

# Australian bush fires warmed the stratosphere for six months

9 April 2021, by Bob Yirka



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A team of researchers from Jinan University, the University of Colorado, Boulder, the U.S. National Oceanic and Atmospheric Administration, and the U.S. National Center for Atmospheric Research, has found evidence indicating that the massive bush fires that burned from late 2019 through early 2020 in parts of Australia produced so much smoke particulates that they increased the temperature of the stratosphere in the region for approximately six months. In their paper published in the journal *Geophysical Research Letters*, the group describes their work, which involved using data from the wildfires and an aerosol model to calculate how much particulate matter made its way into the stratosphere and the impact it had.

The wildfires in Australia burned from approximately December of 2019 to January of 2020 and destroyed trees, brush and homes covering approximately 14 million acres—they also killed 20 people. So large were the fires that the smoke could be seen by astronauts aboard the International Space Station. The government of Australia calculated the costs of the fires to be approximately \$103 billion. In this new effort, the

researchers have found that black particulate matter in the smoke made its way into the stratosphere, leading to a slight [temperature](#) increase.

The stratosphere is approximately 10 to 50 kilometers from the surface of the Earth—notably, it is also the part of the atmosphere that holds the ozone layer. Prior research has shown that in some instances, smoke can cool the atmosphere by blocking [heat](#) from the sun. But in other instances, the opposite can occur. If smoke contains large amounts of particulate matter and that particulate matter is black, then it can absorb heat from sunlight and pass it to the air around it. To calculate how much heat was absorbed by the stratosphere, the researchers entered data from the fires into both the Community Aerosol and Radiation Model for Atmospheres and the Community Earth System Model—both were able to make predictions about how much heat was trapped by the particulate matter and the impact it would have on the temperature of the stratosphere in the region. They found that the [stratosphere](#) temperature increased from 1 to 2 degrees C in the region and stayed that way for approximately six months. They also noted that the smoke particles temporarily increased the size of the ozone hole.

**More information:** Pengfei Yu et al. Persistent Stratospheric Warming Due to 2019–2020 Australian Wildfire Smoke, *Geophysical Research Letters* (2021). [DOI: 10.1029/2021GL092609](https://doi.org/10.1029/2021GL092609)

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