

"Atmospheric Forces Conspire to Make 2011 a Wild Year"
(Source: LiveScience.com, 8/30/11)

So far, 2011 has brought its fair share of tornadoes, droughts, floods and even a rare hurricane in the Northeast. With \$35 billion in natural disaster damage so far this year, it seems natural to wonder: What the heck is going on?

The answer, according to climate and weather experts, is simply a combination of factors, including La Nina, local atmospheric patterns, and potentially climate change — though the importance of climate in any individual weather scenario is still nearly impossible to quantify.

"In the short term, when we're talking months to a couple of years, you don't know," New Jersey's state climatologist and Rutgers University professor David Robinson, told LiveScience. "Now if you start talking longer-term, a decade or multiple decades, then you start looking for a broader explanation."

Wet...

Even before Hurricane Irene dumped rain on the Northeastern United States over the weekend, parts of New England were very soggy. The rain gauge at John F. Kennedy International Airport in New York recorded 7.8 inches (19.8 cm) on Aug. 14, breaking the previous daily record of 6.27 inches (15.9 cm), set in 1984.

Before Irene, Robinson told LiveScience, New Jersey was having its sixth-wettest August since statewide records started in 1895. Then Irene moved in as the second-largest rainstorm in the state since 1895. Preliminary estimates peg New Jersey's August rainfall at 16.5 inches (41.9 centimeters), making it the rainiest month ever recorded in the state.

"This breaks the former record by four and a half inches," Robinson said. "I've been using the word 'staggering,' and the phrase, 'you can't make this up.'"

The reason for the state's sogginess even before Irene was a series of frontal systems that came into New Jersey in August, bringing along numerous, slow-moving thunderstorms, Robinson said.

"It was just this alignment, a constant pipeline if you will, open to the tropics and the Atlantic this month," Robinson said.

... And dry

Meanwhile, Texas, Oklahoma and large sections of New Mexico are experiencing serious drought, with plants dying and reservoirs drying up. The major driver of the drought is La Nina, a condition that occurs when tropical Pacific waters are cooler than usual, said Texas state climatologist John Nielsen-Gammon, a professor of atmospheric sciences at Texas A&M University.

"About 80 percent of La Nina years have below-normal wintertime precipitation in Texas," Nielsen-Gammon told LiveScience. "This was a moderate-to-strong La Nina this year."

La Nina conditions faded by summer, but by that time the drought was already in progress, Nielsen-Gammon said. More recently, a high-pressure system over Texas has kept warm air aloft and circulating over Texas, northern Mexico and the Southwest, Nielsen-Gammon said, preventing precipitation from developing. Fortunately, that pattern is forecast to fade next week, he said, but the relief could be short-lived.

"The National Weather Service came out with a 50-50 chance of a new La Nina evolving this winter, and unfortunately since then ocean temperatures in the tropical Pacific have continued to cool," Nielsen-Gammon said. If La Nina forms again, the drought could enter its second year, he said. It's already the worst one-year Texas drought on record since 1895, as far back as the data goes.

Climate change may or may not be playing a role in La Nina, Nielsen-Gammon said; scientists don't yet understand the relationship between the two. But climate change is very likely making the drought in Texas and nearby states worse, he said.

"With global temperatures warmer now than they were at the beginning of the last century, that means our temperatures are warmer too, which increases the rate of evaporation and increases the demands on water, increases the stress on the water supply, and also leaves us more susceptible to breaking the high-temperature record, which we've been doing lately," Nielsen-Gammon said. In other words, regardless of whether climate change helped create the drought, global warming is exacerbating the situation.

Stormy skies

In addition to drying out Texas, La Nina makes it more likely for Atlantic hurricanes to form, Nielsen-Gammon said. A storm like Irene could happen during any hurricane season, but La Nina reduces wind shear, a force that zaps energy from weather systems, high over the Atlantic, making it easier for tropical storms and hurricanes to form. For that reason, the Colorado State University Tropical Meteorology Project, which forecasts hurricane seasons, predicted that 2011 would be a busy one.

Irene isn't the only dramatic storm to hit the country this year. As La Nina made its exit in the spring (with its effects lingering into the hurricane season that begins June 1), it ended its stabilizing effect on the jet stream — which, in turn, dipped lower into the U.S., bringing cold, dry northern air into contact with warm, damp southern air. The result: A tornado season for the record books.

If preliminary estimates hold, 2011 will likely go down in the record books as the year with the most disasters costing a billion dollars or more apiece. Irene will

likely be the 10th billion-dollar disaster this year, beating 2008's record of 9.

2011 and 2010 both ushered in dramatic weather, Robinson said, but figuring out why is difficult. A couple of extreme years could simply be a statistical anomaly, he said — just pure bad luck. Some extremes feed on themselves, including the Texas high-pressure system that became a vicious cycle, keeping moisture out of the state, which in turn strengthened the high pressure in the atmosphere.

It's when events become persistently volatile over decades that these short-term explanations no longer work, Robinson said. Ocean patterns can drive multi-decade weather patterns, he said, "but you also have to look to human impact, at least if you're a responsible climatologist, the fact that we're loading our atmosphere with greenhouse gases."

"You can't conclude with any significance that it's human impacts and only human impacts," Robinson said. "But you can't discount that there might be some human impact as we see these events becoming more frequent."

//end//