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New Research Examines Climate Change’s Role in 2019 Extreme Weather Events

Report advances scientists’ ability to quantify human influence on climate

January 26, 2021 Boston, MA – Precipitation from Hurricane Dorian, South Africa’s extraordinary four-year drought, fires in Alaska and China, and devastating floods in southern Canada were some of the extreme weather events made more likely by human-caused climate change in 2019, according to new research published today in the *Bulletin of the American Meteorological Society (BAMS)*.

The 10th edition of the report, *Explaining Extreme Events in 2019 from a Climate Perspective*, presents 17 new peer-reviewed analyses of extreme weather across five continents and one sea during 2019. It features the research of 80 scientists from seven countries looking at both historical observations and model simulations to determine whether and by how much climate change may have influenced particular extreme events.

“The attribution studies published in BAMS show the increasing levels of sophistication with which those questions can be answered,” said Keith Seitter, AMS Executive Director. “Being able to determine how much a specific event may have been modified by climate change plays an important role in increasing the public’s understanding of the very real impacts our changing climate is having on them.”

Stephanie Herring, a NOAA climate scientist and editor of *Explaining Extreme Events*, said that as the field of climate attribution matures, so do the scientific tools available to identify a climate signal in extreme weather events.

“This year we are also seeing mounting evidence for our ability to identify a climate change signal in different types of extreme weather events, especially for forest fires and precipitation,” said Herring. “We are also consistently seeing results that indicate extreme cold weather is becoming less likely due to human caused climate change.”

Here are some findings from research on 2019's extreme weather published in this issue.

Heat

- Climate change increased the risk of the 2019 March-June extreme heat over China's Yunan province by 123 to 157 percent, and increased the likelihood of the accompanying drought by 12 to 23 percent.
- Climate change has made extremely warm winter days in central England experienced in the winter of 2018-2019 are 300 times more likely.
- The intensity of the 2019 NW Pacific marine heatwave was amplified by a multi-decadal natural ocean cycle that is likely to worsen due to the impact of climate change.

Cold

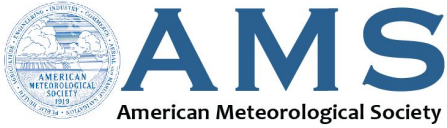
- Severe cold outbreaks in November 2019 over the eastern US were 70 percent *less likely* due to climate change.
- Two modeling studies suggest the extreme early spring cold experienced over the Tibetan Plateau in 2019 was 80 percent *less likely* due to climate change.

Heavy Precipitation & Flooding

- The month-long deluge over Ontario and Quebec that contributed to the 2019 Ottawa River floods is now two to three times more likely due to climate change.
- Climate change modestly increased the likelihood of Hurricane Dorian's observed extreme 3-hour and total accumulated rainfall.
- Climate change has made the high Susquehanna River flows into Chesapeake Bay experienced in 2019 more likely in the future.
- Climate change made the heavy rains observed in southern China from March to July 2019 60 percent *less likely* compared to the 1960's.
- The extended winter rains of 2018-2019 over the Middle and Lower reaches of China's Yangtze River were 19 percent *less likely* due to climate change.
- Analysis of the record number of typhoons affecting Korea in September 2019 showed no discernable influence of climate change.

Drought

- Climate change doubled the likelihood of the prolonged 2015 to 2019 drought over Africa's Western Cape region.
- Climate change increased the likelihood of extreme drought in Southwestern China like the one observed in 2019 by a factor of 6, based on a modeling study.



Fires

- A retrospective study showed that large Alaskan wildfires, like those that burned an area one-third larger than the state of Rhode Island during Alaska's warmest July on record in 2019 - are three times more likely in recent decades because of human-caused ignitions. Extremely hot and dry conditions caused by climate change supported the unusually early and strong peak of the 2019 fire season.
- The weather-related risk of extreme wildfire experienced in 2019 in South China was made 7.2 percent more likely by climate change. The El Nino increased that risk by another 3.6 percent.

The extreme weather events studied in the ten annual issues of the report were selected by individual researchers and do not represent a comprehensive analysis of events during that span. About 75 percent of the 185 research findings published in this series identified a substantial link between an extreme event and climate change; about 25 percent did not.

Read the full [*Explaining Extreme Events*](#) report.