Special Edition 08-23-26

CliSciPol

Climate Science and Policy for Nonscientists

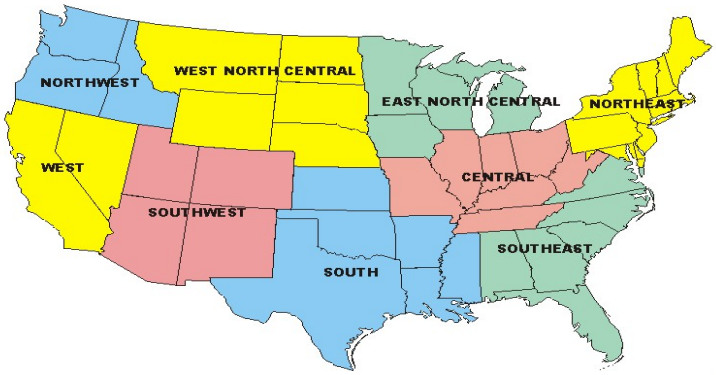
One Picture is Worth a Thousand Words.

MONTANA - WHERE'S THE CRISIS?

This newsletter and website in the past has presented data showing that there is no worldwide climate change crisis. But it is also clear that a variety of serious environmental problems exists in particular places. Such particular problems usually are best addressed on a local or regional level rather than on a national or global level. CliSciPol has discussed problems such as flash flooding in Texas (See CliSciPol Newsletter: July 2025), tidal flooding in Charleston (See CliSciPol Policy Topic: Coastal Cities' Exposure), and wildfires in California (See CliSciPol Science Topic: Wildfires).

In the US there are periodically published studies of climate change in particular states. These studies provide useful perspective on the global generalizations commonly presented in the media. There has just been published such a study for Montana, and this newsletter presents the findings from this study.

THE NINE REGIONS AS DEFINED BY THE NATIONAL CLIMATIC DATA CENTER (NCDC) AND REGULARLY USED IN CLIMATE SUMMARIES



CLIMATE PREDICTION CENTER, NOAA

The National Climatic Data Center recognizes 9 different climate regions in the US. Montana is in the West North Central region. An initial proposition is that the same global climate change will have different effects in each of the 9 regions.

Since 1890 Montana average temperature has risen about 2 F (or 1 C) from 42 to 44 F in a roughly linear fashion with significant year-to-year variability. The rate of warming has been slightly less than 2 F (1 C) per century, which is consistent with the IPCC's conclusion as to the rate of global temperature rise. (AR6 p.5). As shown, the rate of increase in atmospheric CO2 rose significantly starting about 1960, but this increase has not caused an increase in the rate of Montana temperature rise. Temperature rise in Montana does not correlate with CO2 rise.

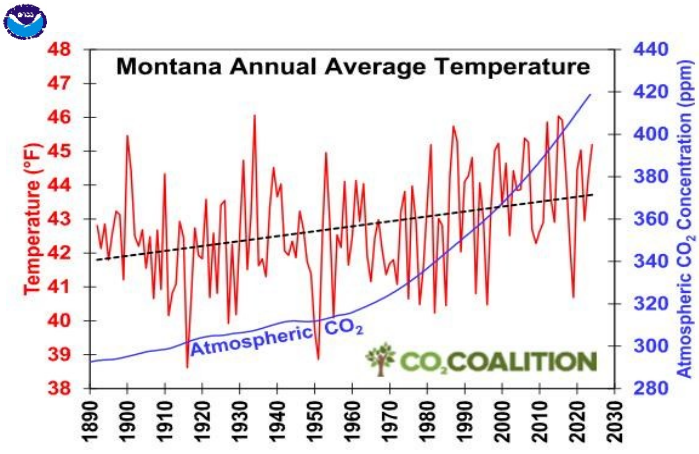
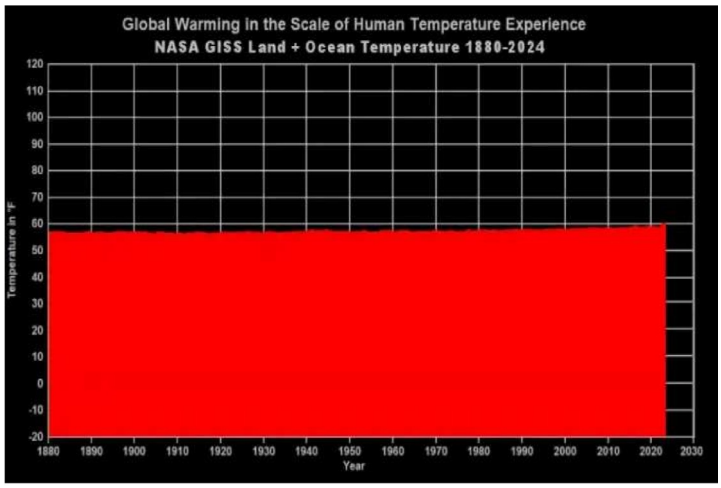
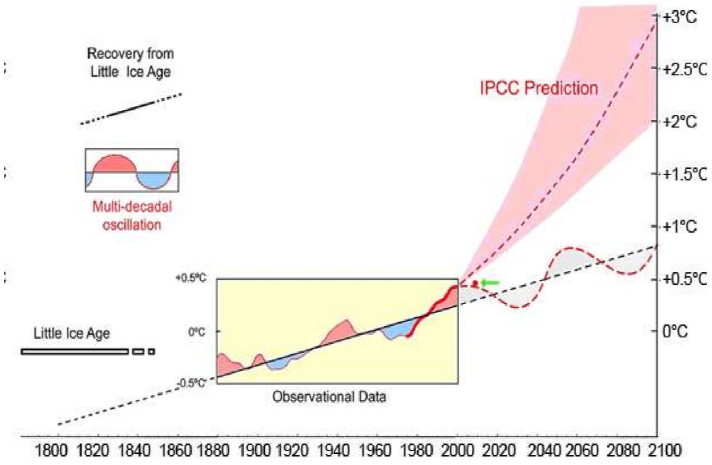


