

Climate Science and Policy for Nonscientists

One Picture is Worth a Thousand Words.

CANADIAN WILDFIRES - GLOBAL v REGIONAL ANALYSIS

Active wildfires in Canada and northern US

In past: ● 24 hours ● 7 days

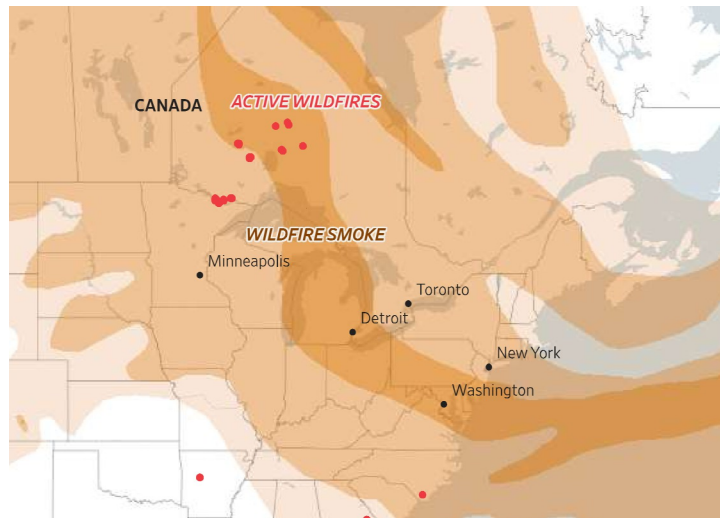
500km
200 miles



Note: Map shows location of fires not their size. Active fire/thermal anomalies may be from fire, hot smoke, agriculture or other sources

Source: Nasa Firms (data as of 16 July)

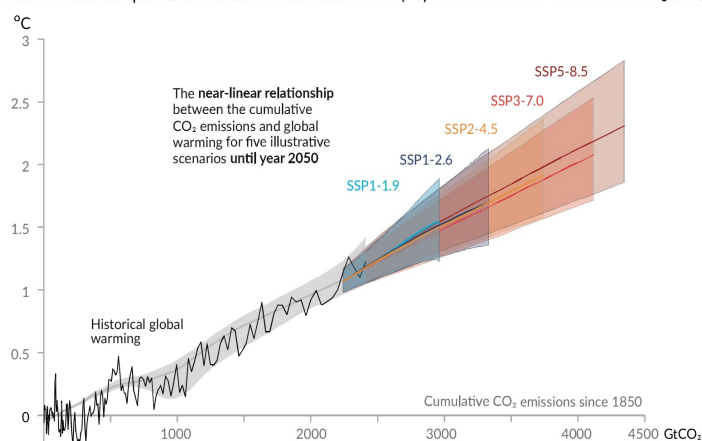
BBC



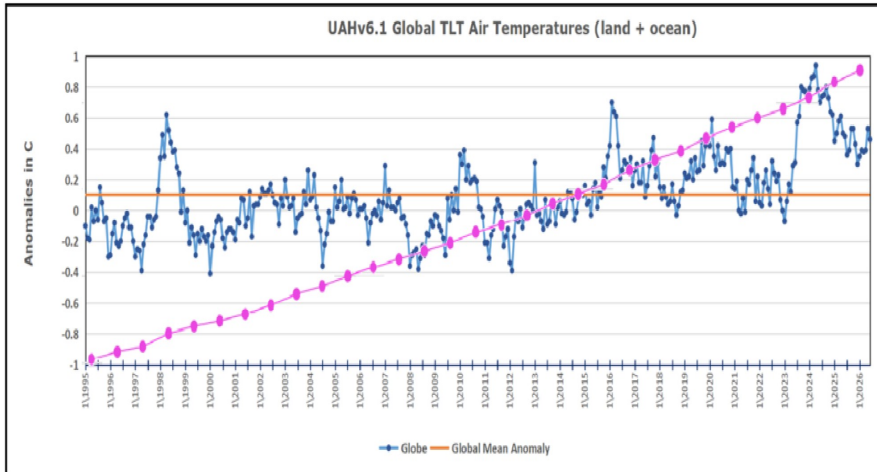
Smoke and other byproducts from massive Canadian wildfires have been invading the US and spreading dangerous pollution. Advocates of the CO₂ “Control Knob” Theory take a global perspective on such events and argue: (1) CO₂ levels are rising causing temperatures to rise, (2) rising temperatures are causing increases in “fire weather,” defined as a compound event of heat and drought, and (3) increases in fire weather are causing larger numbers of wildfires and more severe wildfires. Canadian Prime Minister Carney blames the increase in Canadian fires on the failure of the US to do more to fight climate change.

