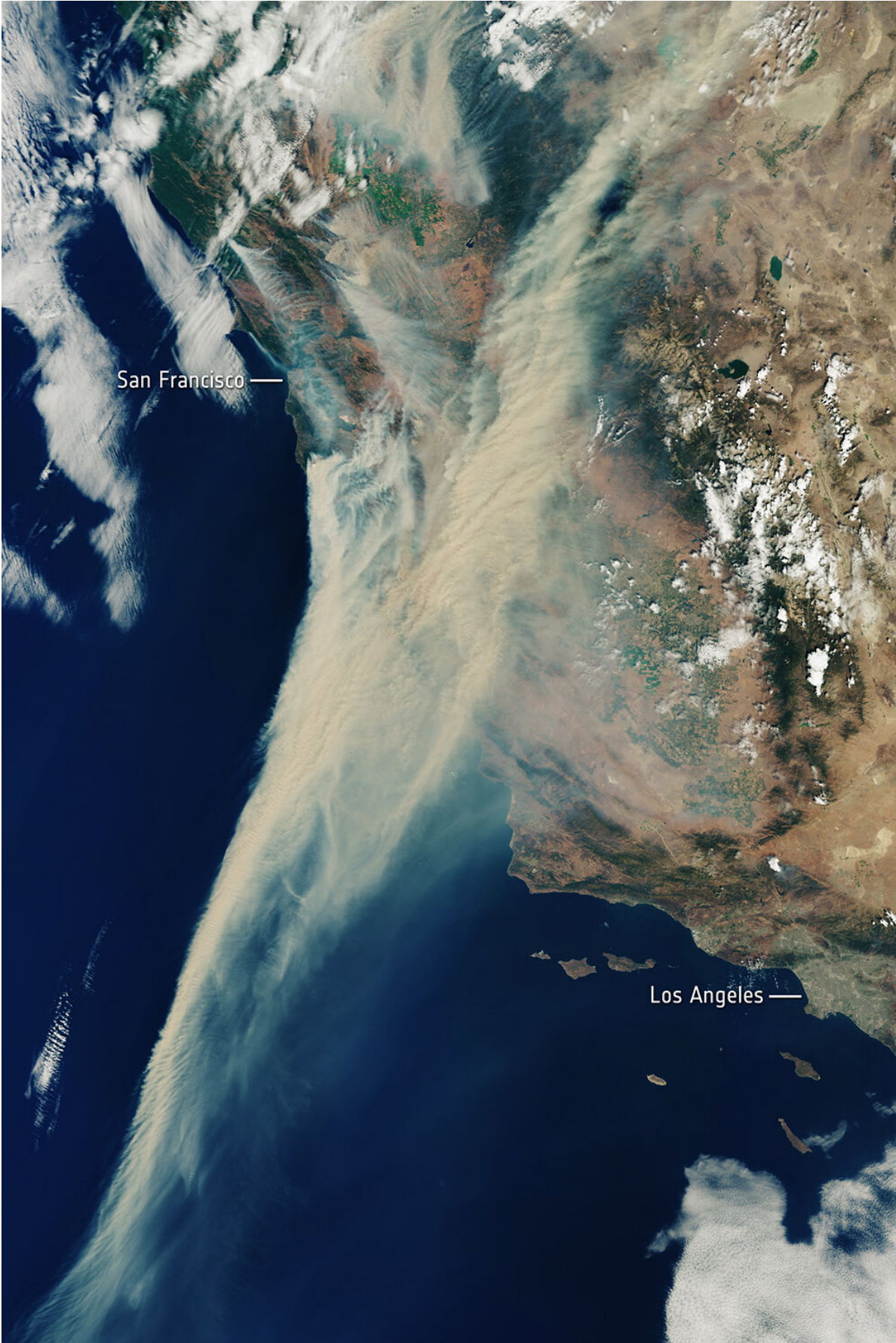


# **Q&A: Experts discuss extreme weather's role in current and future wildfires**

August 28 2020, by Rob Jordan

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Satellite image of smoke from California wildfires on Aug. 19, 2020. Credit: European Space Agency

Something unfamiliar to many Californians—an intense thunderstorm with widespread lightning strikes—spawned the all-too-familiar wildfires that have so far burned more than 1 million acres across the state's north. That contrast may foreshadow a future of increasingly frequent extreme weather that drives natural disasters.

Noah Diffenbaugh, the Kara J Foundation Professor at Stanford's School of Earth, Energy & Environmental Sciences, studies climate change's role in increasing the risk of [extreme weather](#) and has led recent research forecasting longer, more extreme [wildfire](#) seasons. Chris Field, the Perry L. McCarty Director of the Stanford Woods Institute for the Environment, studies climate change impacts, adaptation and vulnerability, with a focus on disaster risk reduction, especially from wildfires.