Figure 8: *Annual average temperature in Montana vs. atmospheric CO_2 concentration. Temperature: NOAA NCEI (2025e), CO_2: Keeling et al. (2025)*



Over 144 years from 1880 to 2024 world average temperature rose from 57 F to 59 F. The rate of increase is 1.4 F (0.8 C)per century or 2.4% per century. Montana's current average temperature is 44 F , which is 15 F lower than the current world average temperature of 59 F.

This rate of temperature rise (around 2 F or 1 C per century) is generally considered mild. The idea of a global climate crisis is based primarily on models predicting that world temperature will dramatically accelerate upward to reach dangerous levels by the year 2100, as shown. These models have been projecting such temperature acceleration for nearly 30 years, but the acceleration has never happened. The IPCC makes no finding of actual temperature acceleration. (AR6, p.5-6)



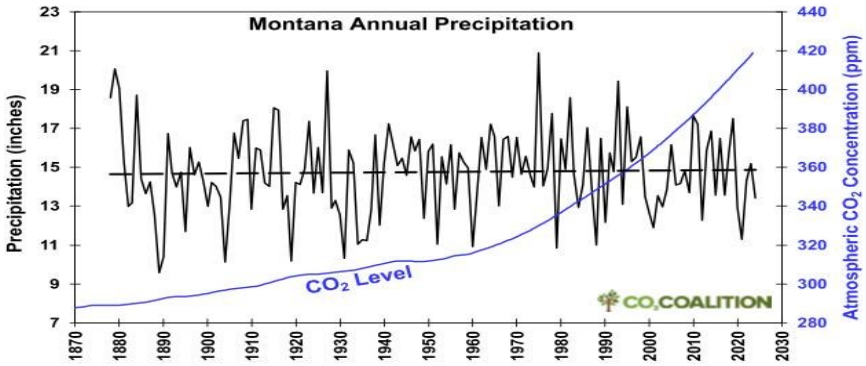


Figure 19: *Annual precipitation in Montana vs. atmospheric CO_2 concentration. Precipitation: NOAA NCEI (2025e), CO_2: Keeling et al. (2025)*

Montana annual precipitation has remained virtually unchanged since 1875.

Kalispell is a city in northwest Montana. It is a gateway to Glacier National Park, which is famous for its peaks and alpine trails. Snowfall in Kalispell has risen very slightly since 1980.

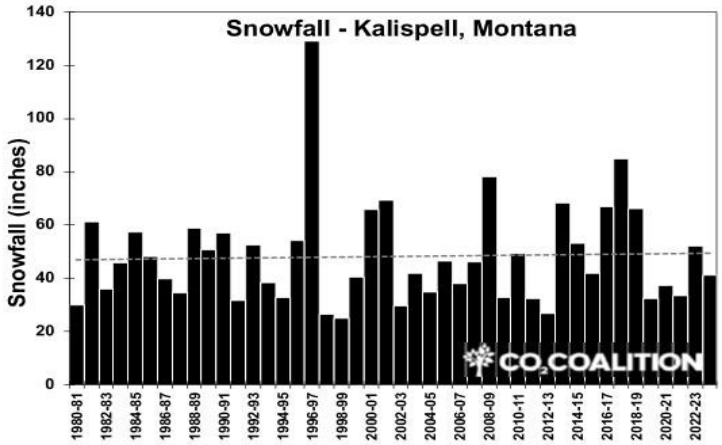


Figure 13: *Annual snowfall at Kalispell, Montana since 1980. Montana State University (2025)*