Every tonne of CO₂ emissions adds to global warming

Global surface temperature increase since 1850–1900 (°C) as a function of cumulative CO₂ emissions (GtCO₂)

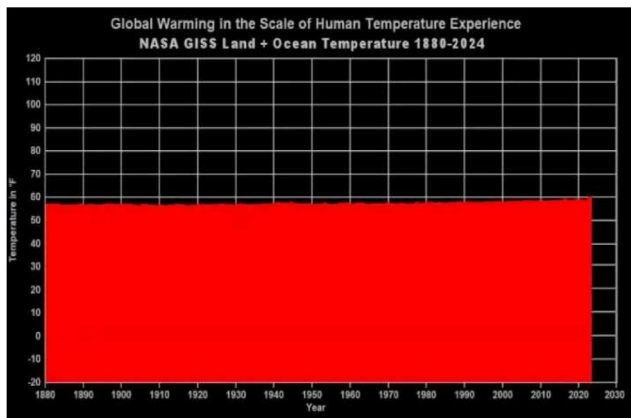
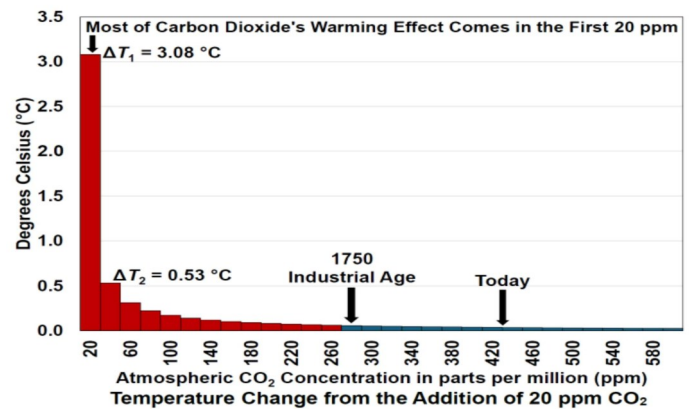


The Control Knob Theory asserts that the relation between CO₂ emissions and temperature rise is basically linear. (IPCC AR6 p.28). CO₂ is a “well distributed” green house gas, meaning that CO₂ levels are roughly the same all around the world, so temperature increases should be similar around the world, justifying a global analysis.



But data shows that for the last 31 years (1995-2026): (1) world temperatures have been rising at a slower rate and a more erratic rate than CO2 levels, and (2) for the last 2 years temperatures have been declining. Each of these points rebuts the Control Knob Theory .

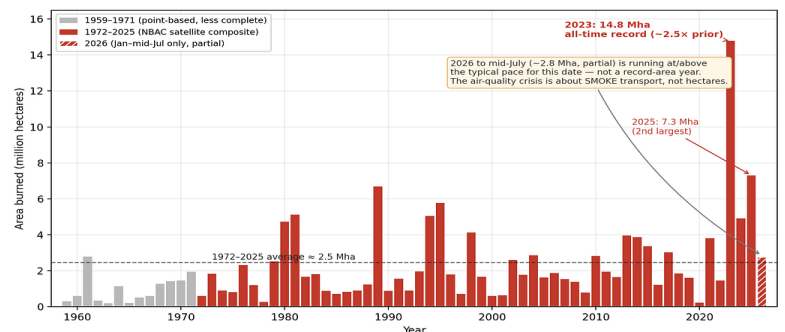
One explanation for this slower rate of rise comes from a number of physicists who argue, based on quantum mechanics, that the strength of CO2 as a greenhouse gas is not a constant but decreases significantly as the atmospheric concentration increases.