Here, Field and Diffenbaugh discuss extreme weather's role in current and future wildfires, as well as ways to combat the trend toward bigger, more intense conflagrations.

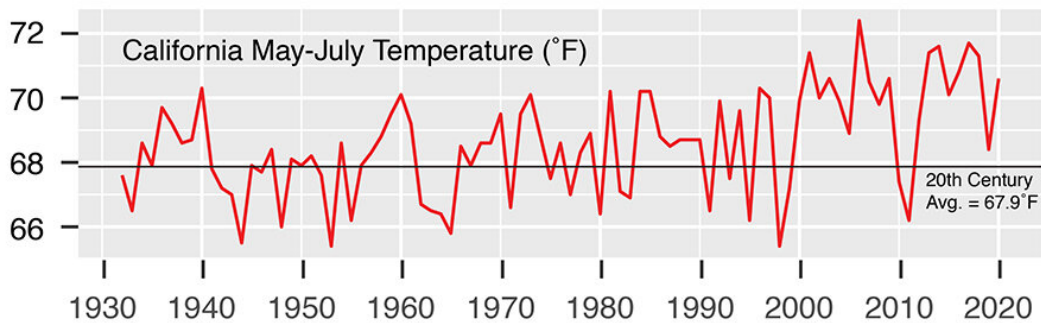
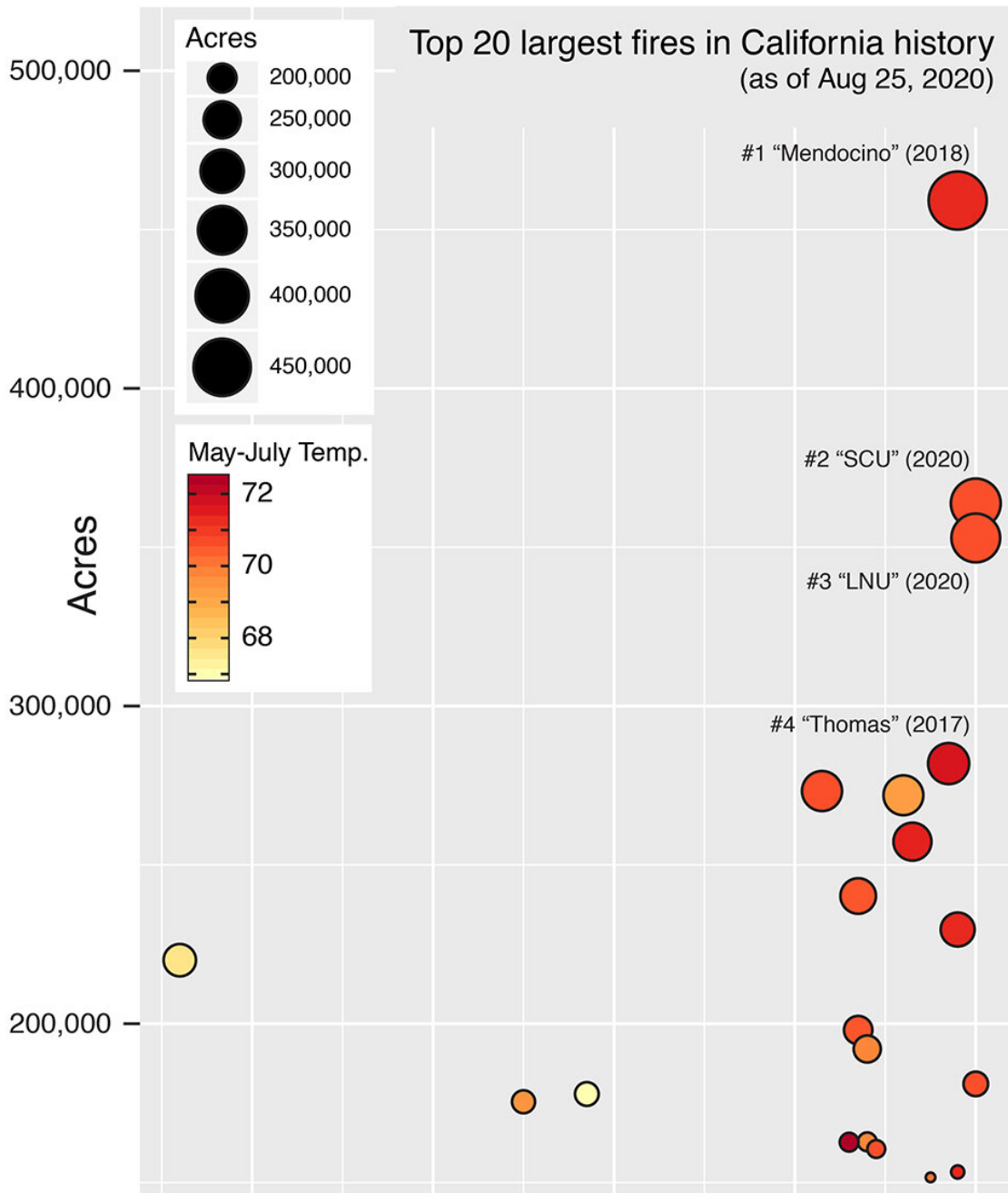
## **What do climate science and climate models have to say about the current situation? Could we have expected this?**

