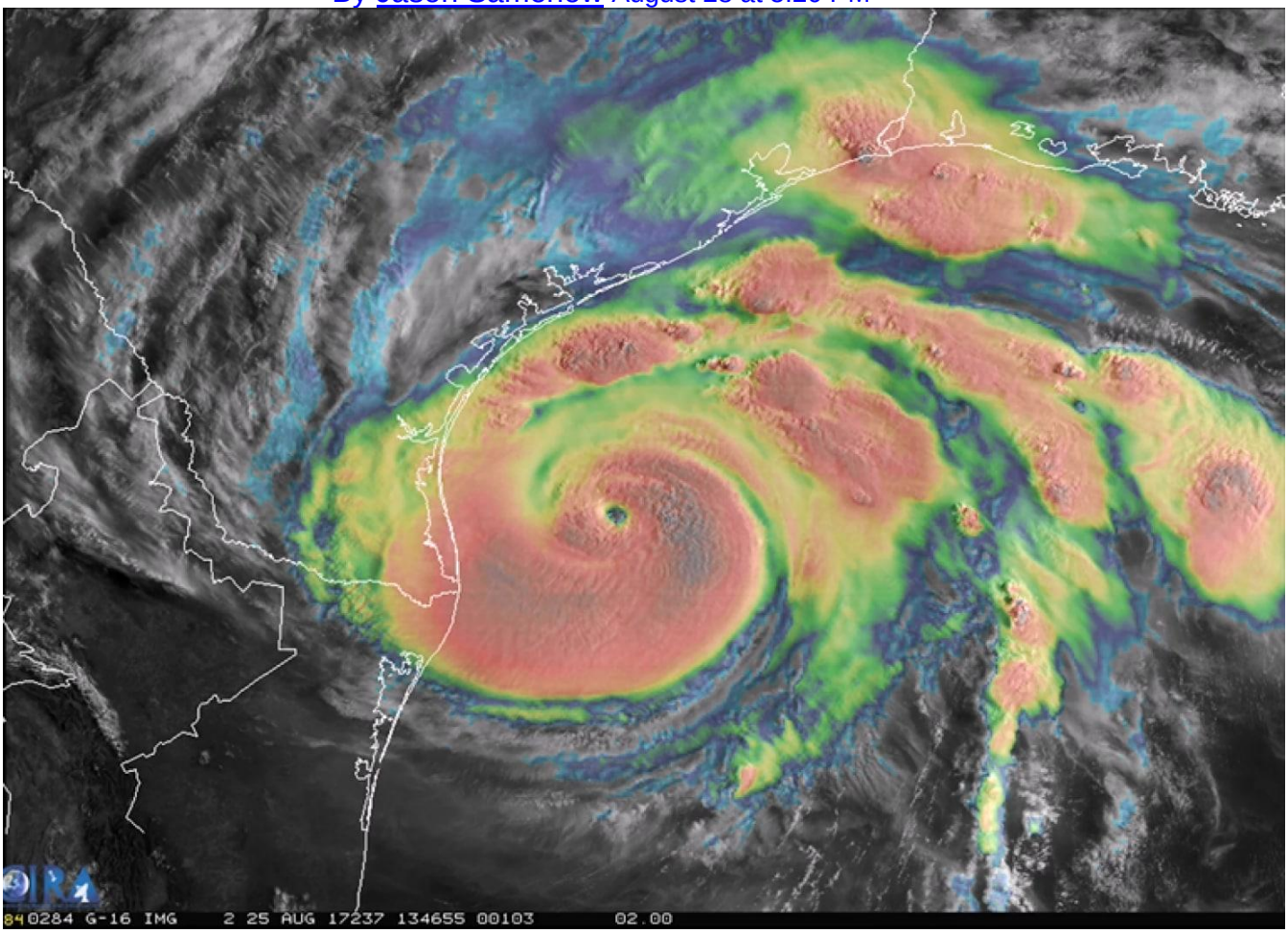
Forecasts for Harvey were excellent but show where predictions can improve

