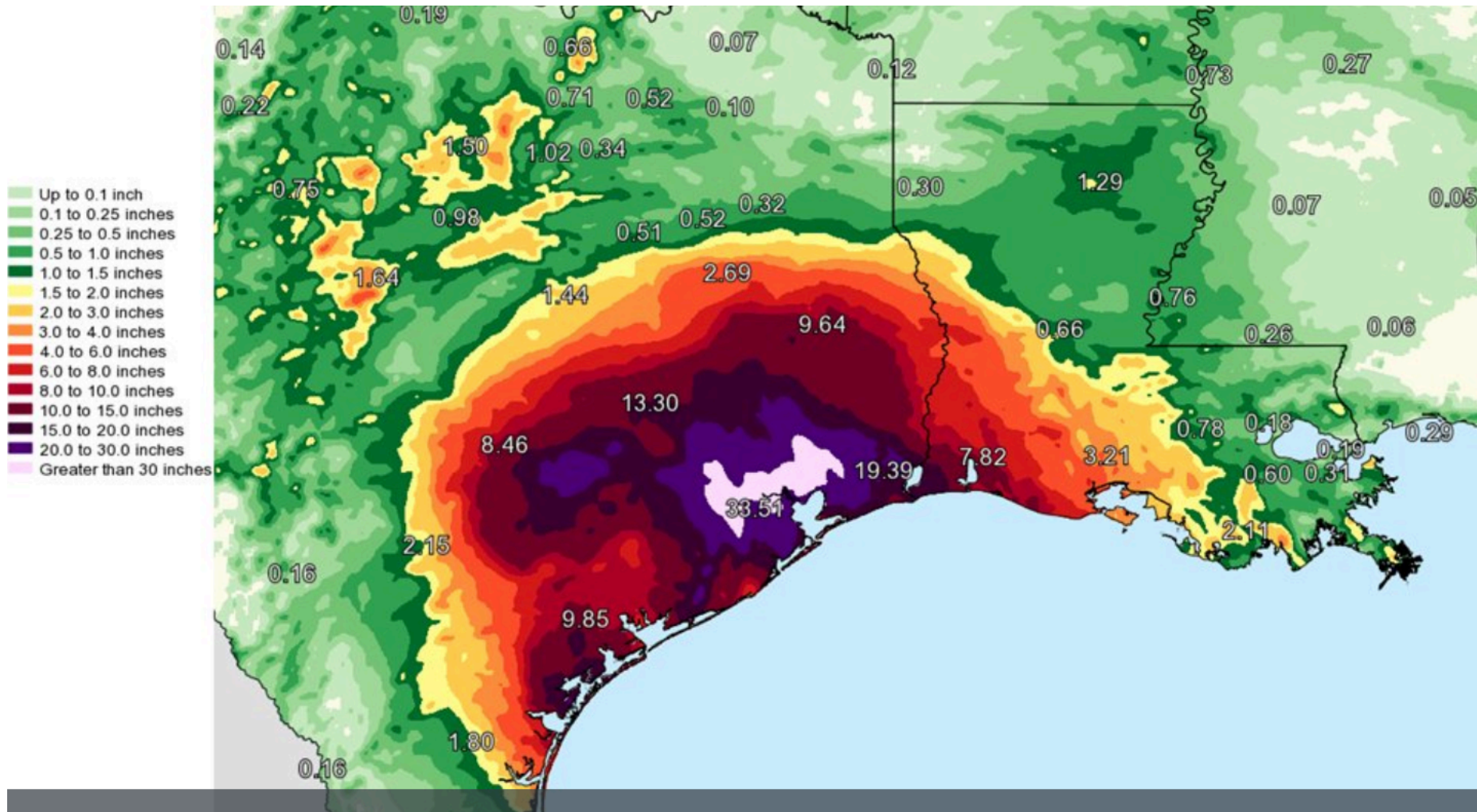
@NWS
Aug 28, 2017



@NWS

Aug 28, 2017

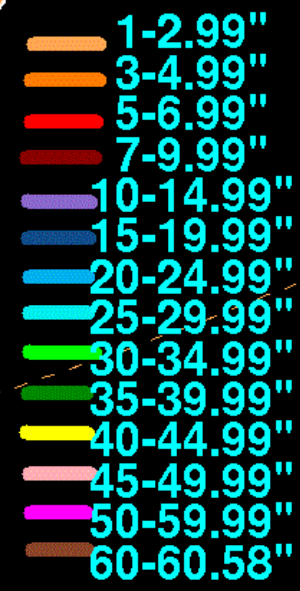
#Harvey in perspective. So much rain has fallen, we've had to update the color charts on our graphics in order to effectively map it.