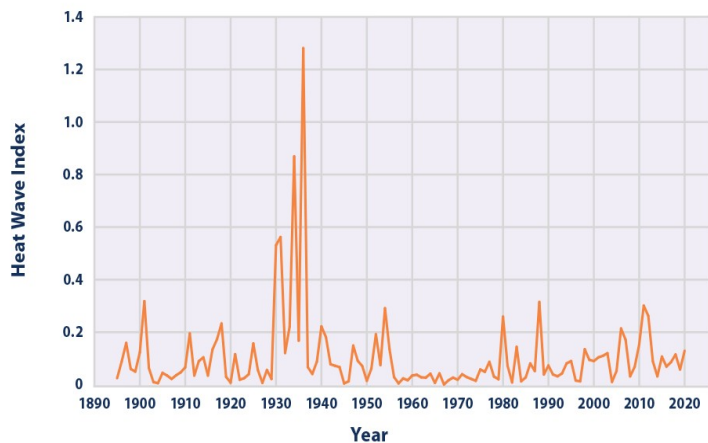
The temperature graphs that are usually presented (as above) show differentials, not actual global temperatures. Such presentations make the changes from year to year appear dramatic. However, the actual temperature increase over the last 144 years has been from 57F to 59F. If actual global temperatures are graphed, as shown here, the graph shows temperatures rising at a very slow and linear rate. Climate change is defined as a statistically significant change in some measured variable over a significant period of time, which is usually understood to mean at least 30 years. So climate change as to world temperature is established at a very slow and steady rate.

But that is not what is happening with wildfires in Canada. In 2023 the area burned in Canada shot up extraordinarily to what can reasonably be called an unprecedented level. The 2025 the area burned was the second highest in 66 years. The 2026 number by year end may be as high as the 2025 number. The graph does not show any significant upward trend over the 67 year period. And there is no correlation whatever between the extraordinary area burned numbers 2023-2026 and the slow, linear rise of CO2 levels and world temperatures.

Canada's wildfire area burned has surged — 2023 shattered the record
Annual forest area burned, 1959-2026. 2023 alone burned more than the previous record by ~2.5x.

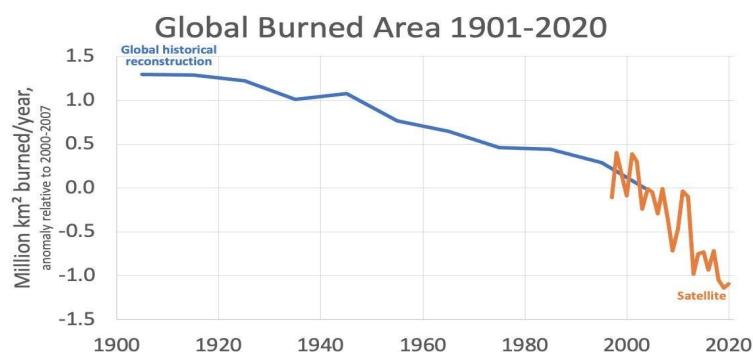


Data: NRCan CMR/NBAC & Nat. Forestry Database; CPFC (2026, prelim.); EBAS Land (ECMWF/Capernicus via Google Earth Engine); NBAC = National Burned Area Composite (spatially mapped). Pre-1972 point-based totals are less complete.



Weather is notoriously variable from year to year, as demonstrated by this graph of the US heat wave index from 1895 to 2020. (US EPA dataset). The extraordinary heat and drought in the mid 1930s caused what is known as the Dust Bowl on the Great Planes. But this was an isolated event. There has been no trend up or down in the US heatwave index over time and so no climate change with respect to the US heatwave index.

The dramatic increase in Canadian wildfire area burned 2023-2026 is anomalous. Repeated studies show that wildfires worldwide are trending down, not up. This dataset shows world area burned declining.



1901-2007 from <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2013JG002532>, 1997-2016 from <http://globalfiredata.org/analysis.html>, and 2002-20 from <https://www.sciencedirect.com/science/article/pii/S0034425718303705>, updated with data from lead author. The two satellite data series were harmonized 2003-16 (very similar), and then anomalized. While estimates of global burned area attempt to be internally consistent, they differ in coverage, hence data here shown as difference from 2000-7. Reconstruction average for that period is 3.63Mkm², satellite is 4.6Mkm². twitter.com/bjornlomborg

The world burning *less*

Climate alarmists keep telling us the world is increasingly on fire. It is not. This is the latest NASA satellite data 2001-24:



