Is the World Moving Closer to a New Climate Epoch

By Don Sutherland

Imagine taking a trip into the not-so-distant future. The year is 2050. It is now 20 years since the rate of global warming suddenly accelerated. Rather than being on course for 2.6°C-3.1°C warming by 2100, the world is now finds itself on track for something closer to 3.5°C-4.0°C. The pledge of Net Zero emissions is a fading memory, a testimony to a world that could not summon the political courage to break free from its destructive addiction to fossil fuels.

Today, a growing number of species are endangered or going extinct. Large regional crop failures have burst onto the scene creating explosive and widespread famines. Seemingly unending near-oceanwide marine heatwaves and overfishing have brought an end to humanity's ability to harvest the seas for food. The politics of the status quo had pushed the world into a warmer, more dangerous climate regime.

Scientists looking back through data for the three most recent decades confirmed that the world had, indeed, passed an invisible threshold and left the Holocene behind sometime during 2025-2035. Evidence for an acceleration in the warming was unequivocal.

By extending the life of the fossil fuel era, humanity had knowingly steered the Planet into the warmer climate regime in which it now found itself. Scientists concluded that the growing atmospheric concentration of greenhouse gases had driven warming to a level sufficient to trigger cloud-related feedbacks that amplified the rate of warming. It was those feedbacks—not the reductions in aerosol pollution, some little understood mechanism of internal variability, or some mystery factor yet to be discovered of earlier hopes—that put the world on a steeper warming trajectory.

Back to 2024. Fossil fuel emissions are again projected to increase over the 2023 figure. 2024 will become the world's warmest year on record, topping the mark set just one year earlier. Even as the 2023-2024 El Niña has yielded to neutral-cool ENSO conditions, the world's warmth is stubbornly persisting. COP 29 was another spectacular failure. It made no mention of fossil fuels whatsoever in its declarations. It provided no binding and enforceable targets for winding down the burning of fossil fuels.

Scientists, once astonished by the sudden and sharp increase in global temperatures in 2023 and the persistent warmth of 2024, are moving closer to explaining these related phenomena. They are now beginning to point to clouds.

Back in 2019, Jiang Zhu, Christopher J. Poulsen, and Jessica Tierney identified the potential of cloud-related changes to enhance the rate of warming. Their findings provided a profound breakthrough: equilibrium climate sensitivity (ECS) from a doubling of CO2 was not static, but dynamic. At higher levels of CO2, ECS would actually increase.

The three scientists wrote:

During the PETM event, global surface temperature rose by 5° to 9°C in response to an estimated atmospheric CO2 increase of ~70 to 100%, suggesting an equilibrium climate sensitivity (ECS) of ~6°C. Simulating the extreme warmth of the Early Eocene and the large temperature increase in the PETM has been a challenge for climate models given their modest climate sensitivity (2.1° to 4.7°C). The inability of climate models to match the warm conditions inferred from proxy evidence has been attributed to missing model components and physical processes, climate forcings, or misinterpretations and uncertainties in proxy reconstructions.

They then revealed their finding:

With warming from our 1× to 6× simulations, low- and medium-level cloud cover decreases, especially at mid- and high latitudes (except over the Arctic...)... At lower latitudes, in-cloud liquid water content decreases with warming, which is another contributor to the decrease in cloud opacity. This thinning of clouds with warming is broadly consistent with a recent large eddy simulation of the subtropics. The combined reduction in cloud cover and cloud opacity increases surface shortwave radiation and surface warming.

That finding explained the Eocene's warming. But did it apply to ongoing climate change? Until recently, it wasn't fully certain.

However, on December 5, 2024, Helge F. Goessling, Thomas Rackow, and Thomas Jung, revealed:

Since March 2023, however, global sea-surface temperatures have broken records, well ahead of substantial contributions from the more moderate 2023/24 El Niño. With the annual global-mean surface temperature (GMST) close to 1.5K above the pre-industrial level, in particular the North Atlantic made headlines with the average surface temperatures exceeding previous records by clear margins... An unexplained warming of about 0.2K thus remains. Based on CERES-EBAF (hereafter CERES) data..., the recent warming has been linked to an unusually large total top-of-atmosphere (TOA) energy imbalance [EEI]...

They continued:

[W]*e find that the unusually large recent imbalance was mainly driven by a record-low planetary albedo in 2023, continuing a multi-annual trend related to decreasing shortwave reflection by clouds... The cloud-related albedo reduction is apparently largely due to a pronounced decline of low-level clouds over the northern mid-latitude and tropical oceans, in particular the Atlantic.*

They concluded:

In summary, if the cloud-related albedo decline was caused not solely by internal variability, the 2023 extra heat may be here to stay and Earth's climate sensitivity may be closer to the upper range of current estimates. We may thus be closer to the temperature targets defined in the Paris agreement than previously thought, with potentially strong implications for remaining carbon budgets.

Their paper confirmed the existence of the kind of cloud feedbacks described by Zhu et al. In doing so, it affirmed a pathway toward higher climate sensitivity.

The hypothetical journey beyond the Holocene at the beginning of this piece has not yet occurred. But the new data demonstrates that it is no longer a matter of theoretical debate.