CliSciPol

Climate Science and Policy for Nonscientists

One Picture is Worth a Thousand Words.



TORNADOES

Tornadoes are terrifying natural events. They have been occurring recently in the US Mid-West and have been receiving much media coverage. In an average year there will be about 1,200 tornadoes, and 71 Americans will be killed. Most tornadoes are less than 250 feet across and travel only a few miles along the ground before dissipating. The IPCC has concluded that the mean annual number of US tornadoes remains "relatively constant." [AR6 WGI p.1595 (2021)]

Large tornadoes, such as the Easter Tornado of 1965, and particularly clusters of tornadoes, can kill hundreds and cause massive damage.





Like hurricanes, tornadoes are ranked on a scale of 1-5 (the "EF" scale) with 5 being the most extreme. Tornadoes ranked EF3-5 are considered "major." The frequency of major tornadoes is trending downwards both for the period 1950-2022 and the period 2000-2022. US annual normalized tornado damage has been trending slightly downward with some years being particularly bad. For a more comprehensive treatment of tornadoes see CliSciPol Science Topic: Tornadoes.





FLOODS

In the past year Europe has had some major floods that the media has claimed are evidence of climate change. Climate change is a statistically significant change in some climate variable (e.g. number of floods) over a significant period of time (usually considered to be at least 30 years). Scientists often have difficulty determining whether climate change has occurred, because they lack enough historical data. A recent study of extreme floods in Northwestern Europe over the last 8,000 years has concluded that the frequency of extreme floods has declined significantly.

EARTHQUAKES

On March 28, 2025, a massive earthquake (7.8 magnitude) struck Myanmar and Thailand. When a count is finally completed, the number of people killed will probably be comparable to the 60,000 killed by the similar magnitude earthquake that hit Turkey and Syria in 2023. Over the last 25 years earthquakes have caused more deaths worldwide than any other type of disaster event. Over the last 25 years the frequency of massive earthquakes has been declining. Earthquakes are not caused by human activity.

8,000 years of extreme flood data from NW-Europe



IPCC FINDINGS ON WORLDWIDE FLOODS (AR6 2021)

There is low confidence in how the frequency of flooding will change regionally as it is strongly dependent on catchment characteristics, antecedent conditions, and how atmospheric circulation system respond to climate change. (AR 6 p.1073.

Water regulation and management have, in general, increased resilience to flooding, masking effects of an increase in extreme precipitation on flood probability... There is not always a one-to-one correspondence between an extreme precipitation event and a flood event, because floods are affected by many factors in addition to heavy precipitation. (AR6 p.1567)

Peak flow trends are characterized by high regional variability and lack overall statistical significance of a decrease or an increase over the globe as a whole. ... As to floods there is low confidence about peak flow trends over the past decades on the global scale, but there are regions experiencing increases... and regions experiencing decreases. (AR6 p.1568)

There is low confidence in the human influence on the changes in high river flows on the global scale. (AR6 p.1569)

The IPCC's findings on worldwide floods in the most recent assessment report (AR6 2021) are inconclusive as to any change. (See image). As to river floods in North America, there is limited evidence and low agreement on any observed climate change. (AR6 p.1830).

Contiguous U.S. Palmer Drought Severity Index (PDSI)

US DROUGHT

In recent years the media has often complained about drought in the US (and fewer floods?), particularly in the West and in California. The US government has been measuring the Drought Severity Index since 1895. The data covering 130 years through January 2025 shows above average drought over the last five years, but no downward trend over any statistically significant time period.



PARIS AGREEMENT

195 countries have signed the Paris Agreement of 2015, but only 15 have met the latest deadline for submitting emission plans. Failures to submit include the European Union, China, India, and Russia. A scientific basis for the three goals set out in the Paris Agreement (1.5 C, 2.0 C, and Net Zero) is lacking. For a discussion of this lack of a scientific basis see the CliSciPol Science Post: Tipping Points and the Paris Agreement.



HEATHROW POWER FAILURE

On March 21, 2025, a fire at the North Hyde Electricity Substation caused Heathrow, London's airport, to lose its electricity and to shut down. The airport's backup generation system failed. Its diesel backup generators had been replace by a "net zero backup system," using biomass. This was the first time that the new backup system was called upon, and it failed to work. The British government has ordered an investigation.





NUCLEAR POWER

Presently worldwide there are 59 nuclear reactors under construction in 17 countries, but none in the US with Vogle 2 having been recently completed. The Chinese and Russians are providing the technology and the expertise to build most all of them. The US is falling behind in nuclear power-plant technology.





In July 2024 a blade broke off one of the turbines in the Vineyard Wind project off Nantucket. Dangerous debris washed up on Nantucket, forcing beaches to close, and causing the Vineyard Wind project to be temporarily shut down by regulatory order. Nantucket has now become a hotbed of anti-offshore wind activism, and the town has filed suit to block the proposed South Coast wind project, which plans to built 147 massive turbines South of Nantucket.

OFFSHORE WIND

The Alpha Ventus offshore wind farm in the North Sea off Germany is going to be dismantled after only 15 years of operation. It has become too unprofitable to operate even with massive subsidies.





But cause must precede effect, and a number of studies, such as the one shown (temperature changes appear in blue and CO2 changes in green), have found the reverse, namely that temperature change precedes CO2 change. This is inconsistent with the CO2 Control Knob Theory.



TEMPERATURE ANOMALIES v ACTUAL TEMPERATURES

While world temperatures rose dramatically in 2023 and early 2024, they have cooled since then. Most temperature graphs do not present actual temperatures but rather temperature "anomalies," i.e. changes in temperature rather than actual temperature. The distance between two adjacent horizontal lines on this graph represents an anomaly, or change, of only 0.2 C.

The CO2 Control Knob Theory

Atmospheric CO2 levels have been rising steadily and significantly since 1958. The CO2 Control Knob Theory asserts that these rising CO2 levels have caused all, or virtually all, of the world's rising temperatures



Roughly 30% of incoming solar radiation does not reach the earth's surface, because it is reflected back into space by clouds. A key assumption of the CO2 Control Knob Theory has been that cloud cover remains constant. But there is recent data showing that cloud cover is decreasing over significant areas of the earth. This allows more incoming solar radiation to reach the earth, which, in turn, causes warming. So a significant part of modern global warming may have been caused by decreasing cloud cover, not by rising CO2 levels.





From 1880 to the present (approximately 145 years) the average world temperature has risen a little over 1 C or 2 F (the "anomaly"). The actual, measured average temperature has risen from about 57 F to 59 F. If the actual temperature rise from 57 F in 1880 to 59 F in 2025 is graphed, the total rise is 3.5% and can hardly be noticed.



The most accurate dataset of US continental temperatures maintained by the US government (the Climate Reference Network or "CRN") shows no temperature anomaly (no temperature change) from 2005 (when the network started collecting data) through February 2025.



In Boston the night time temperature of the coldest month (January) averages about 20 F and the daytime temperature of the hottest month (July) averages about 82 F. If over 145 years this graph moves up by 2 F, people will be perhaps a little happier in January and perhaps a little unhappier in July, but overall such a small change over such a long period of time will hardly be noticed by most people during most of the year.

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).