



Extreme Weather and Climate Change: What the Science Really Says

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Key Points

- Increased damage from hurricanes is due to factors such as increased wealth and population, rather than increased severity of storms.
- The frequency and intensity of droughts in central North America have decreased since 1950.
- Evidence for increased flooding and tornados is also lacking.

On April 13th, “Years of Living Dangerously,” a new James Cameron-Arnold Schwarzenegger produced miniseries focusing on climate change, premiered on Showtime. The miniseries represents Hollywood’s latest attempt to sway public opinion on climate change. Each episode features a different celebrity (Harrison Ford, Jessica Alba, Matt Damon, etc.), and centers on a different aspect of the climate issue. Several episodes attempt to link climate change to specific instances of droughts, storms, and other natural disasters.¹

But it’s not just Hollywood that’s trying to link climate change to extreme weather events. Shortly after Hurricane Sandy made landfall, New York governor Andrew Cuomo declared that “anyone who says there’s not a dramatic change in weather patterns is denying reality.”² Former Vice President Al Gore wrote on his blog that both Hurricane Sandy and the 2010 Nashville floods “were strengthened by the climate crisis.”³ And John Holdren, the Obama Administration’s science advisor, has sought to link climate change to recent California droughts, saying “Weather practically everywhere is being caused by climate change.”⁴

Yet while politicians and media figures are quick to blame climate change for the latest natural disaster, scientific support for these claims is very often lacking. In fact, documents and data even from the Intergovernmental Panel on Climate Change (IPCC), the National Oceanic and Atmospheric Administration (NOAA), and other official sources do not support claims that current extreme weather events are the result of climate change.

Hurricanes & Tropical Storms

The most prominent attempts to link extreme weather to climate change are predictions that warming will increase the average intensity of hurricanes between 2 percent and 11 percent over the course of the century (it is also predicted that warming will decrease the frequency of hurricanes).⁵ The evidence that climate change is causing more pow-

erful storms in the present day, however, is weak at best. This is the conclusion not just of skeptics, but also of the IPCC, which noted that “Globally, there is low confidence in any long-term increases in tropical cyclone activity . . . and low confidence in attributing global changes to any particular cause.” While storm intensity has increased in the North Atlantic since the 1970s, “[n]o robust trends in annual numbers of tropical storms, hurricanes, and major hurricanes counts have been identified over the past 100 years in the North Atlantic basin.”⁶

As an analysis by the NOAA noted last year, “the rising trend in Atlantic tropical storm counts is almost entirely due to increases in short-duration (less than 2-day) storms alone [which were] particularly likely to have been overlooked in the earlier parts of the record, as they would have had less opportunity for chance encounters with ship traffic.” As such, “the historical Atlantic hurricane record does not provide compelling evidence for a substantial greenhouse warming induced long-term increase.”⁷

Further, while damage from hurricanes has increased in recent decades, the IPCC concluded that “Economic growth, including greater concentrations of people and wealth in periled areas and rising insurance penetration, is the most important driver of increasing losses,” and that “[a]part from detection, loss trends have not been conclusively attributed to anthropogenic climate change; *most such claims are not based on scientific attribution methods.*”⁸

The bottom line, according to the IPCC, is that “uncertainties in the historical tropical cyclone records, the incomplete understanding of the physical mechanisms linking tropical cyclone metrics to climate change, and the degree of tropical cyclone variability provide only low confidence for the attribution of any detectable changes in tropical cyclone activity to anthropogenic influences. Attribution of single extreme events to anthropogenic climate change is challenging.”⁹

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Drought

Droughts have also frequently been mentioned as examples of current climate-enhanced disasters. In its Fourth Assessment Report (AR4), released in 2007, the IPCC gave some credence to this idea. The newly released Fifth Assessment Report, however, walks back this idea, stating: “Based on updated studies, AR4 conclusions regarding global increasing trends in drought since the 1970s were probably overstated.” The new IPCC assessment concludes that “there is not enough evidence at present to suggest more than low confidence in a global-scale observed trend in drought or dryness (lack of rainfall) since the middle of the 20th century.” In fact, the report states that “it is likely that the frequency and intensity of drought has ... decreased in central North America and north-west Australia since 1950.”¹⁰