Hurricane Harvey
August 25-
September 4, 2017

6784 sites

Maximum: 60.58"
Nederland 1.5 SW, TX



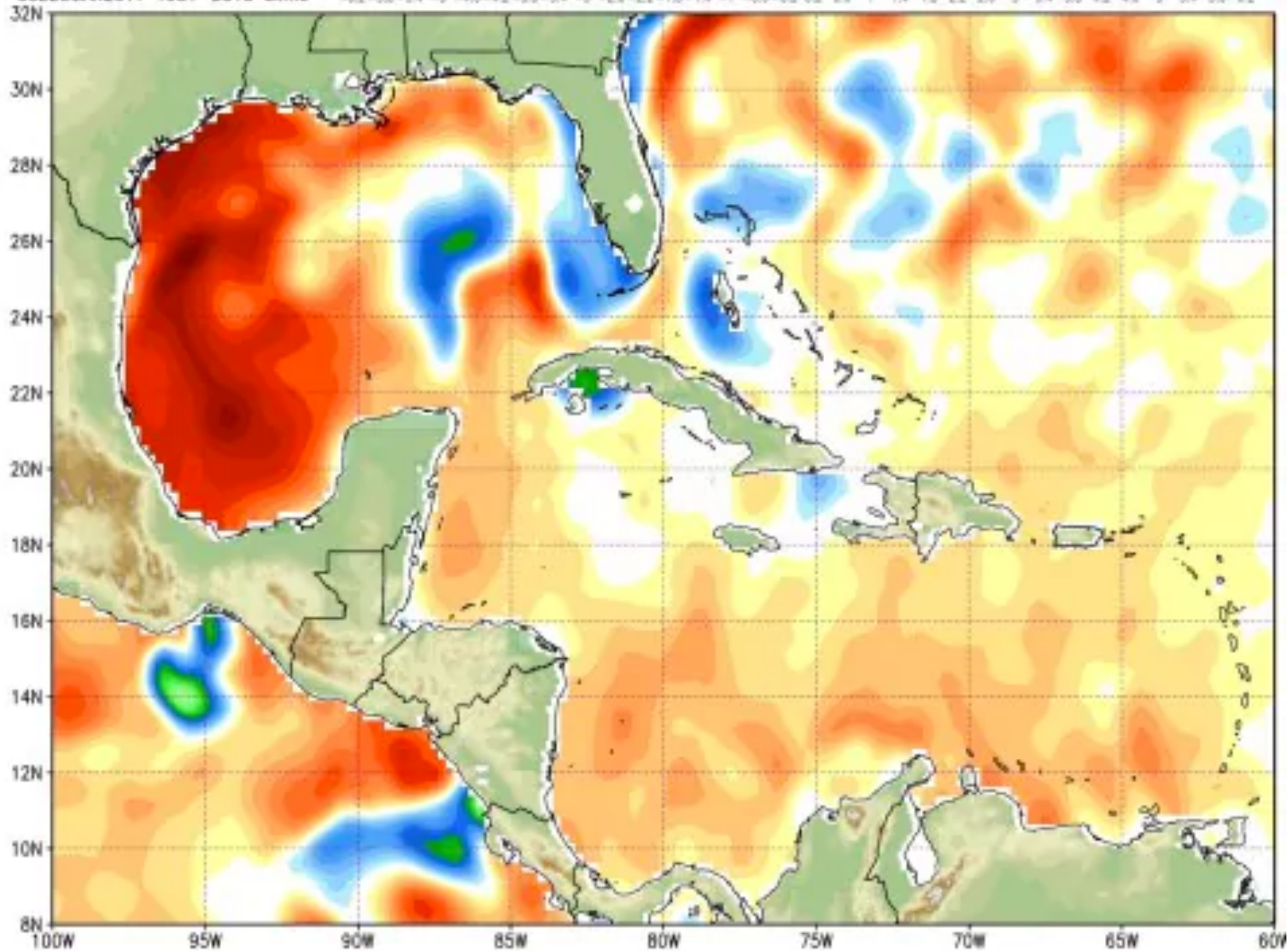
Track

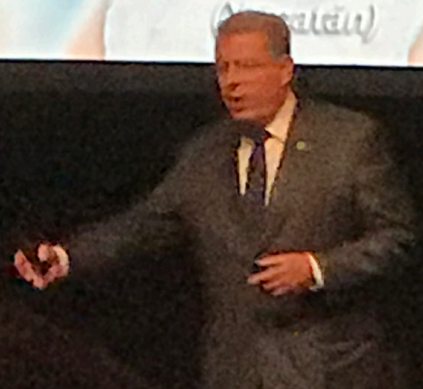
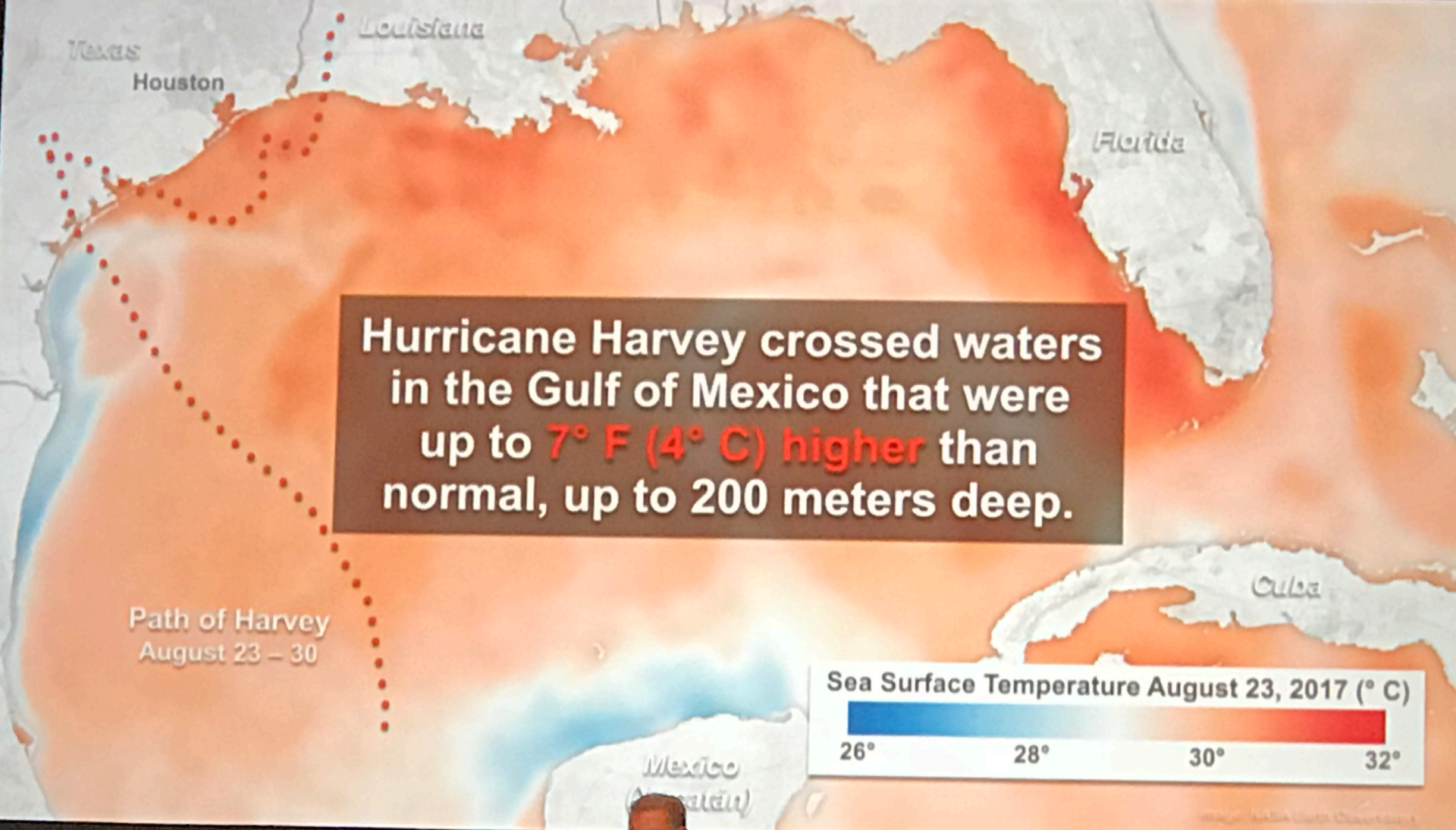
Maximum: 60.58"
Nederland 1 SW, TX



A few facts: the Gulf of Mexico is 4 degrees warmer than normal this year, and it has been getting worse. Back in March of this year, the *Washington Post's* Jason Samenow reported that the Gulf was "freakishly warm, which could mean explosive springtime storms." Warm water feeds hurricanes, and Harvey feasted on it, sucking up energy and using it to dump ridiculous amounts of water onto south Texas.