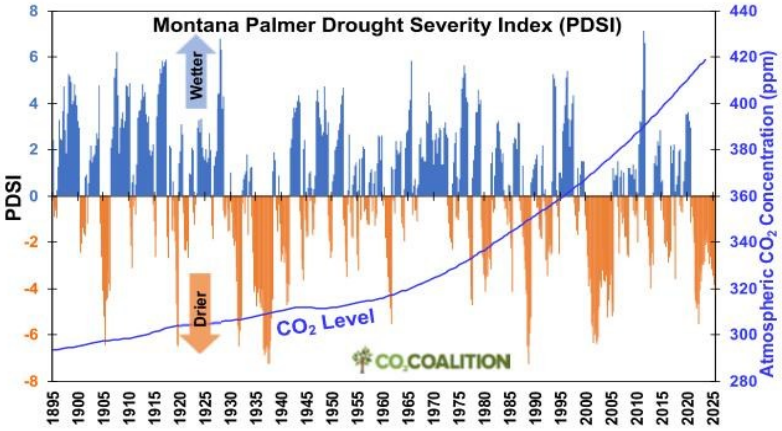


Figure 20: *Palmer Drought Severity Index (PDSI) of Montana vs. atmospheric CO_2 concentration. PDSI: NOAA NCEI (2025b), CO_2: Keeling et al. (2025)*

The Palmer Drought Index for Montana since 1895 shows high year-to-year variability but no significant change over the entire period. But a trend line over just the last 25 years might be interpreted as showing an increase in drier weather.

Montana yields per acre on major crops are much, much higher than they were a century ago, and crop yields show a correlation with rising atmospheric CO2 levels. CO2 is both plant food and plant fertilizer.

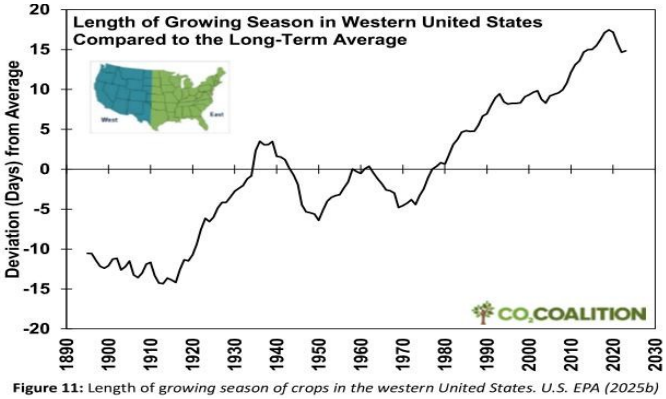


Figure 11: Length of *growing season of crops in the western United States. U.S. EPA (2025b)*

The growing season in the US West has lengthened by roughly 25 days as a result of rising temperatures. The IPCC has found that the growing season has lengthened up to two days per decade since the 1950s in the Northern Hemisphere extratropics. (AR6 p.6)

