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# Global warming in 2015 made weather more extreme and it's likely to get worse

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Hurricane Patricia approaches the coastline of Mexico from the eastern Pacific Ocean in October. (National Oceanic and Atmospheric Administration/European Pressphoto Agency)

By **Jason Samenow** January 20 Follow @capitalweather

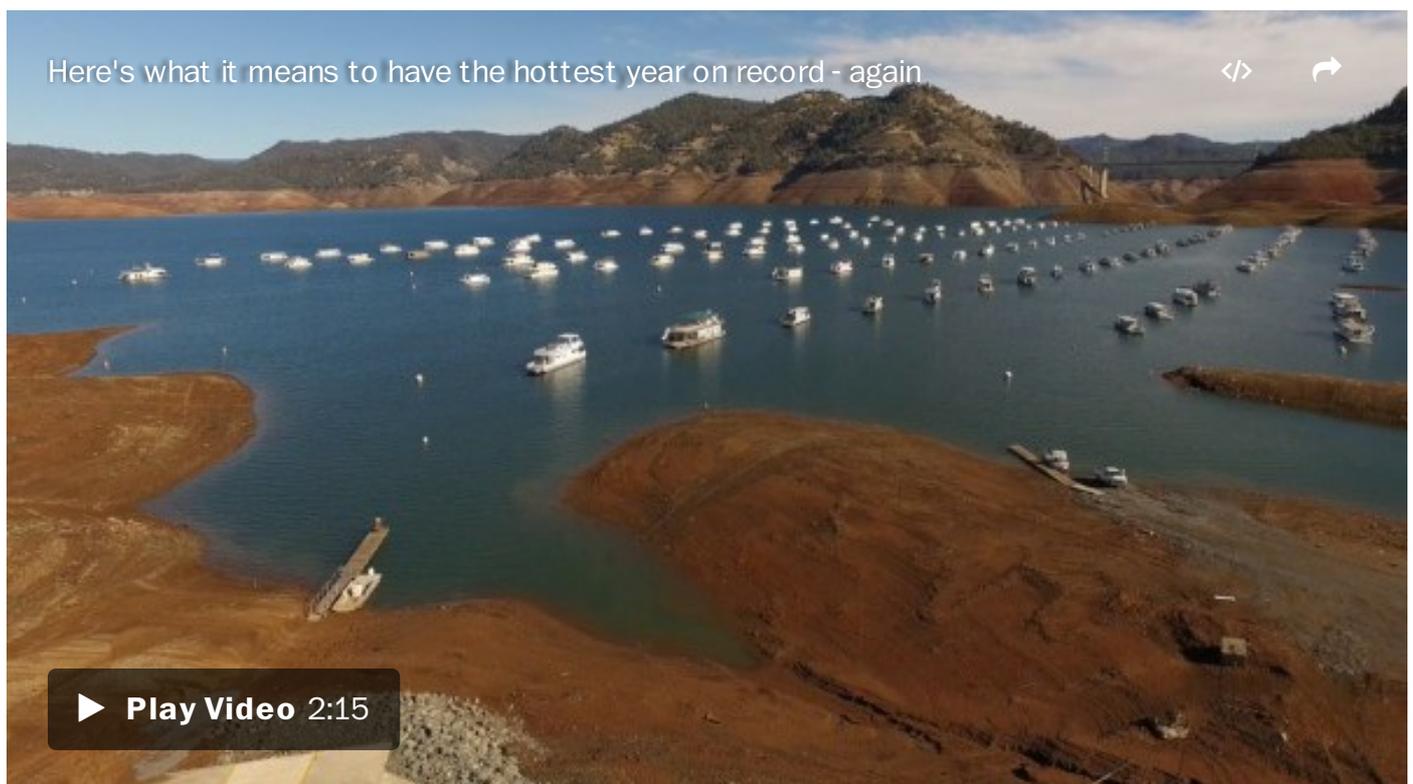
*Jason Samenow is weather editor at The Post.*

For those still unconvinced about the reality of climate change, the year that just ended should erase any doubt. Climate data from the air, land and water all reveal an indisputable portrait of a warming world.

On Wednesday, the National Oceanic and Atmospheric Administration and NASA jointly announced that [2015 was the warmest year on record](#) for the planet. The previous record, set just 12 months ago in 2014, wasn't merely broken, it was smashed.

There's a saying that numbers numb and stories sell, but the latest climate numbers tell a story that is stunning.

