

Humanity's tipping point? How the Queen's death stole a climate warning's thunder

May 5 2023, by Darren Ray



Credit: AI-generated image ([disclaimer](#))

Think back to September last year. What happened early that month?
What news shook the world and reverberated for weeks, if not months?

That's a question I've been asking friends and colleagues lately.

On September 8, 2022, at 6.30pm in Britain, [Buckingham Palace announced](#) the death of Queen Elizabeth II. The news broke [just 30 minutes before](#) the press embargo lifted on a major [review of climate change tipping points](#) in the journal *Science*.

The paper in *Science* was truly earth-shattering, as it heralded changes that could threaten the future of civil society on this planet. But it was the other news that captured the world's attention.

So, in case you missed it, I'd like to alert you to this important paper by British [climate](#) researcher David Armstrong McKay and colleagues.

Grappling with tipping points

The question of when [global warming](#) might push elements of the climate system past points of no return has come into focus over last the decade or so. And tipping points [once thought to be far off](#) in the distance have come into sharp relief.

The research examines major features of the global climate system, such as ice sheets, glaciers, rainforests and coral reefs. It asks when melting of ice sheets on Greenland and West Antarctica would become irreversible, ultimately contributing many meters to sea level. Or when thawing of frozen ground in the Arctic might start producing so much methane and [carbon dioxide](#) (CO₂) that it blows the global emissions budget.

Amazonian forest die-back is another major part of the Earth's climate system. Global heating and regional reductions in rainfall could cause trees to die, releasing large amounts of greenhouse gases. Fewer trees [ultimately means less rainfall](#) for those that remain, creating a vicious cycle.

The pivotal paper in *Science* reviewed more than 220 papers published

since 2008 to estimate what level of global temperature rise (relative to pre-industrial levels) would trigger each of the global and regional climate tipping points.

The world has already warmed 1.1°C (see the horizontal line "current warming" in the chart above). The 1.5°C and 2°C lines represent the Paris Agreement on [climate change](#) targets agreed to internationally in 2016.

Once initiated, irreversible melting of the Greenland Ice Sheet would add about 5m to global sea level. Disturbingly, the threshold for this tipping point may have already been crossed. If not, it is "very likely" to be crossed at 2°C.

Ice sheets in West Antarctica contain about another 3.5m of sea level rise, and again, irreversible melting is likely to begin at around 2°C.

So, that's about 5m from Greenland and another 3.5m from West Antarctica. Add [thermal expansion](#) from warming oceans, and mountain glacier melt, and we have more than 10m of sea level rise to contend with.

While that will unfold over many centuries, it will be irreversible and inexorable. It means children born today will likely see sea levels rise by well over 1m early in the 22nd century. Longer-term, these changes will shape the planet for the next 150,000 years or so, until the next ice age.

Consider how 10m of sea level rise might change the map at [ClimateCentral](#).

Much of the world's tropical coral reefs will likely die at 1.5°C to 2°C of warming. And thawing of Arctic permafrost would start releasing vast amounts of greenhouse gases, equal to about 10% of human emissions.

That would likely push global temperature up by another 0.5°C to 1.0°C (on top of 2°C).

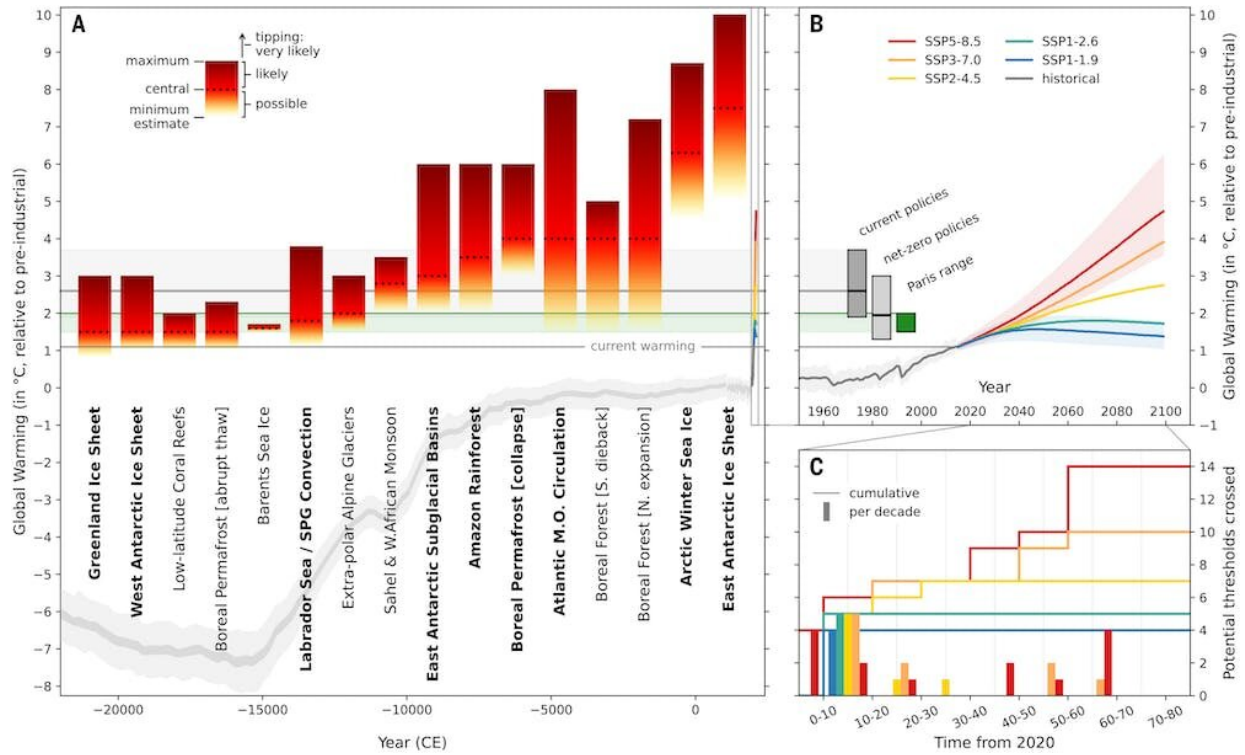
Thankfully, logging and wildfire aside, the Amazon forest looks relatively safe until about 3°C of warming. But the combination of some of those other tipping points might get us there, setting off a further cascade of tipping points.

Can we avoid disaster?

After decades of delay, our chances of keeping global warming below 1.5°C are pretty slim. But, clearly, this research shows that limiting warming to 2°C will not keep us safe.

The focus on "[net zero by 2050](#)" has in fact done us a disservice. If we let emissions remain anywhere near current levels for much longer, by 2030 we will have used up the carbon emissions budget that would allow us to stay near 1.5°C .

We need to act quickly and at least halve current emissions by 2030 on the way to net zero before 2050. This research shows that failing to do so will trigger 10m or more of sea level rise. That will gradually displace hundreds of millions of people and many of the world's major cities.



Global warming threshold estimates for climate tipping elements, ranging from the minimum in yellow where tipping is possible, through to maximum in dark red where tipping is very likely, central dotted line is the best estimate. Compare to the Paris Agreement range of 1.5°C to

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