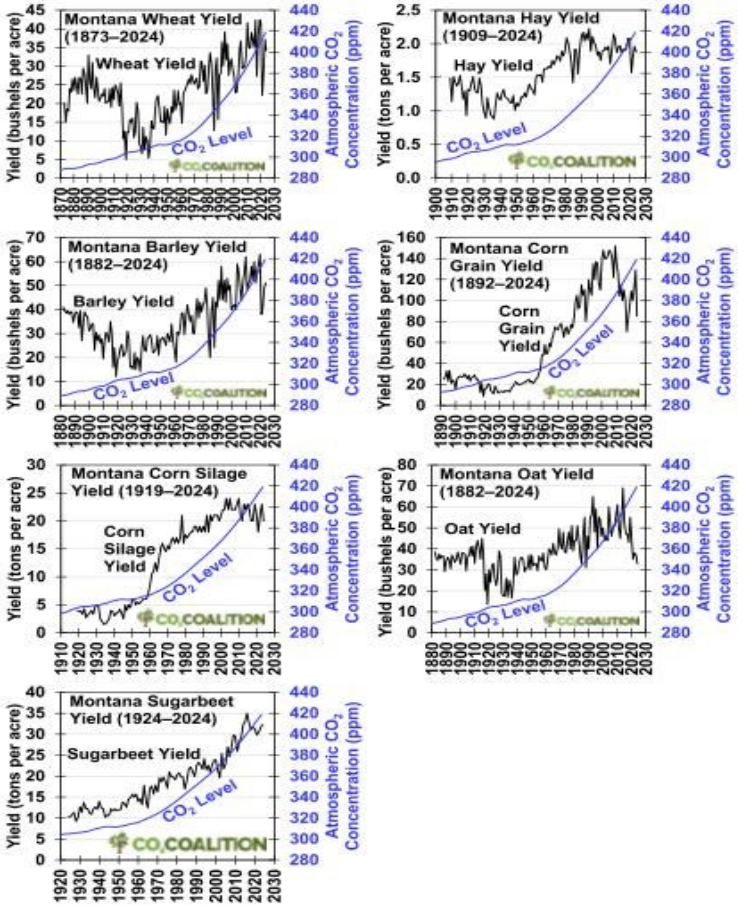


Figure 36: *Agricultural yields of the top crops in Montana vs. atmospheric CO_2 concentration. Crop yield: USDA-NASS (2025b), CO_2: Keeling et al. (2025)*

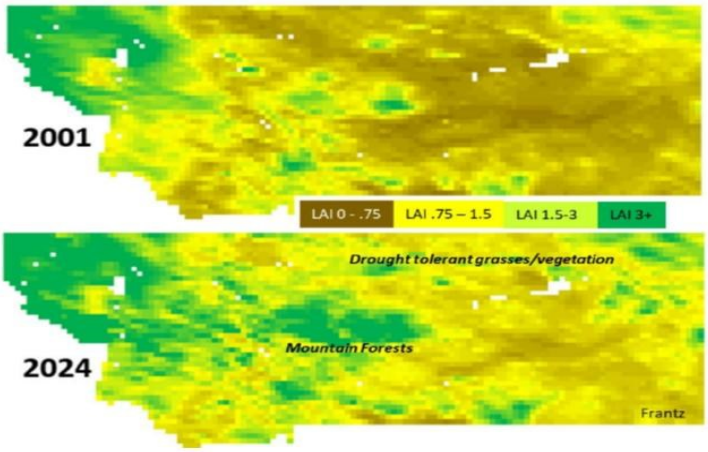


Figure 33: *Leaf area index in Montana on February 25, 2001, vs. March 4, 2024. Image source: Climate Intel (2024), data source: NASA Earth Observations (2026)*

From 2001 to 2024 Montana grew significantly greener, as has the world in general. (See CliSciPol Science Topic: Greening World)

This NOAA dataset shows that over 135 years from 1890 to 2025 the number of days in Montana with temperature over 90 F increased from about 11 days per year (3%) to 20 days (5.5%), an increase of 0.7 days per decard

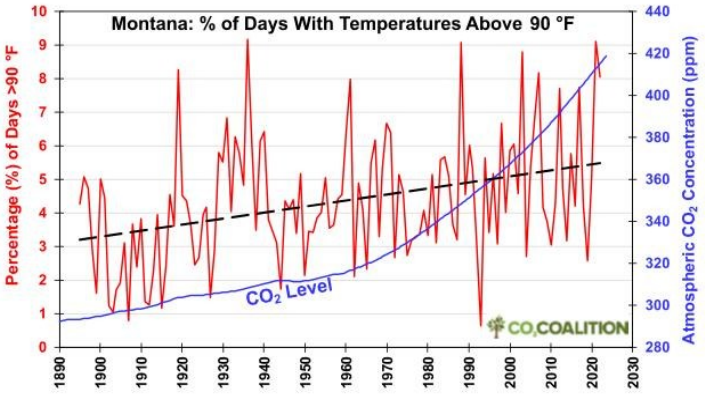
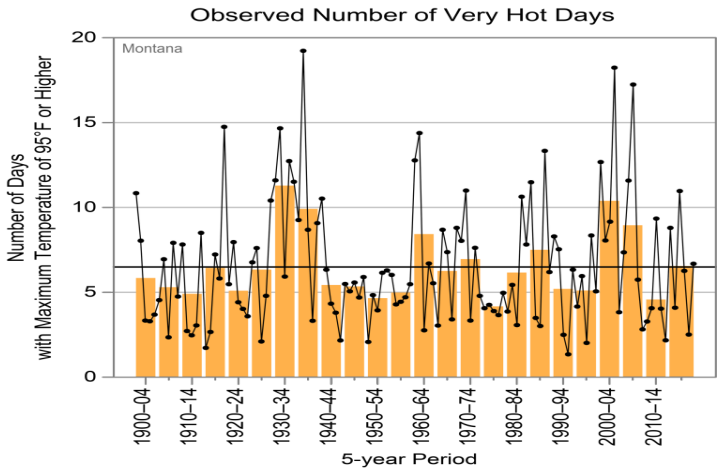
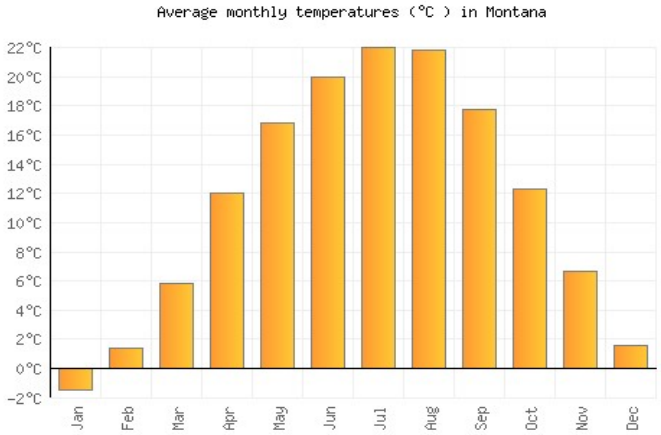