0.25° OISST Anomaly [°C]
00Z20MAR2017 1981-2010 Climo





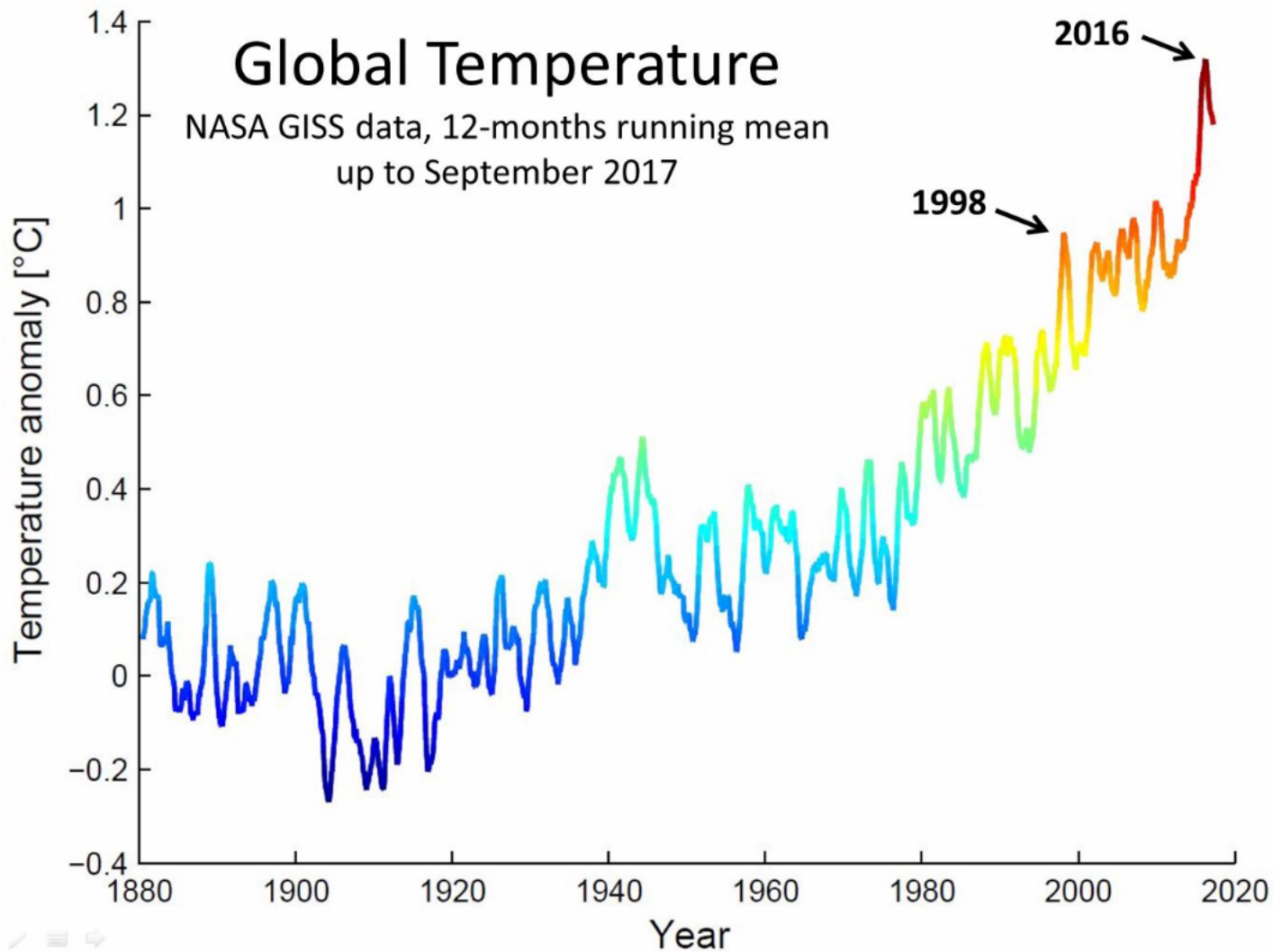


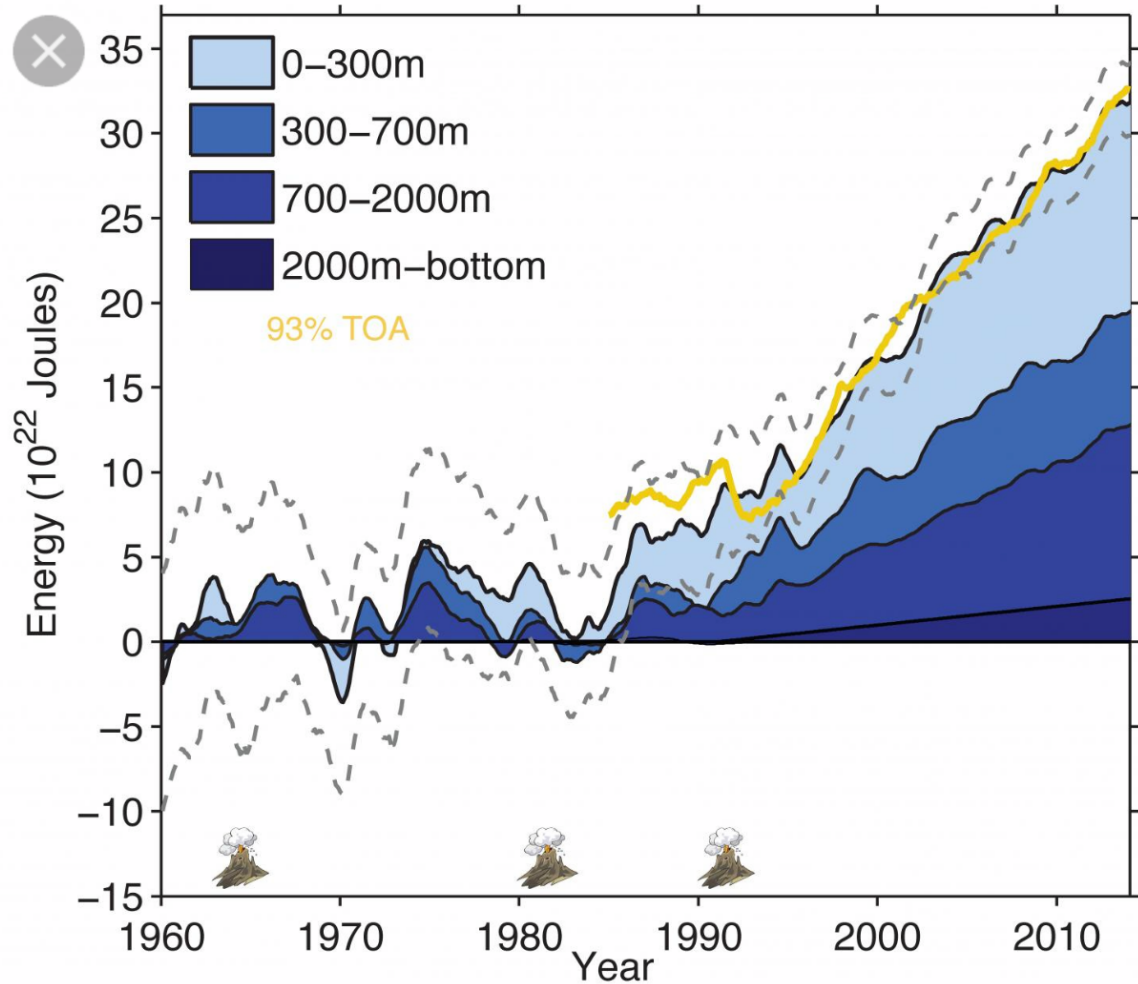
Fig. 1 GISTEMP global temperature data, in 12-months running average (anomalies relative to the first 30 years). The data are available monthly and averaging over 12 months removes a considerable amount of month-to-month 'noise'. Showing only