These conclusions have been affirmed by other scientific authorities. After Obama science advisor John Holdren linked the current California drought to climate change, Martin P. Hoerling, a research meteorologist with NOAA’s Earth System Research Laboratory, took to the pages of *The New York Times* to offer a diametrically different assessment: “At present, the scientific evidence does not support an argument that the drought [in California] is appreciably linked to human-induced climate change... We can also say with high confidence that no appreciable trend toward either wetter or drier conditions has been observed for statewide average precipitation since 1895. This drought is not part of a long-term drift toward reduced precipitation over the state.”¹¹

Floods

At the opposite extreme from droughts is flooding, which is also often blamed on climate change. Again, even sources such as the

IPCC do not support a current increase in flooding due to climate change. According to the IPCC, “there is currently no clear and widespread evidence for observed changes in flooding ... there continues to be a lack of evidence and thus low confidence regarding the sign of trend in the magnitude and/or frequency of floods on a global scale,” and “the evidence for climate driven changes in river floods is not compelling.”¹²

Tornados

Evidence that climate change is affecting tornados is also extremely weak. As the IPCC concluded in 2012: “There is low confidence in observed trends in small spatial-scale phenomena such as tornadoes and hail.”¹³ When corrected for increased reporting, the frequency of tornados in the United States has been unusually low in recent years. Even over the long term, it is not clear whether warming should increase or decrease the projected number of tornados.¹⁴

Conclusion

To be clear, IPCC documents do predict an increase in some forms of extreme weather over the long term (for example, the IPCC projects average hurricane intensity to increase by around 5% by 2100). But there is a big difference between saying that warming is projected to result in a certain effect 50 years from now, and saying that it is already detectable. There is also a key distinction between weather (atmospheric conditions over a short period of time in certain places) and climate (how the atmosphere behaves over longer periods of time). In evaluating the different potential policy responses regarding climate change, it is important to look at the facts, and not to be swayed by extreme claims regarding extreme weather. ★

¹ Bryan Walsh, “The Docu Series Years of Living Dangerously Tries to Close the Climate Gap,” *Time* (1 Apr. 2014).

² Jane C. Timm, “Carole King: Sandy is ‘Climate Change Calling to Say Hello,’” *MSNBC* (1 Nov. 2012).

³ Al Gore, “Statement on Hurricane Sandy,” *Al Gore.com* (30 Oct. 2012).

⁴ Laura Barron-Lopez, “Obama Pitches \$1B Climate Change ‘Resilience Fund,’” *The Hill* (14 Feb. 2014).

⁵ “Global Warming and Hurricanes: An Overview of Current Research Results,” *Geophysical Fluid Dynamics Laboratory/NOAA* (30 Dec. 2013).

⁶ Hartmann, D.L., A.M.G. Klein Tank, M. Rusticucci, L.V. Alexander, S. Brönnimann, Y. Charabi, F.J. Dentener, E.J. Dlugokencky, D.R. Easterling, A. Kaplan, B.J. Soden, P.W. Thorne, M. Wild and P.M. Zhai, *Observations: Atmosphere and Surface*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2013) (AR5 Ch. 2) at 2.6.3.

⁷ “Global Warming and Hurricanes: An Overview of Current Research Results,” *Geophysical Fluid Dynamics Laboratory/NOAA* (30 Dec. 2013).

⁸ Bindoff, N.L., P.A. Stott, K.M. AchutaRao, M.R. Allen, N. Gillett, D. Gutzler, K. Hansingo, G. Hegerl, Y. Hu, S. Jain, I.I. Mokhov, J. Overland, J. Perlwitz, R. Sebbari and X. Zhang, *Detection and Attribution of Climate Change: from Global to Regional*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2013) (AR5 Ch. 10) at 10.7.3 (emphasis added).

⁹ “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.” A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (2012) (SREX) at 112.

¹⁰ AR5 Ch.2 at 2.6.2.3.

¹¹ Martin P. Hoerling, “Global Warming? Not Always,” *New York Times* (8 Mar. 2014).

¹² AR5 Ch.10 at 10.7.3.

¹³ SREX at 8.

¹⁴ Shaunacy Ferro, “FYI Could Climate Change Cause More Tornados?” *Popular Science* (22 May 2013).