Including 2015, 15 of the 16 warmest years in NOAA's 136-year climate record have occurred since 2000. And 2015 marks the 39th consecutive year, dating to 1977, in which global temperatures have been above the 20th-century average.



Researchers say 2015 was the hottest year on record, and that it "smashed" the previous record, which was 2014. The Post's Chris Mooney explains what that could mean for weather patterns, the Paris climate deal and 2016. (Gillian Brockell, Chris Mooney/TWP)

In the past two decades, the Earth's temperature has surged to new highs six times — in 2015, 2014, 2010, 2005, 1998 and 1997 — while the last record-cold year was 1908.

Numerous independent indicators corroborate this temperature data, painting a consistent and compelling portrait of a warming world.

### **Ice is melting.**

Glaciers around the world are losing mass at a rate "[without precedent](#)" in the 21st century, according to a survey published in September from the World Glacier Monitoring Service.

Meanwhile, Arctic sea ice is declining dramatically. The peak extent [in February 2015](#) was the lowest on record, while the minimum extent in September [ranked fourth-lowest](#). Depending on the season, the ice extent has declined about 10 to 15 percent per decade since satellite measurements began in the late 1970s.

Though Antarctic sea ice extent has exhibited [a counterintuitive increase](#) in recent years, likely related to changing winds, it is not as sensitive to temperature as Arctic ice, whose losses, [according to NASA](#), are occurring twice as fast as the Antarctic's gains.

### **Seas are rising.**

As glaciers and overland ice sheets shed ice and the warming oceans expand, sea level rise is accelerating; NASA says the rate of sea level rise has jumped from 1 millimeter per year 100 years ago to 3 millimeters per year today. The more the seas climb, the more high tides inundate areas that previously flooded only during big storms. This “nuisance flooding” — which makes roads impassable, overwhelms storm drains and seeps into structures — has increased a staggering 300 to 925 percent in U.S. coastal areas since the 1960s, [according to NOAA](#).

### **Fresh water is warming.**

Lake water temperatures have climbed even faster than the temperatures of air and oceans since the 1980s, according to [research supported by the National Science Foundation and NASA](#). More than 60 scientists monitored 235 lakes on six continents for at least 25 years to conduct this study, the largest ever of its kind, published in December.

### **The weather is getting freaky.**

The fingerprints of climate change can be found not only on the air, ice and water, but they've also shown up on numerous recent cases of extreme weather around the world.

Our weather now operates in vastly changed conditions compared with 50 or 100 years ago, thanks to unrelenting carbon dioxide emissions . In 2015, carbon dioxide levels [passed the symbolic threshold](#) of 400 parts per million, which is more than 40 percent above pre-industrial levels. Carbon dioxide and other human-generated heat-trapping gases act like a steroid in the atmosphere, injecting extra heat into weather systems and increasing their potential to achieve new extremes.

2015 unleashed a barrage of unprecedented weather events that shocked meteorologists time after time.

After a record- warm winter devoid of appreciable snow, [California's April snowpack](#) crashed to a pathetic and unheard- of 5 percent of normal.

In July, a town in Iran registered values of heat and humidity so extreme that the heat index — the metric used to convey what such a combination feels like — [could not be reliably computed](#).

In October, fueled in part by [record- warm waters](#) boosted by one of the strongest El Niños on record, the eastern Pacific's Hurricane Patricia became [the strongest hurricane ever measured](#) in the Western Hemisphere, with peak winds of 200 mph.

To put an exclamation point on 2015, a surge of warm air fronting a monster storm near Iceland at the end of December briefly pushed the [temperature at the North Pole](#) above freezing, some 50 degrees above normal. A piece of this storm could be traced to the weather system that caused a deadly tornado outbreak near Dallas and that spurred record-setting temperatures along the East Coast around Christmas.

The new year, too, has wasted no time in manufacturing mind-boggling storms. Last week, [an Atlantic hurricane](#) formed in January for the first time since 1938, right after the earliest hurricane on record [formed in the central Pacific](#).

None of these individual weather events, by itself, can be said to be evidence of climate change. Throughout history, even prior to man's tinkering, the atmosphere has conjured up freak storms. But this striking overall collection is unlikely to have occurred by chance. It also signals a cautionary preview of the type of events expected to increase in a warming world.

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Jason is the Washington Post's weather editor and Capital Weather Gang's chief meteorologist. He earned a master's degree in atmospheric science, and spent 10 years as a climate change science analyst for the U.S. government. He holds the Digital Seal of Approval from the National Weather Association.

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