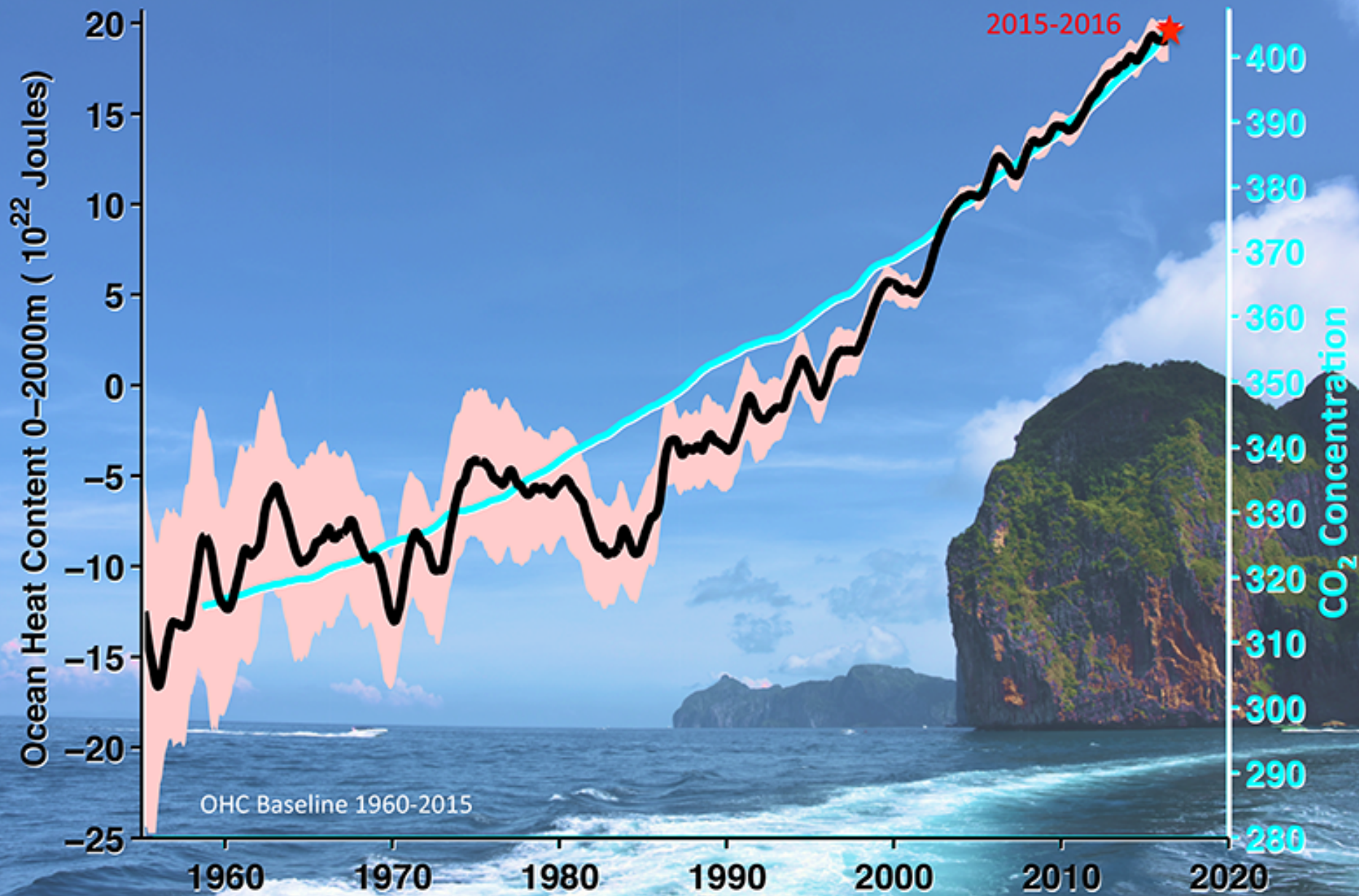


New estimate of ocean heat finds more warming

Ocean energy budget estimated by Cheng et al. 2017. The 93% of the energy imbalance observed from the top of ...