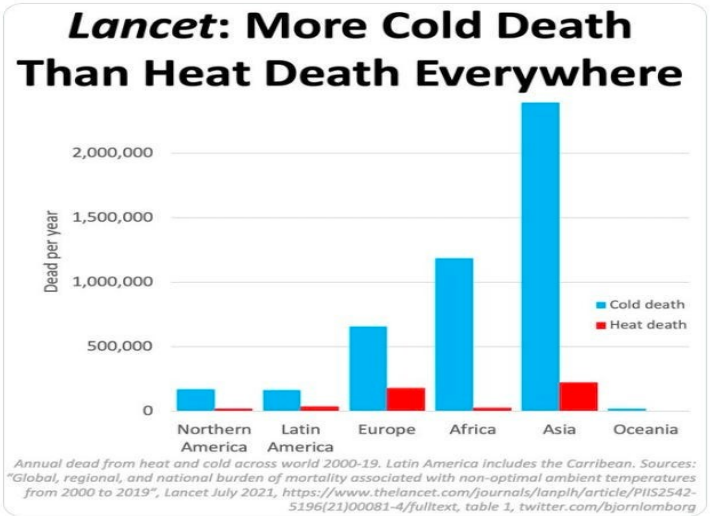
Figure 17: *Percentage of days with temperatures above 90 °F in Montana vs. atmospheric CO_2 concentration. Temperature: NOAA NCEI (2025c, 2025e) via Heller (2023), CO_2: Keeling et al. (2025)*



But a study has concluded that in Montana the number of days per year over 95 F did not change from 1900 to 2020. It also concluded the hottest 5-year period was 1930-1934.

Currently January, the coldest month in Montana, averages 28 F (-2 C), and July, the warmest month, averages 72 F (22 C). The swing from the coldest month to the warmest month is 44 degrees. Global warming is not evenly distributed over the 12 months of the year. A disproportionate amount appears in the winter. Winter warming is much appreciated in Montana. If the July average temperature increases over the next century from 72 F to 74 F, this would not cause a crisis.





Numerous studies show that cold kills many more people than heat. In particular, freezing temperatures are the deadliest. As temperatures rise, deaths from cold decrease much more than deaths from heat increase. Thus there is a net decrease in deaths. Wherever air conditioning is available, it counters the effects of extreme heat.

The Montana flood count shows very high variability since 1996 but no upward trend.

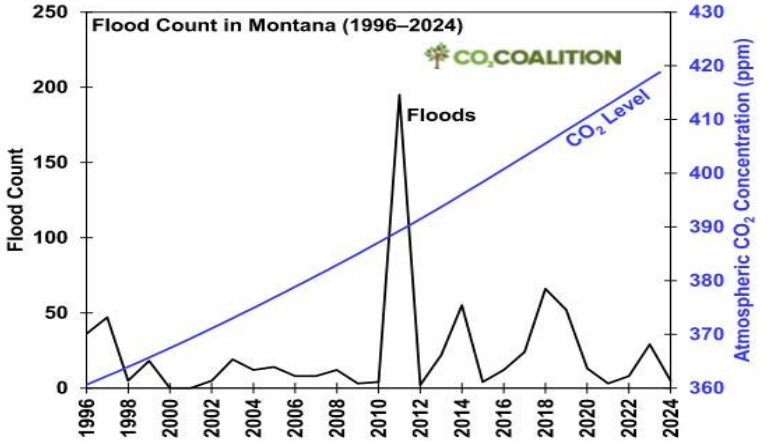


Figure 25: *Annual frequency of floods in Montana vs. atmospheric CO_2 concentration. Floods: NOAA NCEI (2025d), CO_2: Keeling et al. (2025)*