By Jason Samenow August 28 at 5:20 PM



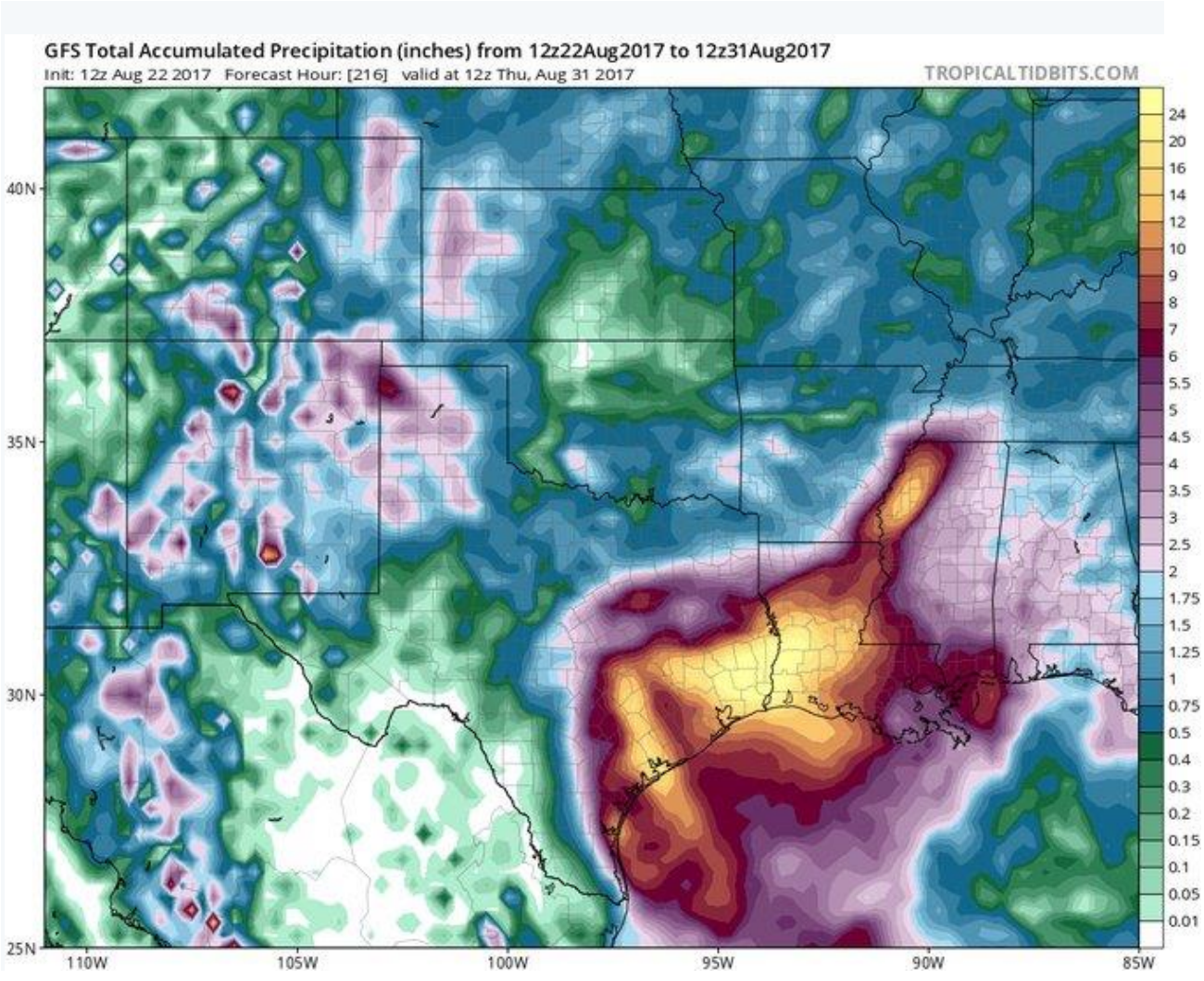
Combined visible and infrared satellite image of Hurricane Harvey. (NOAA)

The massive output of disastrous rain from Harvey has apparently surprised some people and officials in Texas. “I don’t think anybody saw that this was going to be to this extent,” said Art Acevedo, Houston’s police chief.

But the record shows we forecasters expressed the incredible threat posed by Harvey days in advance, ramping up the severity of predictions over time. That said, the event has turned so extreme that even we are somewhat stunned, hardly able to believe our own dire predictions are actually playing out. The experience with Harvey is yet another example of weather forecasts being really good but certainly not yet perfect.

It was back on Tuesday, more than 72 hours before Harvey's landfall, that the warning signs started becoming apparent. Then, computer models correctly predicted that a strong tropical storm or hurricane would make landfall Friday in Southeast Texas. The National Hurricane Center accurately started to warn of the prospect of flooding from both rain and storm surge that day. Capital Weather Gang's tropical weather expert Brian McNoldy wrote about the prospect of a "big problem" from "very substantial rainfall totals."