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August 29, 2017  315 comments

Texas Major Hurricane Intensity Not Related to Gulf Water Temperatures

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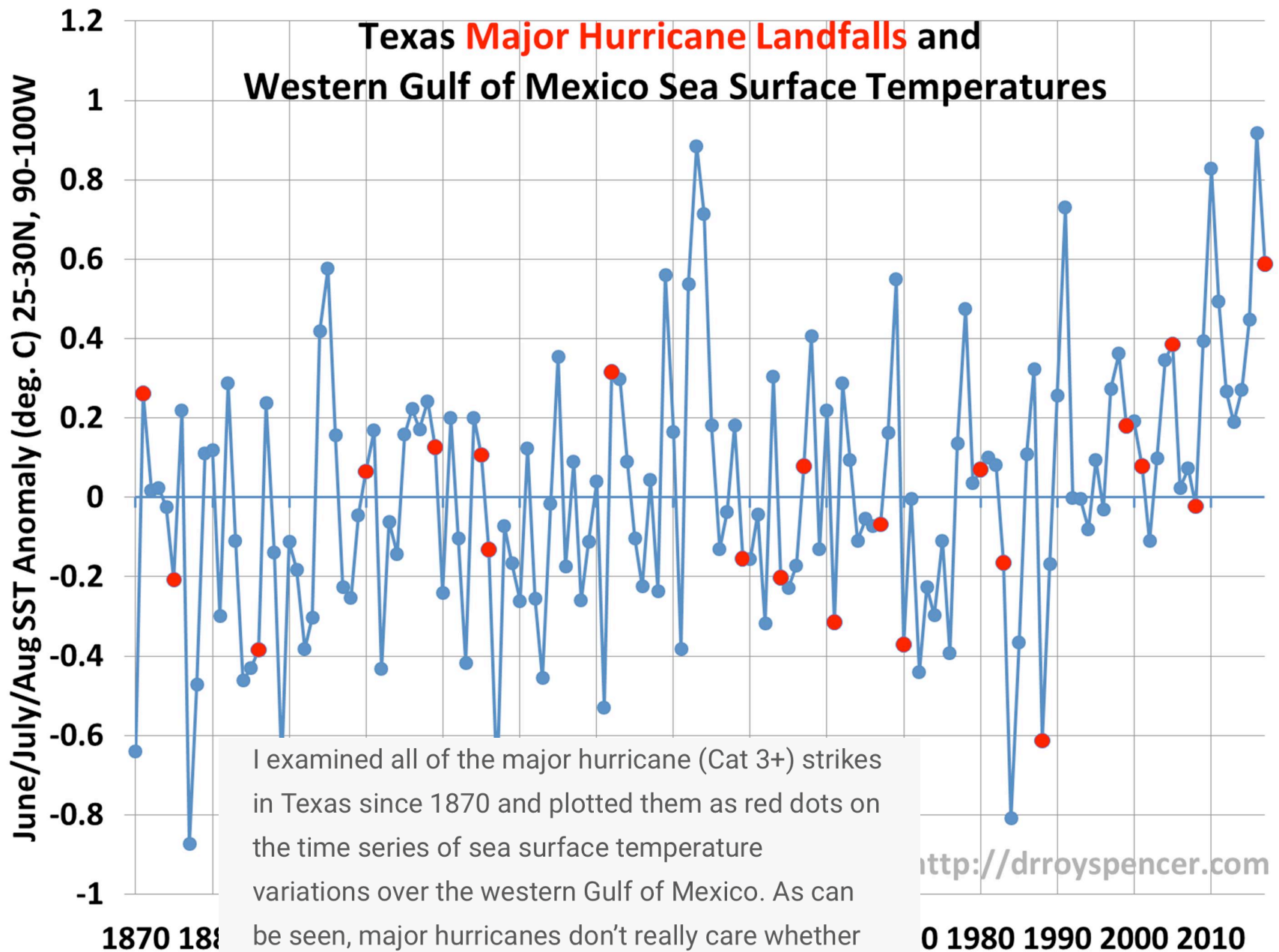
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As the Houston flood disaster is unfolding, there is considerable debate about whether Hurricane Harvey was influenced by “global warming”. While such an issue matters little to the people of Houston, it does matter for our future infrastructure planning and energy policy.

Texas Major Hurricane Landfalls and Western Gulf of Mexico Sea Surface Temperatures



2. Does global warming cause landfalling hurricanes to stall?

I don't know of any portion of global warming theory that would explain why Harvey stalled over southeast Texas. Michael Mann's [claim in The Guardian](#) that it's due to the jet stream being pushed farther north from global warming makes me think he doesn't actually follow weather like those of us who have actual schooling in meteorology (my degree is a Ph.D. in Meteorology). We didn't have a warm August in the U.S. pushing the jet stream farther north.

Opinion

It's a fact: climate change made Hurricane Harvey more deadly

We can't say that Hurricane Harvey was caused by climate change. But it was certainly worsened by it

 [Tropical storm Harvey - live updates](#)




15,056


692

Michael E Mann

Monday 28 August 2017 10.07 EDT

How Climate Change Likely Strengthened Recent Hurricanes

And while scientists maintain that no single weather event can be attributed to climate change, two centuries of human fossil-fuel burning has altered temperatures just enough to almost certainly make this particular storm worse.

By Craig Welch

PUBLISHED SEPTEMBER 20, 2017

at least three troubling factors converged. The storm intensified rapidly, it stalled out over one area, and it is dumped record rains for days and days.

By Craig Welch

PUBLISHED SEPTEMBER 20, 2017

WHAT'S BEHIND THE INTENSITY?

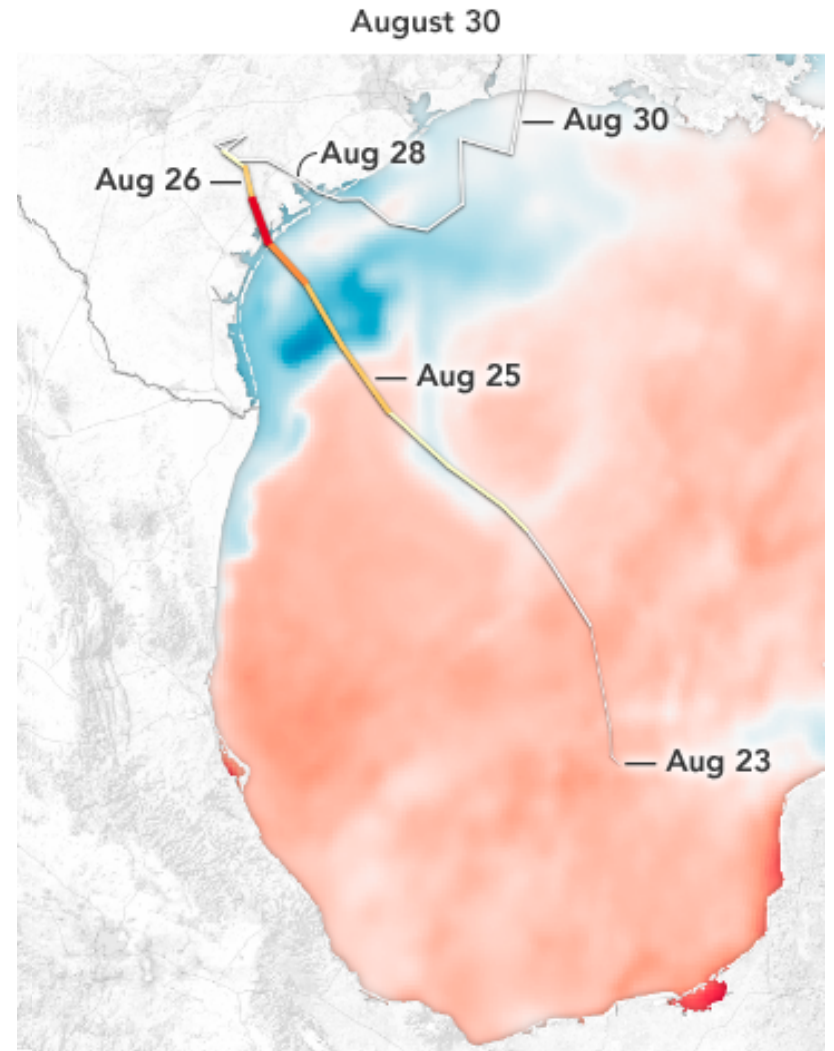
Hurricanes tend to weaken as they approach land because they are losing access to the hot, wet ocean air that gives the storms their energy. Harvey's wind speeds, on the other hand, intensified by about 45 miles per hour in the last 24 hours before landfall, according to National Hurricane Center data.