Diffenbaugh: The current event is unprecedented, in that two of the three largest wildfires in California's recorded history are burning

simultaneously. The largest and fourth-largest were in 2018 and 2017, respectively, and all but three of the top 20 have occurred since 2000, during which time California's temperature has routinely been well above the historical average. We have very strong evidence, in part from our recent research, that the frequency of extreme wildfire weather has been increasing in California in recent decades. The primary mechanism in terms of weather conditions is long-term [warming](#), which has resulted in more dry, flammable vegetation. We know that around half of the increase in area burned in the western United States in recent decades is associated with this long-term warming. In addition, warming has also increased the number of days for which the fire weather conditions reach extreme levels. For the current event, the thunderstorms were highly unusual, but the heatwave and vegetation dryness were very much in line with recent trends. In fact, our research shows that global warming has increased the odds of record-setting hot events by about 80 percent across the globe, and doubled or even tripled the odds in the region of California and the Southwest that experienced extreme heat prior to the thunderstorms. So we have a lot of evidence that global warming is intensifying the conditions that are in place when other ingredients like ignition and high winds occur.

**What do the current wildfires tell us about the future in terms of extreme weather, fire risk and fire intensity?**





Calfire ([https://www.fire.ca.gov/media/11416/top20\\_acres.pdf](https://www.fire.ca.gov/media/11416/top20_acres.pdf); Aug 25, 2020)

NOAA (<https://www.ncdc.noaa.gov/cag/statewide/time-series/4/tavg/3/7/1932-2020>)

Top 20 largest fires in California history. Credit: Noah Diffenbaugh

Diffenbaugh: The same research that shows that global warming has increased the frequency of extreme wildfire weather historically also suggests that continued global warming will intensify those conditions further. In particular, further warming is likely to continue increasing the simultaneous occurrence of extreme wildfire conditions over disparate areas of California, which has placed so much stress on firefighting resources in recent years, including this week. Meeting the goals agreed to in the UN Paris Agreement would reduce the level of intensification of extreme wildfire weather, particularly later in this century. However, even holding global warming to below 2 degrees Celsius—a primary goal of the Paris Agreement—would still yield increases. So both greenhouse gas mitigation and climate change adaptation have important roles in managing these increasing risks.

## **How might more widespread prescribed burns—fires purposefully set under controlled conditions to clear ground fuels—have affected the scope of the current fires?**

Field: We are decidedly behind the curve in wildfire preparations. A large part of effective preparation is fuel treatments, including clearing defensible spaces around communities and reducing the abundance of ladder fuels—vegetation near the ground that can carry fire into the treetops. Prescribed burns are an important part of the package, but they are not the best choice everywhere. In some places, we should be reducing fuel loads with grazing by goats or cattle or cutting with saws or

tractor-mounted equipment. It is important to remember that what we think of as classic California landscapes, from grasslands with scattered oaks to majestic yellow-pine forests, have experienced frequent fires for thousands of years. Bringing fire back into these landscapes is an important part of keeping them healthy.

## **What role, if any, does climate change have in exacerbating bad air quality over large areas of the state during wildfires?**

Diffenbaugh: By increasing the area burned by wildfire and the frequency of extreme wildfire conditions, global warming is increasing the risk of the wildfires that produce harmful smoke conditions. In addition, although there are a lot of nuances to the air quality in any given location at a given time, [our previous research](#) suggests that [global warming](#) is likely to increase the kinds of air stagnation events that produce poor air quality, including over the western United States.

## **What other approaches should California and other fire-prone states focus on to improve the wildfire situation?**

Field: As is the case with all disasters, we need to think about effective interventions at all stages—prepare, respond and recover. For preparation, there is so much to do, from reducing unsafe accumulations of ladder fuels to improving defensible space around homes, to repairing the aging infrastructure that causes some of the worst fires, to chemical treatments that prevent fires from taking off. In addition, we should be thinking about preparations that facilitate safe evacuations, with particular focus on road maintenance and preparations that keep us safe from smoke exposure, as well as improved air filtration in public

buildings and homes. When a fire occurs, an effective response requires the availability of trained first responders, plus well-equipped evacuation and medical facilities. Our experience over the last week, with so many different fires, should push us to rethink the necessary size of the fire-fighting force. After the fire, we can do much more to make recoveries efficient. When rebuilding communities, it is especially important to make the resources available to make them fire safe in the future. In locations where the fire risk is too high to rebuild, we need to plan for relocations.

Provided by Stanford University

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