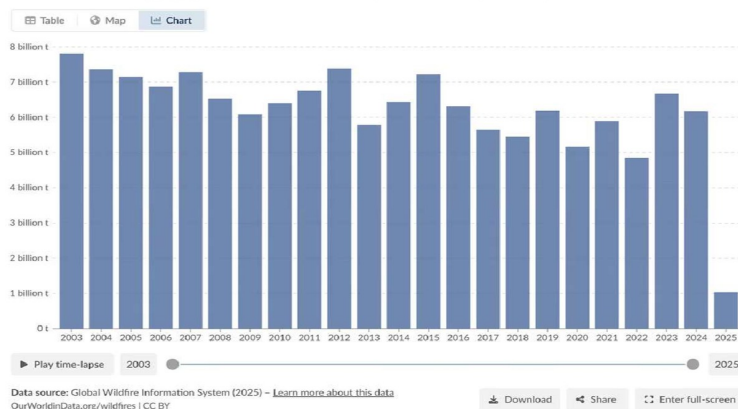
This NASA dataset shows a declining percentage of world area burned.

This dataset of CO₂ emissions world wide from wildfires shows such emissions to be declining over the period of the study, 2003-2024. The 2025 data is only through April.

As shown in the June 2026 newsletter, area burned in the US has been trending down since 2007. (And see CliSciPol Science Topic: Wildfires).

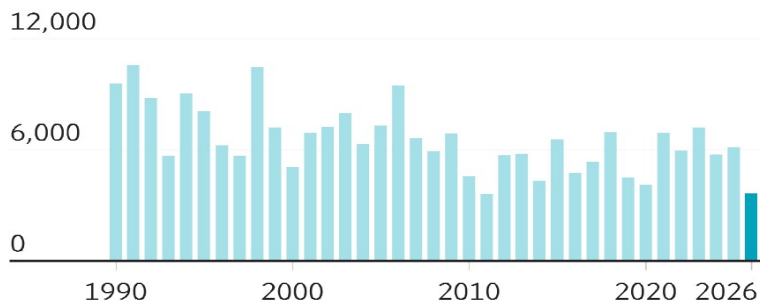
Annual CO₂ emissions from wildfires, World, 2003 to 2025

Carbon dioxide released by wildfires in tonnes. The 2025 data is incomplete and was last updated 25 April 2025.



Canada Wildfires

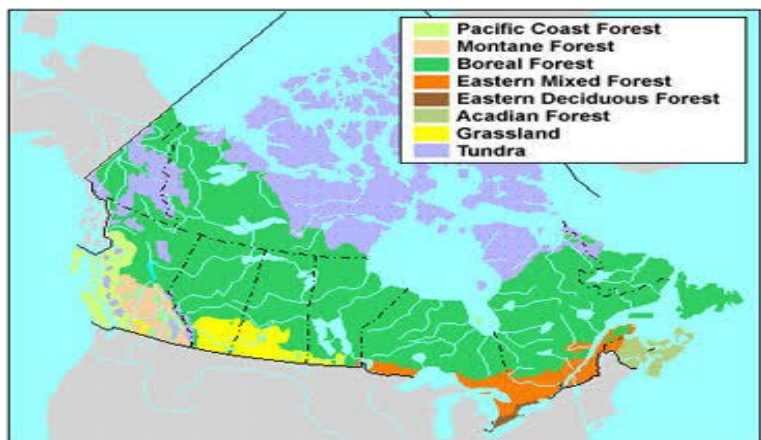
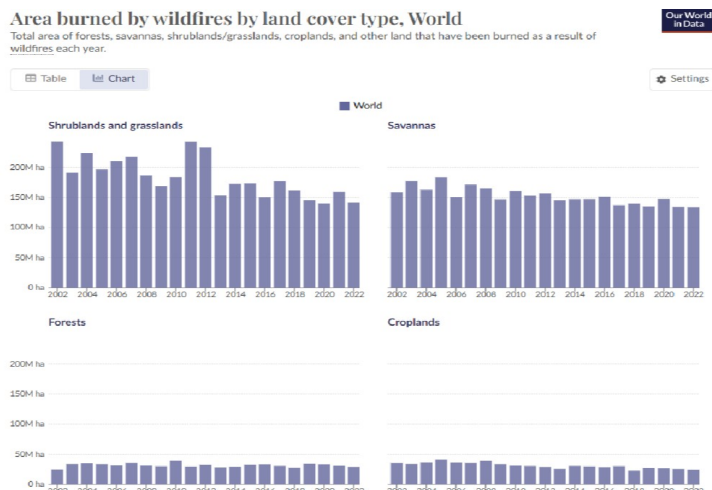
Wildfires



Source: Canadian Interagency Forest Fire Centre

Surprisingly the number of wildfires per year in Canada has been declining since 1990. So what is happening in Canada that has caused the huge jump in area burned since 2023? A global analysis based on the Control Knob Theory fails to answer this question. An answer requires a regional analysis.

