

# Climate Extremes and Surprises



Dr. Alan K. Betts

Climate extremes and surprises have both been part of life this summer in the Northeast and elsewhere. Smoky hazy air was blown down again from wide-spread fires in Canada.

In big cities like New York, visibility fell to new low values and the smoke pollution was dangerous to those with respiratory problems, and more generally for the young and old. But why the Canadian fires are so severe this year is not fully clear although, although it is clearly a feature of the rapidly warming climate system. In addition Canada refuses to bring its fossil fuel exports under control.

Some places in Vermont got substantial rain in June, followed by many days of sunshine. Then massive floods occurred across the state on July 10 and repairs are still ongoing. With around seven to eight inches of rain in 24 hours across most of the state, almost all the rivers rose above flood stage and flooded many towns and washed away many roads. Montpelier (see photo) and Barre in the north had the worst floods. It was a reminder of the floods from tropical storm Irene in 2011, but this time there was no tropical storm, just day-long bands of heavy rain over the whole state and some surrounding regions. For days, Vermont was effectively closed in order to evacuate people from flooded regions.

On the larger scale, the ocean circulation in the Pacific and Atlantic is shifting to the warmer state known as 'El Nino' after three years of the cooler 'La Nina'. The global temperatures set new records on July 4, 5

and 6. As the oceans warmed rapidly, the evaporation of water and flooding accelerates, so the climate crisis is fast deepening.

We should not be surprised since the US is largely responsible for the catastrophic climate change now under way. Back in 1978, the Exxon senior scientist James Black identified and modeled correctly the impact of doubling CO2 on global climate. He warned management that a climate disaster lay ahead if they did not change their business plan. His report was suppressed. Exxon and its collaborators (that I called the Fossil Empire in reference<sup>1</sup>) bribed 139 Republicans in the US Congress for a mere \$61 million to publically lie and deny climate change. Webs of lies and 'greenwashing' for decades have created an acquiescent public. These are deliberate criminal actions by companies like Exxon-Mobil to make billions destroying life of Earth both now and for our grandchildren; as well as killing so many across the globe in extreme heat waves. We should bill them for the flooding damage this summer, and in future years. Climate change will simply accelerate until society forces the Fossil Empire to take responsibility for its deception. So far there has been absolutely



A Vermont road is washed away due to the extreme flooding experienced this summer. (Greg Whitchurch)

no willingness to do this in the US and other oil companies have noticed. Shell is considering moving its headquarters from the United Kingdom to the United States. Britain has implemented a windfall-profits tax on energy companies, which suggests to Shell that the U.S. is more "supportive of oil and gas companies".

Massive climate change is underway and everything is interconnected. Increased evaporation from warming oceans is the major driver of our summer floods, but our region is mountainous so the distribution of rain is not uniform. Our historic building strategies along the flood plains of rivers need to be reviewed, because extremes are likely to get worse.

The climate system is fully interconnected on a global scale. The Polar Regions

are warming faster than lower latitudes as ice melts and this weakens the N-S temperature gradients and the jet stream circulations. Forests and vegetation are also fully coupled to the climate system in complex ways and our understanding increases every year. This is an area where many indigenous people understand the forest-climate coupling better than our models.

Globally there have been many extremes of both heat waves and floods this summer. In late June 2023, weather extremes gave record-breaking heat waves in China, where Beijing surpassed 40 degrees Celsius (104 degrees Fahrenheit) for the first time. Around China, cities used bomb shelters as cooling centers during a 10-day streak of days above 35°C (95°F). In July 2023, temperatures in Texas surpassed those of Northern Africa, as they reached 43.3°C (110°F). This past week, European temperatures along the Mediterranean in Spain, Italy and Greece all approached 45°C (113°F). A deeper analysis of the summer temperature extremes over land and ocean will emerge this fall.

We have moved into the climate crisis stage that we knew was coming for 45 years and the situation will only get worse. It is bizarre that societies like the US have tolerated the destruction of life on Earth to protect the profits of the fossil fuel companies for so long. When will we face the truth, rather than continue to accept the webs of lies?

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