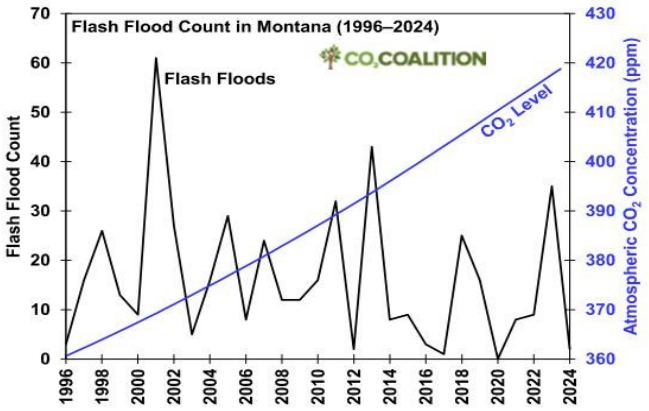


Figure 26: *Annual frequency of flash floods in Montana vs. atmospheric CO_2 concentration. Flash floods: NOAA NCEI (2025d), CO_2: Keeling et al. (2025)*

The Montana flash flood count shows very high variability since 1996 with a descending trend.

The Montana tornado count had unusual highs from 1988 to 2000 but has trended down significantly since the extraordinarily high year of 1992.

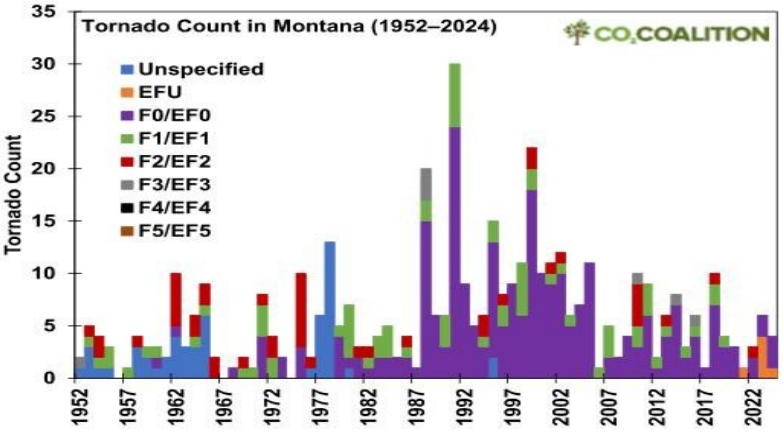
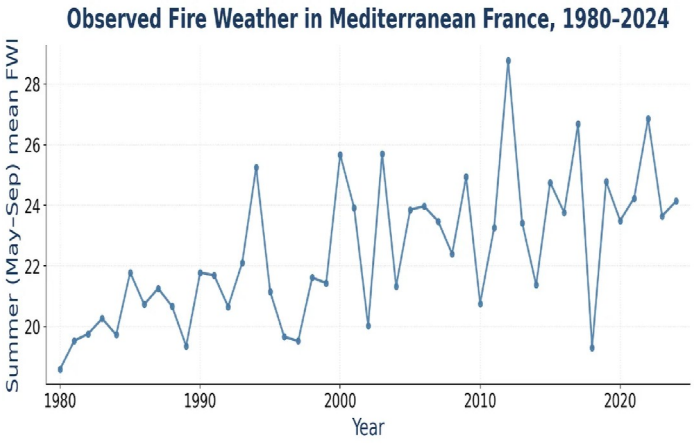


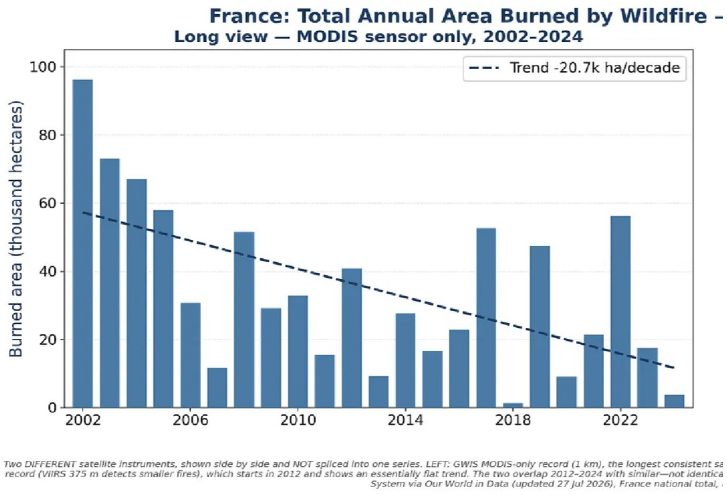
Figure 27: *Annual frequency of tornadoes in Montana. NOAA NCEI (2025d)*