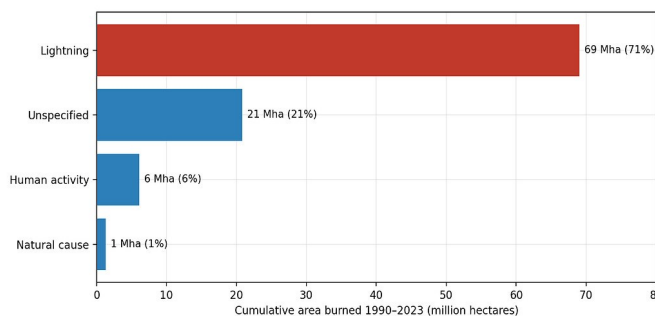
Wildfire scientists distinguish four types of ground cover where wildfires occur. This data from 2002 to 2020 also shows a downward trend in global area burned. The ground cover type responsible for the largest area burned is shrublands and grasslands. Next is savannas. Wildfires in forests are relatively rare and trending downward slightly.



Huge areas of Canada are boreal forest (subarctic and coniferous or evergreen), as opposed to the US where the forests are mostly deciduous (broad-leaved trees that seasonally shed). Canada's boreal forest covers an area roughly 14 times the size of California. Most of it is virtually unpopulated. Of Canada's 41 million population over 90% live within 100 miles of the US border.

One study has concluded that 71% of area burned in Canada over a 33 year period resulted from fires caused by lightning. Other studies put the number at over 80%. Human activity is only a very minor cause. Contrast California where area burned is increasing (as in Canada), but where most of the fires are in shrublands and grasslands, and where human activity is the principal cause of fires due to the lengthy and expanding wildland-urban interface..

Lightning drives most of Canada's burned area
Area burned by cause, 1990-2023. Lightning-ignited fires in remote boreal forest dominate — and rise with warming.



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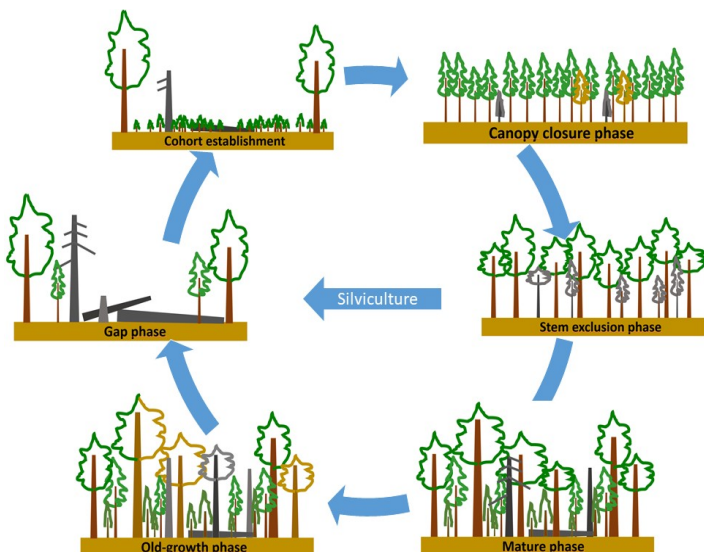
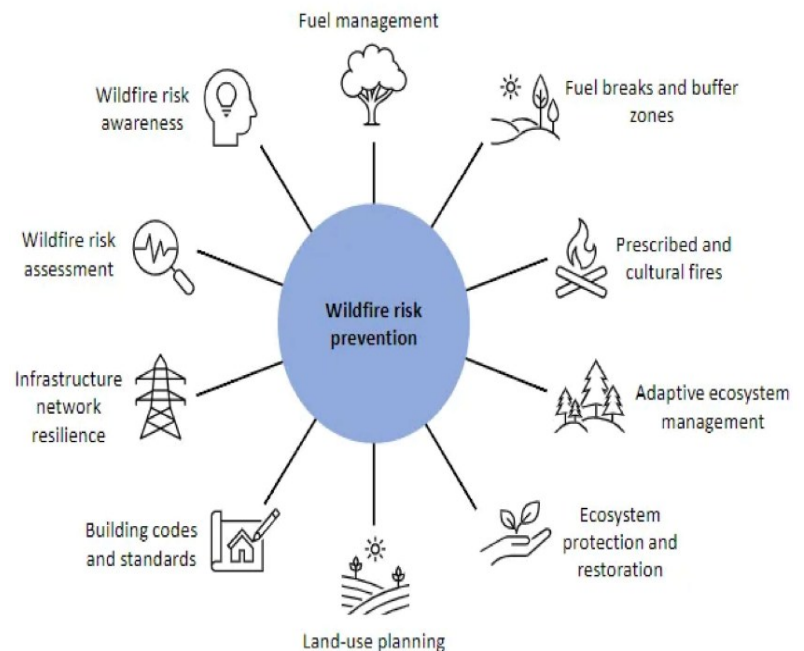
Source: Nasa Firms (data as of 16 July)