Remarkably, computer models were already simulating rainfall totals in feet over Southeast Texas over the next nine days:



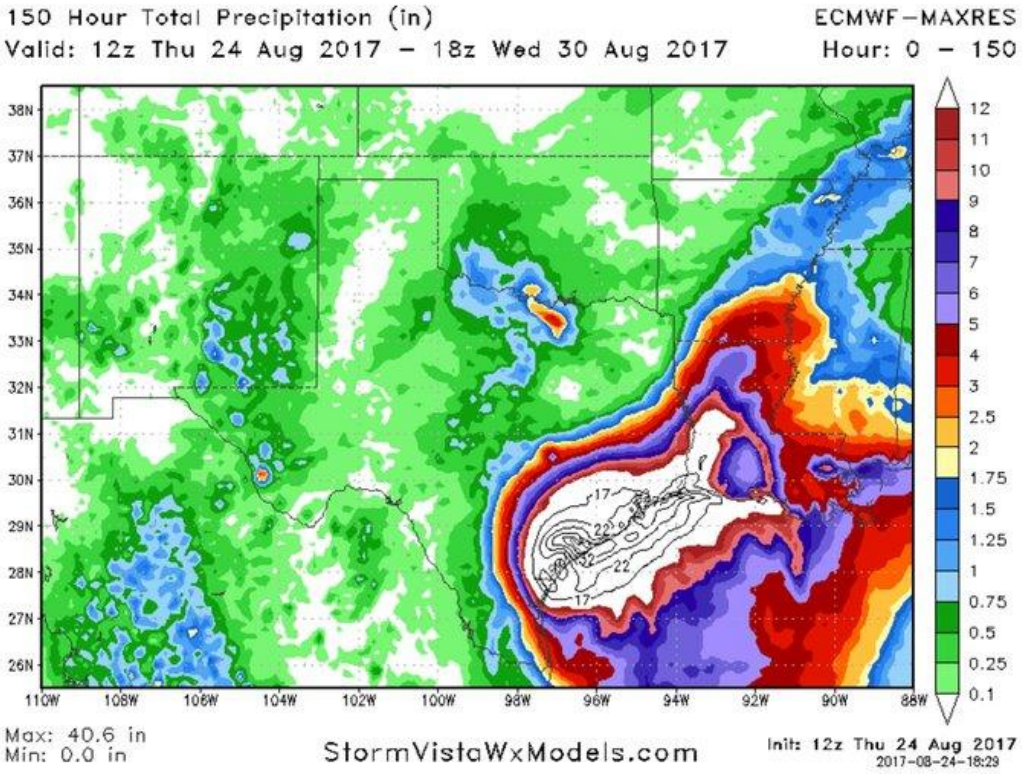
9-day GFS forecast from *last Tuesday* for total rainfall valid this Thursday morning.

1:57 PM - Aug 28, 2017

The next day (Wednesday), the Capital Weather Gang – when at least one model was showing the potential for up to 50 inches of rain – started sounding the alarm bell. The Hurricane Center issued a hurricane watch for coastal Texas, and we warned of "tremendous rainfall":

By far, the hazard of greatest concern with this system is its rainfall. While the center of the storm is expected to reach the coast Friday afternoon, heavy rain is likely to begin in the morning. Because of weak atmospheric steering currents, **computer models indicate Harvey will stall over the Texas-Louisiana area through most of the weekend, at least, dispensing potentially incredible amounts of rain**.

Then, 36 hours before the storm, the Hurricane Center hoisted warnings and computer models converged on the idea that rainfall amounts were going to be exceptionally high, exceeding two feet.



Potential flood disaster: Like GFS, European model forecasts large area 17-32" of rain thru Wed in eastern Texas.

2:40 PM - Aug 24, 2017

On Friday, as the storm approached and models uniformly simulated extreme rainfall totals, our language only became more dire. This is when the Hurricane Center said “catastrophic flooding” was likely in Southeast Texas.

Before we pat ourselves on the back too much, though, here are a few aspects of predicting this storm that proved challenging:

The wind-intensity forecast. On Tuesday and Wednesday last week, meteorologists predicted that Harvey would make landfall as a strong tropical storm or low-end hurricane. Of course, Harvey came ashore as a Category 4 hurricane. It wasn’t until Thursday that forecasters began to communicate the possibility that Harvey could be a major hurricane (Category 3 or higher) at landfall. This underscores the well-understood need to improve hurricane-intensity forecasts.

The placement of the heaviest rainfall. We knew since Tuesday or Wednesday that it was going to rain a ton, but our models aren’t yet quite good enough to know where the heaviest rain is going to focus — which makes it challenging for emergency responders to pre-position and prepare. This underscores the need to develop improved high-resolution models that can better isolate where the most extreme weather is going to occur at longer lead times.

Trusting the model forecasts. On Thursday and Friday, computer models were simulating so much rain, with peak totals of 40 to 60 inches, that some of us were ambivalent on predicting that much ourselves. We had never seen anything like it. But it turns out the models had the right idea. Weather models have become so good at capturing extreme events that when the entire universe of them agree one is about to

happen, we need to have the confidence and awareness to pull the trigger and convey the severity and urgency of the situation and try to avoid equivocation.

While weather forecasts and forecasters clearly have areas in which they can improve, they have reached the point where they are accurate and reliable enough that the public, emergency managers and politicians can and should pay attention to them and take necessary action. This is especially true when the situation is extreme and the stakes are high.

Forecasts of Harvey's impact have been spot-on, which is really bad news for Texas