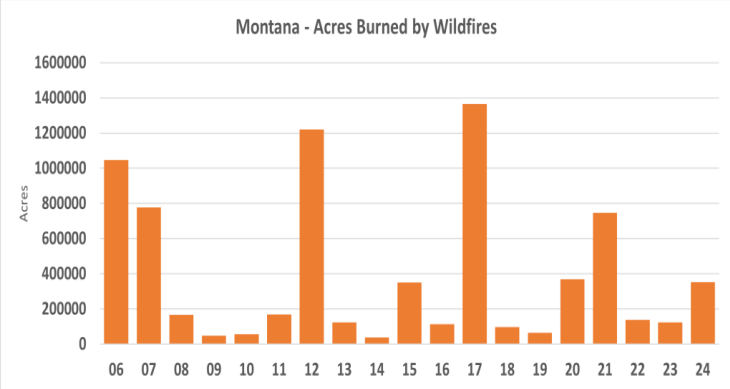


Observed May–September mean Fire Weather Index, Mediterranean region, from the Copernicus CEMS fire-danger reanalysis (ERA5-based), 1980–2024. Observed data only. Source: Copernicus Climate Data Store, European Climate Data Explorer (sis-ecde-climate-indicators).

The IPCC has defined "fire weather" as "weather conditions conducive to triggering and sustaining wildfires, including rising temperatures coupled with increasing drought." (AR6 p.2229). But the IPCC also noted that "fire weather" does not include the presence or absence of fuel, which a number of scientists believe is a key factor in determining wildfire area burned. France has seen a significant increase in fire weather since 1980.

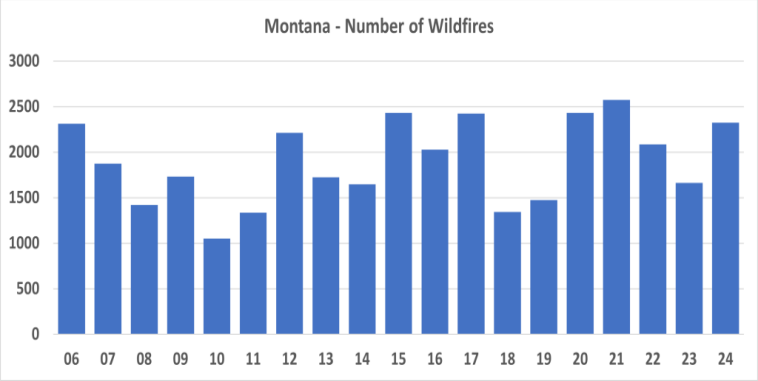
But France has had a significant decrease in wildfire area burned since 2002.





The Montana wildfire area burned per year has trended down since 2006 with high year-to-year variability.

The number of Montana wildfires per year has shown no particular trend since 2006.



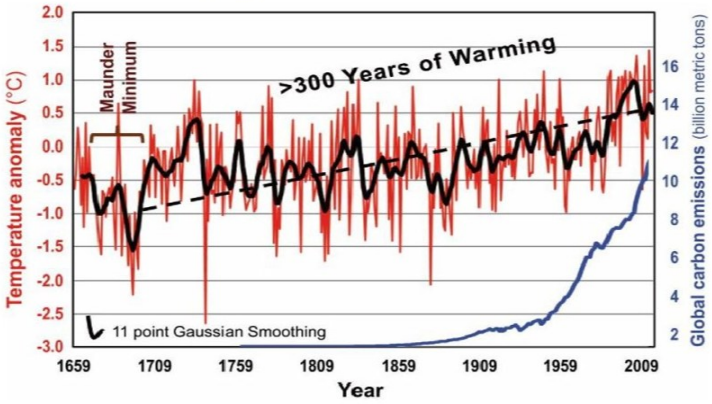
CONCLUSION

So where's the crisis? Climate change over the last century would appear to have been net beneficial for Montana. The significant positive changes have been the increase in crop yields, the lengthening of the growing season, and a general greening, offset by an increase of less than one 90 degree day per year per decade.

If the world temperature rise continues at roughly the present mild rate of 2 F (1 C) per century, Montana and other large areas in the world will arguably benefit. This is particularly true for areas, such as Montana where the average temperature (44 F) is lower than the world average temperature (59 F). The average temperature of Massachusetts is 47 F, and retirees flock to Florida where the average temperature is 72 F.

It is likely that any region of the world, where the average temperature is less that the global average of 59 F, will derive a net benefit from global warming at the present rate.