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In this image the red dots show the location of roughly 900 active wildfires as of 07-16-26. Most of the fires are in unpopulated areas, but there is a concentration in Western and South-Western Ontario that is the likely source of the smoke and pollution being carried into the US on South-Easterly winds. Referring back to the previous map of forest types in Canada, part of this area is Eastern Mixed forest as opposed to Boreal forest.

Wildfires are like floods in that human adaptive behavior can substantially reduce the damage caused by them. For example, one study has concluded that the absolute value of flood damage could be reduced by 95% by adequate adaptation. (AR6 WGII p.607). Forests can be managed to reduce risk and resulting damage, but such management is expensive. In general, private owners of forest lands fund the management of their forests to protect their investments. But in Canada over 90% of forestland is publicly owned, and management is the responsibility of various government entities, some of whom have cut their firefighting budgets in recent years.

Reducing the risk of extreme wildfires through prevention measures



Lightning caused wildfires are part of the natural lifecycle of forests. Where the forests are remote, the fires can usually be ignored, and there is no need for active forest management. But, when fires are a threat to human life and property, fire management policies must be adopted and funded: (1) that take into account the circumstances of the particular area to be managed, and (2) that balance the expenses required in relation to the risk and potential damage. Canadian wildfires are an issue in the US only when the Jet Stream blows the smoke and pollution into the US, but the direction of the Jet Stream has been described as "highly fickle."

CONCLUSION

The situation is some what comparable to Tijuana's dumping of raw sewage that crosses the US border and pollutes beaches and other areas around San Diego. The US is demanding that Mexico take action to abate the cross-border pollution flow.

So, here, Canada is responsible for smoke and other pollution entering significant areas of the US. Climate change is not an issue. The US has grounds for complaint regarding Canada's failures to manage adequately their wildlands that are located where fires can spread smoke and pollution into the US. Canada also has its own cities, such as Toronto, that are being badly affected by the current fires.

A regional analysis is required:

1. The areas in Canada should be identified where wildfires are occurring that cause smoke and other pollutants to enter the US.
2. The local cause or causes of the 2023-2026 spike should be determined, if only, to conclude that this has been a prolonged, random weather event.
3. Taking into account the cause(s) of the spike, appropriate management plans should be formulated, funded, and implemented to reduce the number and size of the fires in the relevant areas.

Canada has been managing its wildfires on a provincial basis. Despite its 150 fire crews and 80 water bombers, Ontario is presently overwhelmed by some 130 fires burning simultaneously, most of which probably have natural causes.

Unlike the Tijuana problem, the wildfire problem is two way. Sometimes smoke and pollution from US fires are blown into Canada. And just last January Canada helped California during the Palisades Fire. So, although the problem may best be analyzed on the regional level, dealing with the problem requires a cooperative effort between the two nations involved.



All footnote citations are to the Intergovernmental Panel on Climate Change's publication, Climate Change 2021 The Physical Science Basis, the first part of the Sixth Assessment Report (AR6).