By Craig Welch

PUBLISHED SEPTEMBER 20, 2017

Scientists have known for decades that the peak intensity of severe storms will likely increase as temperatures rise. But it also is shortening the time it takes to reach those speeds. And late summer temperatures in the Gulf of Mexico now average more than 2 degrees Fahrenheit warmer than they did 30 years ago, says Andreas Prein, with the National Center for Atmospheric Research.

Hurricane Harvey



Hurricane Category



"Hurricanes are powered by the evaporation of sea water," Emanuel says. "Water evaporates faster from a hot surface than a cold surface."

By Craig Welch

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Emanuel analyzed the evolution of 6,000 simulated storms, comparing how they evolved under historical conditions of the 20th century, with how they could evolve at the end of the 21st century if greenhouse gas emissions

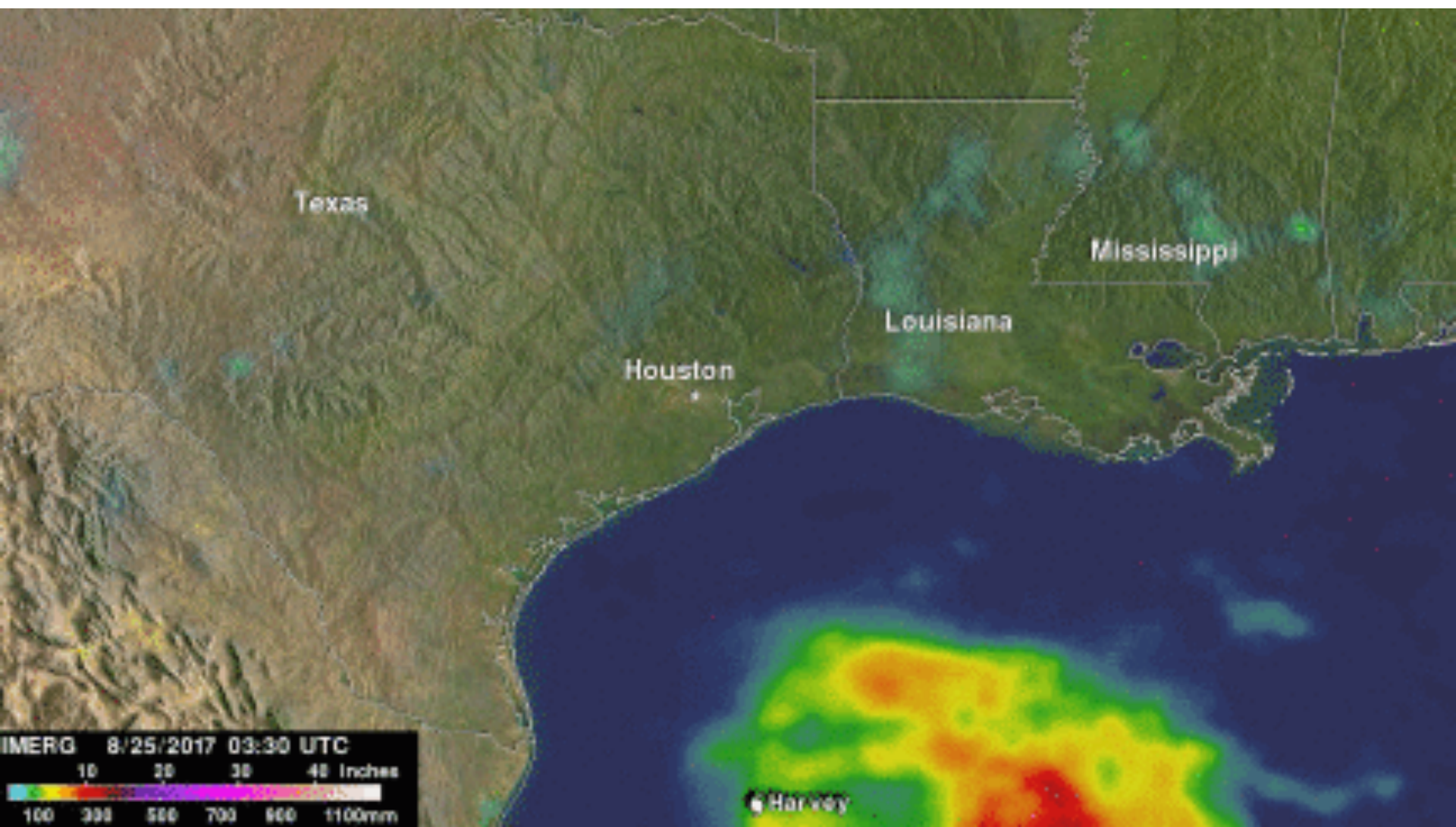
The result: A storm that increases its intensity by 60 knots in the 24 hours before landfall may have been likely to occur once a century in the 1900s. By late in this century, they could come every five to 10 years.

STALLING IN PLACE

Of course, the volume of rain wouldn't matter quite so much if the storm just continued moving. But in the case of Harvey, Texans aren't so lucky. The storm pulled to a stop and parked itself over that region.

"The critical thing with Harvey is that it's stationary—it's not moving a lot," Prein says.

"It's just dumping all this moisture over the same spot."



