The key triggers of the costly 2017 wildfire season

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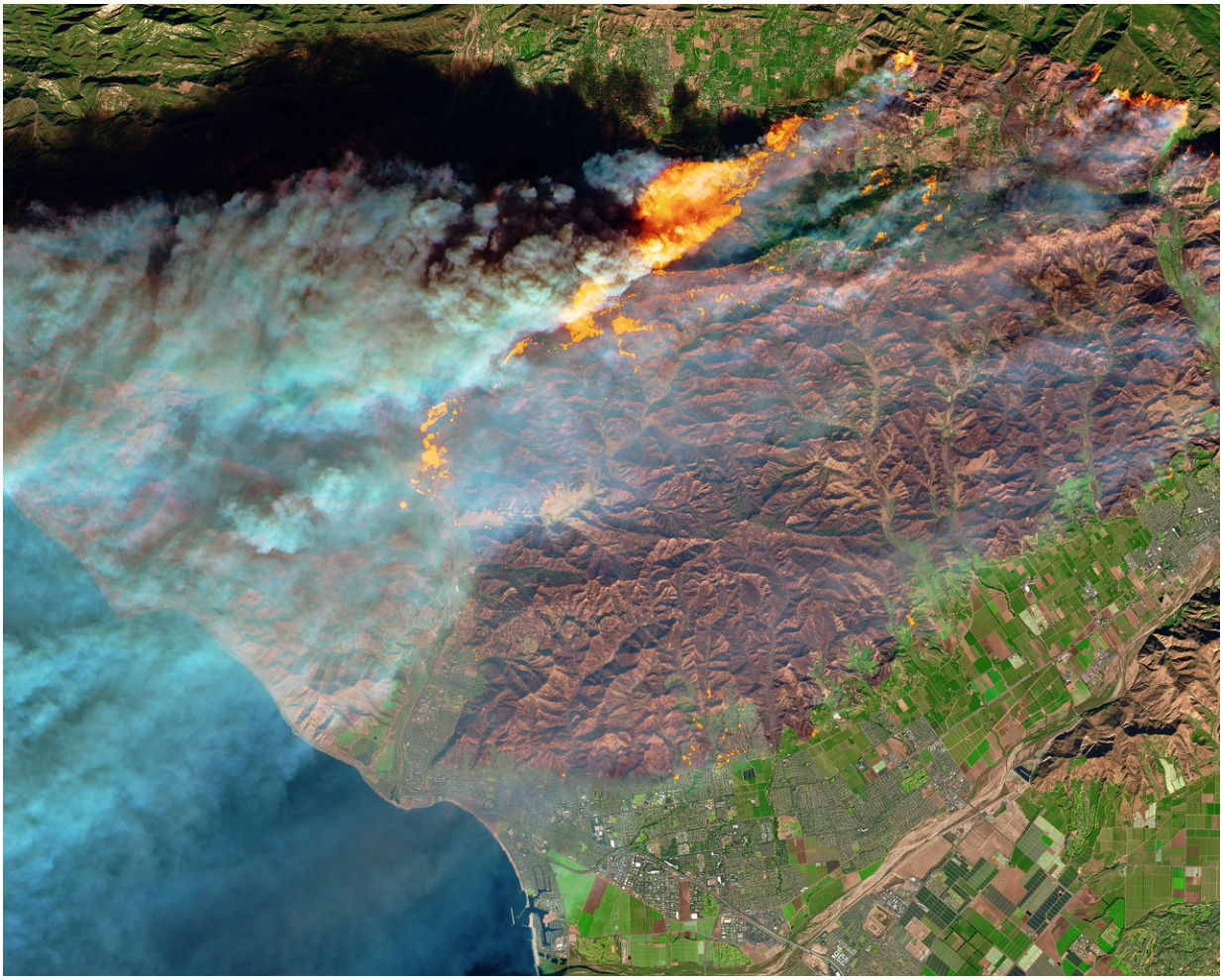

The Thomas fire burned >113,000 hectares from early December 2017 to late January 2018, making it the largest fire in California's modern history. While large fires such as the Thomas fire gain much media attention, proportionally large fires in less fire-prone ecoregions can also be ecologically and economically costly. Nagy et al. defined large fires by ecoregion across the

United States (U.S.) using government records of wildfires from 1992-2015 (~175,000 large fires). Of these large fires, humans started 92% and 65% of fires in the eastern and western U.S., respectively. Large human-caused fires occurred in wetter and windier locations and months on average than large lightning-caused fires and included >80,000 large fires in seasons when lightning-ignited fires were rare (i.e., spring, fall, and winter.) Credit: NASA Earth Observatory

New University of Colorado Boulder-led research shows that three major "switches" affecting wildfire—fuel, aridity, and ignition—were either flipped on and/or kept on longer than expected last year, triggering one of the largest and costliest U.S. wildfire seasons in recent decades.

The 2017 wildfire season cost the United States more than $18 billion in damages. That year, 71,000 wildfires scorched 10 million acres of land, destroying 12,000 homes, evacuating 200,000 people and claiming 66 lives. By comparison, 2016 saw 5.4 million acres burned.

"Last year, we saw a pile-on of extreme events across large portions of the western U.S: the wettest winter, the hottest summer and the driest fall—all helping to promote wildfires," said lead study author Jennifer Balch, director of CU Boulder's Earth Lab in the Cooperative Institute for Research in Environmental Sciences (CIRES).

The new paper co-authored by researchers at CU Boulder's Institute of Arctic and Alpine Research (INSTAAR), Columbia University and the University of Idaho was published today in the journal *Fire*.

Western wildfire seasons are worse when conditions are dry and fuel-rich, raising the chances of ignition. Climate change likely exacerbates fuels and dryness, the paper found, and human behavior contributed the

sparks. The research team sought to pinpoint the precursors that led to 2017's fires in order to provide information for decision makers considering policies that might prevent or minimize future fire disasters.

2017's wet winter acted as the first trigger. Increased precipitation early in the year fed the growth of fine grasses across the western United States—grasses that would later serve as fuel for fire. Then, summer and fall brought dry, arid conditions, baking the dense fields of grasses into dehydrated kindling.

The scene was set for the third switch: ignition. Nearly 90 percent of total wildfires last year were sparked by people; Balch's previous work has illuminated just how extensively humans exacerbate wildfire. Human activity triples the length of the average fire season.

"We expect to see more fire seasons like we saw last year," said Megan Cattau, an Earth Lab researcher and a co-author on the study. "Thus, it is becoming increasingly critical that we strengthen our wildfire prediction and warning systems, support suppression and recovery efforts and develop sustained policies that help us coexist with fire."

The paper notes that computer climate models project an increased risk of extreme wet winters in California and a decrease in summer precipitation across the entire West Coast. Those models also tend to project a delay in the onset of fall rain and snow.

Although naturally occurring climate variability influences environmental conditions that affect the wildfire season, that variation is superimposed on an anthropogenically warmer world, so climate change is magnifying the effects of heat and precipitation extremes, Balch said.

"The 2018 wildfire season is already underway and here at home in the southern Rockies, fuels are very dry," said Balch. "June is forecasted to

be a busy month in terms of wildfires due to severe drought and low snowpack."

More information: Jennifer Balch et al, Switching on the Big Burn of 2017, *Fire* (2018). DOI: 10.3390/fire1010017

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