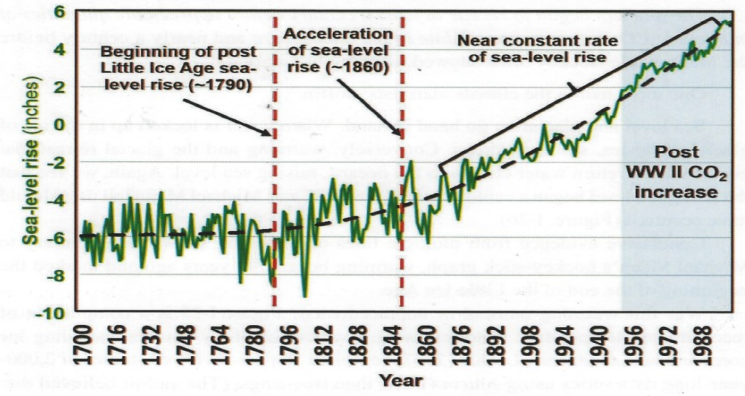
Figure I-24: Greater than 300 years of warming in central England from 1695 – 2017



(Source data: Temperature: Parker 1992; CO_2: Boden 2016)

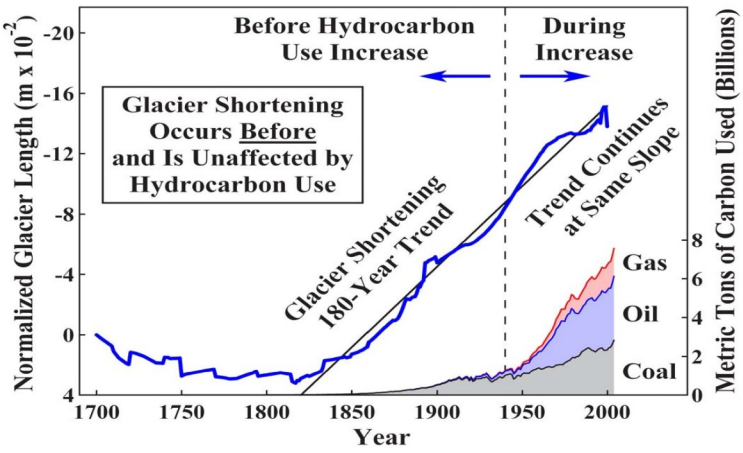
The longest existing temperature dataset is for Central England and goes back to 1659. It shows temperature rise starting around 1700 and continuing at a roughly linear rate since then. The rise started long before CO2 emissions could possibly have been its cause, and the rate shows no acceleration since the 1950s when CO2 emissions started to rise dramatically

Figure I-26: Greater than 200 years of sea-level rise



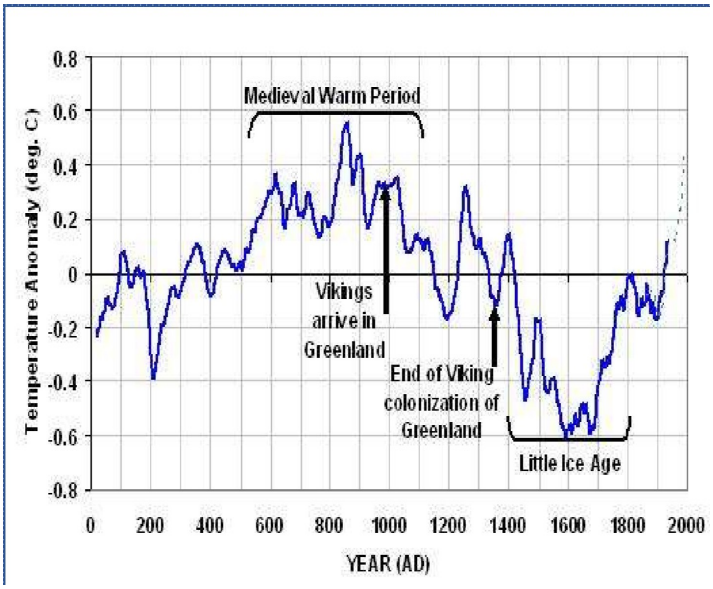
(Source data: Jevrejeva 2008, PSMSL 2008)

Sea level rise is caused by global warming. The modern rise started about 1790. long before CO2 emissions could possibly have been its cause The rate increased around 1860 and has been very linear since then. No effect of CO2 emissions is shown.



Glacier retreat is caused by global warming. It started around 1820, long before CO2 emissions could possibly have been its cause. Again no effect from increasing CO2 emissions appears.

The evidence is growing (although much disputed and seldom mentioned in the media) that the present global warming is substantially the result, not of increasing CO2 emissions, but of a natural, cyclical recovery from the unusual cold that prevailed during the period from roughly 1400 to 1800, known as the Little Ice Age. If this is true, then it is reasonable to expect that the present mild, linear warming of about 2 F (1 C) per century will continue, regardless of the level of CO2 emissions, and the effect will arguably be net beneficial for significant areas of the world. There is no global climate change crisis.



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).