By Craig Welch

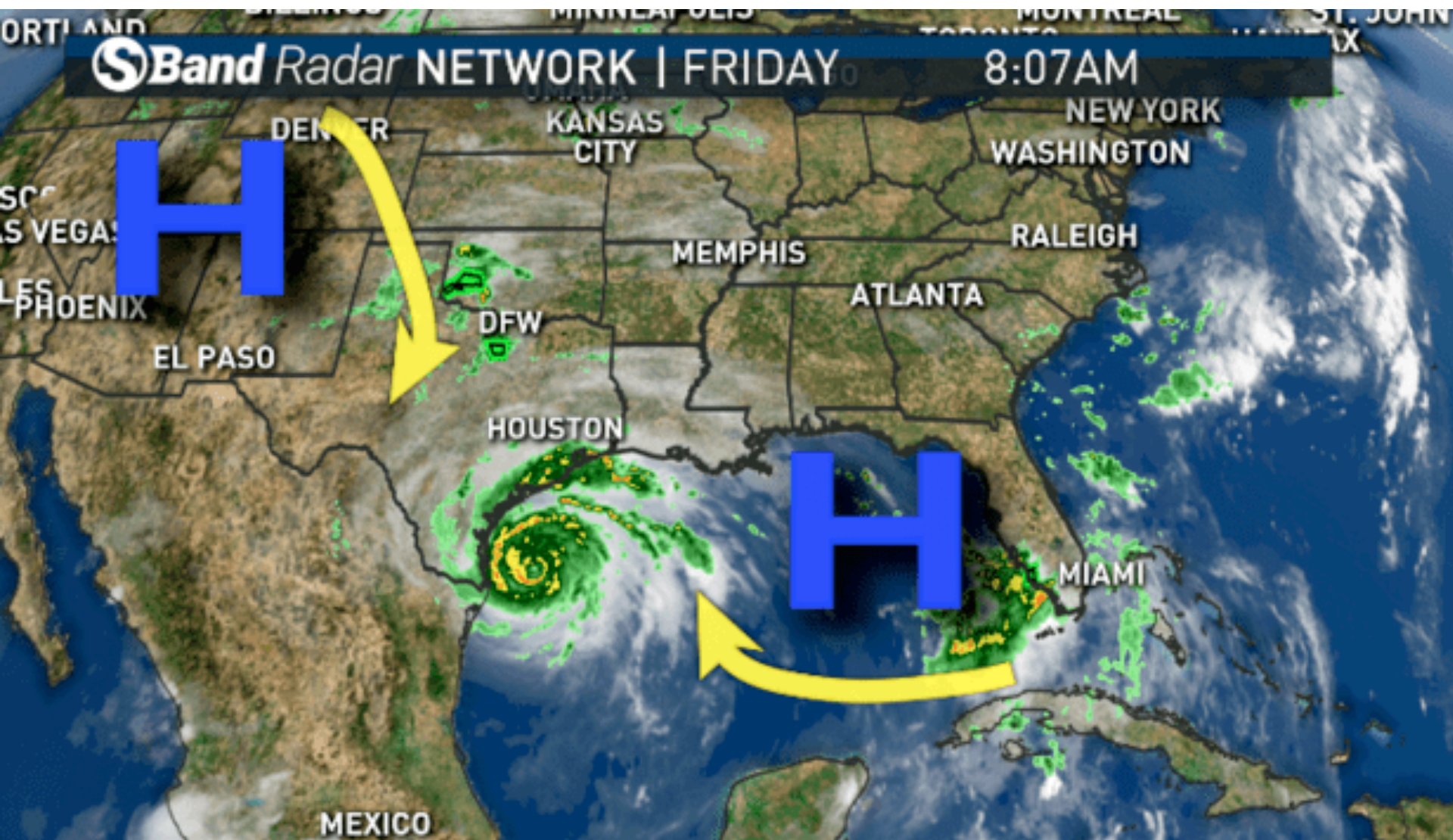
PUBLISHED SEPTEMBER 20, 2017

So far, climate scientists say, it doesn't appear that climate change was a significant factor in that stall. It was just bad luck.

The winds pushing Harvey around were weak. In addition, two high-pressure systems sitting over the Southwest and North were trying to drive Harvey in opposite directions, essentially keeping the storm from moving northward.

SBand Radar NETWORK | FRIDAY

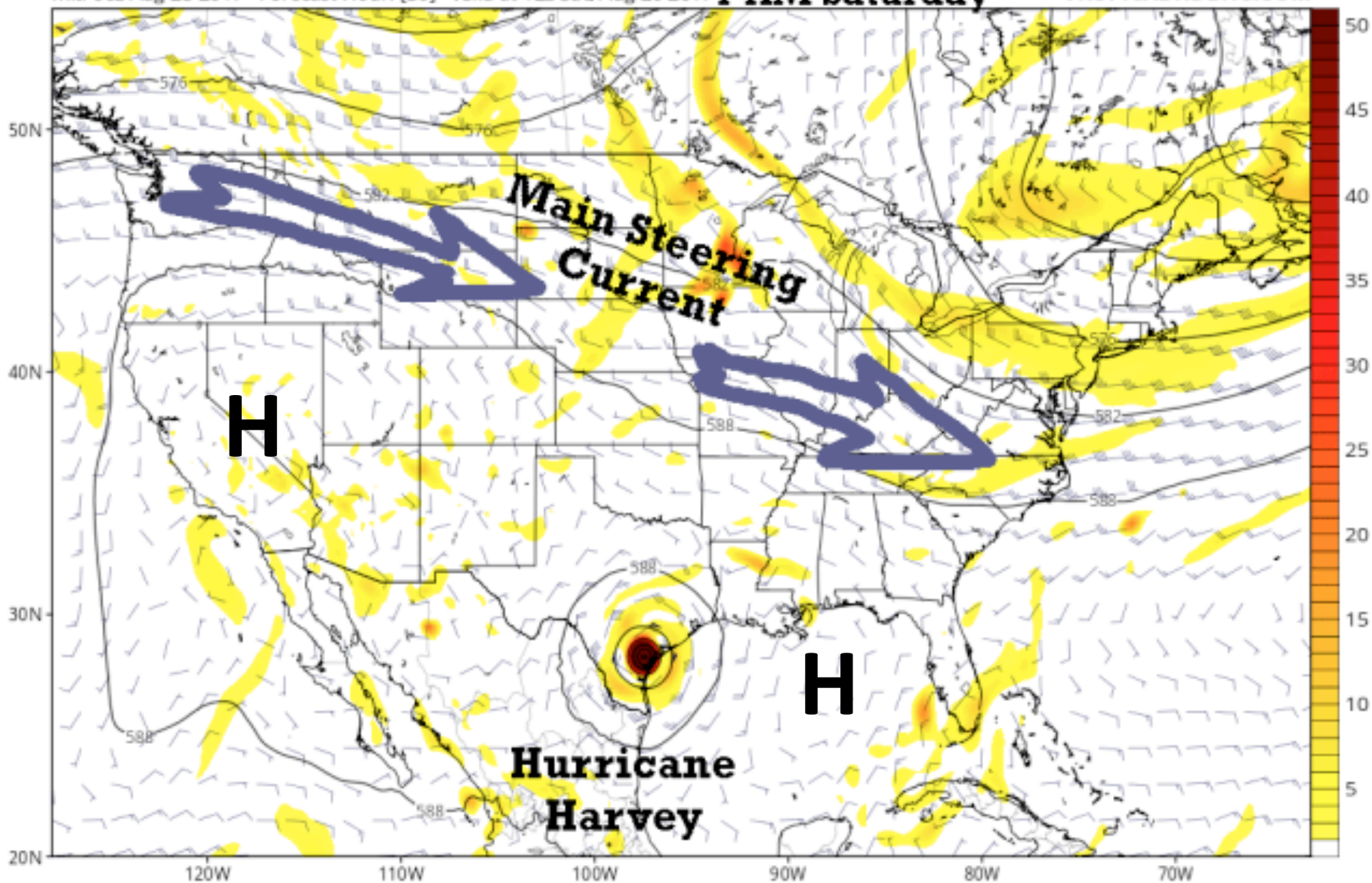
8:07AM



GFS 500mb Geopotential Height (dam), Cyclonic Vorticity (10^{-5} s^{-1} , shaded), and Wind (kt)

Init: 06z Aug 25 2017 Forecast Hour: [30] valid at 12z Sat, Aug 26 2017 **7 AM Saturday**

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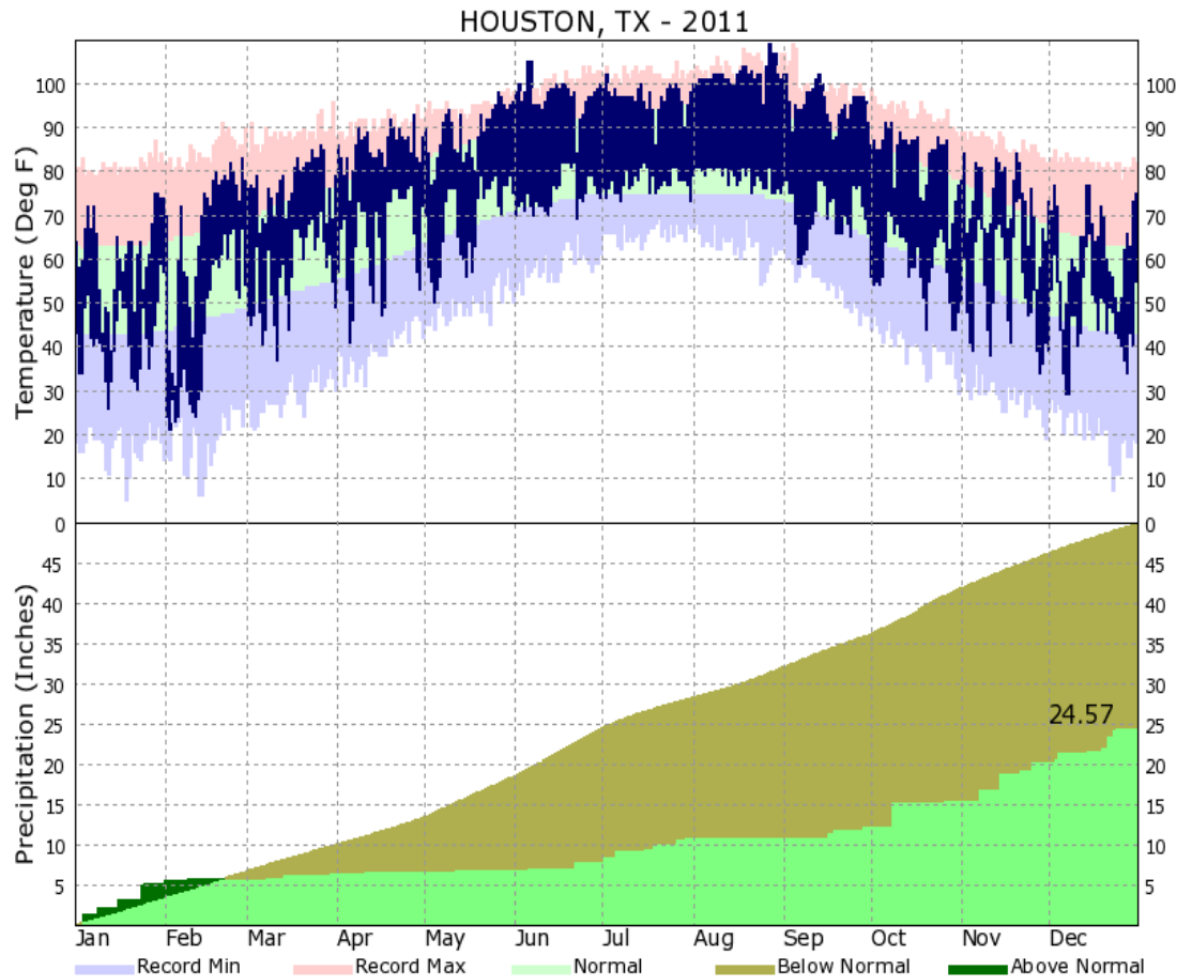


Stalled weather systems are often associated with extreme events, Prein says, which can lead to human disasters. It was a factor in the

By **Craig We**

PUBLISHED SE

Stalled weather systems are often associated with extreme events, Prein says, which can lead to human disasters. It was a factor in the



Put another way, Wehner says, "if there is a climate signal, it's one that's so weak we haven't been able to detect it." What he meant was: The circulation patterns that steer storms like Harvey have been weak in recent years, but that change has come on very quickly. That leads scientists to doubt it is connected to climate change.

In a Facebook post, climate scientist Michael Mann of Penn State University expanded on that possibility. He agreed that the weak prevailing winds that failed to steer the storm back out to sea allowed it to "spin around and wobble back and forth like a top with no direction." He said that currently a climate connection would be "tenuous," but models predict similar behavior with climate change.

Several factors conspired to make Hurricanes Harvey, Irma, and Maria so destructive, and warming temperatures are likely part of the problem.

And while scientists maintain that no single weather event can be attributed to climate change, two centuries of human fossil-fuel burning has altered temperatures just enough to almost certainly make this particular storm worse.