

Climate scientists predict devastating weather conditions for the Southern Hemisphere summer

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In the lead-up to the 2023/24 summer period in the Southern Hemisphere, climate scientists are issuing dire warnings of the consequences for the earth of the growing climate crisis.

This comes in the wake of the Northern Hemisphere summer that produced a searing heatwave across the Eurasian landmass and North America, accompanied by devastating wildfires.

Climate scientist at the University of Melbourne Andrew King told *Nature* there is “a high chance of seeing record-high temperatures, at least on a global average, and seeing some particularly extreme events in some parts of the world.”

One of the starkest indicators was the announcement on December 7 by Copernicus Climate Change Service (C3S) that 2023 was the hottest year in recorded history, including two days 2°C above the preindustrial period. Scientists predict that 2024 may be even hotter.

“As long as greenhouse gas concentrations keep rising, we can’t expect different outcomes from those seen this year. The temperature will keep rising and so will the impacts of heatwaves and droughts. Reaching net zero as soon as possible is an effective way to manage our climate risks,” C3S Director Carlo Buontempo commented.

The conditions of runaway global warming are being enhanced by the strong El Niño event in the Pacific Ocean, and a positive Indian Ocean Dipole. These are natural weather patterns that govern the earth’s weather systems but in combination with global warming are having potentially dire consequences.

The Australian Bureau of Meteorology (BOM) announced the current El Niño event in September. This is usually associated with heatwaves. This followed a La Niña weather system for the past three years, that generally produces wet and cool conditions. This served to mask the effects of global warming to some extent.

The full effect of the changing climate is “emerging properly” King told *Nature*.

El Niño and La Niña are part of the El Niño-Southern Oscillation (ENSO) weather pattern that strongly influences the world’s climate. They are based on temperature differentials in the central and eastern Pacific Ocean.

In August, the BOM reported that a positive Indian Ocean Dipole (IOD) had developed. This is associated with hot and dry weather for the Australian continent. The IOD is the difference in sea surface temperature between the western pole in the Arabian

Sea and an eastern pole in the Indian Ocean south of Indonesia.

In 2019-20 the two climate systems in combination produced a very severe Australian bushfire season with a devastating impact on rural communities and the environment.

In east Africa the combination of the two weather systems is expected to cause extreme rainfall and flooding. Above average rainfall is predicted over southern Africa during spring followed by warm and dry conditions in the summer.

In South America El Niño is expected to produce excessive rain and flooding especially in Peru and Ecuador but also very dry conditions and drought for the Amazon and the northeast.

A feature of the Northern Hemisphere that accompanied the unprecedented summer heatwave were heat domes. These are due to the disproportionately large land mass where areas of circulating warm, dry air block the movement of low-pressure systems that would bring cooler conditions. This is not expected to appear in the Southern Hemisphere due to a much higher ocean-to-land ratio (80 percent of the Southern Hemisphere is water, compared to 60 percent of the Northern Hemisphere).

Nevertheless, numerous indicators around the world all point to conditions that are developing for a possibly unprecedented summer heatwave in the Southern Hemisphere.

One of the most important factors is the heating of the oceans that is leading to a very severe retreat of Antarctic ice. The world’s oceans cover over 70 percent of the globe and have acted as a heat sink for most of the world’s warming, because water has a very high heat capacity. According to the National Aeronautics and Space Administration (NASA) 90 percent of the world’s warming has been absorbed by the top few meters of the ocean’s water.

In April the National Oceanic and Atmospheric Administration (NOAA) reported that ocean temperatures were at an unprecedented high. The data gathered from satellites and ocean buoys showed that the average temperature at the ocean’s surface was 21.1° C since the start of April; the previous record was 21° C set in 2016. Even a small difference, spread over the vast expanse of all the oceans of the world, comes to a major increase in global warming.

“The current trajectory looks like it’s headed off the charts, smashing previous records,” climate scientist at the University of New South Wales Professor Matthew England told *The Guardian*.

The rising ocean temperatures are causing sea level rise due to thermal expansion, coral bleaching, accelerated melting of Earth's major ice sheets, intensified hurricanes, and changes in ocean health and biochemistry.

A comment by Distinguished Scholar Kevin Trenberth at The National Center for Atmospheric Research in Auckland, published in January 2022 in *The Conversation* "Ocean heat is at record levels, with major consequences," stated that "all oceans are warming, with the largest amounts of warming in the Atlantic Ocean and in the Southern Ocean surrounding Antarctica. That's a concern for Antarctica's ice—heat in the Southern Ocean can creep under Antarctica's ice shelves, thinning them and resulting in calving off of huge icebergs. Warming oceans are also a concern for sea level rise."

Scientists are particularly alarmed by the unprecedented warming at the poles. Sea ice was at a record low around Antarctica during the winter, leading scientists to predict feed-back loops.

"Large areas of the Southern Ocean that would usually still be covered by sea ice in October aren't," Arian Purich, a climate scientist at Monash University in Australia, told *Nature*.

This leaves less sea-ice to reflect heat back into space, leaving dark ocean that absorbs the heat. "Then this makes the surface warmer and it's going to melt back more sea ice so we can have this positive feedback," Purich continued.

Global warming is more extreme at the poles than the rest of the planet, a process known as polar amplification. Antarctica is warming at triple the rate of the rest of the planet.

A study by physical geographer Kyle Clem at the School of Geography at Victoria University in Wellington and his team was published in June 2020 in *Nature Climate Change* "Record warming at the South Pole during the past three decades." They found, "The most recent 30-yr period of 1989–2018 experienced the largest 30-yr annual-mean warming trend on record of 0.61 ± 0.34 °C decade⁻¹ (95% confidence interval, CI), over three times the global average rate."

The West Antarctic sea ice is of particular concern, because if this collapses, worldwide sea levels could rise by several meters. The ice sheet is vast and contains 2.2 million square kms of ice. It has warmed by more than 0.1 °C per decade over the last fifty years.

Important research headed by ocean modeler Kaitlin Naughten and her group from the British Antarctic Survey in Cambridge, published in October 2023 in *Nature Climate Change*, and titled, "Unavoidable future increase in West Antarctic ice-shelf melting over the twenty-first century," simulated a number of likely scenarios to predict the melting of the including that global warming is stabilized at targets set out by the Paris Agreement, 1.5°C and 2°C.

All these simulations show that the melting of the West Antarctic sea ice may have reached the point of no return. This is a very alarming result as the complete melting of the ice sheet would produce a 5m rise in sea levels. Internationally this would inundate low-lying islands and low-lying areas near the coast, devastating innumerable communities.

Naughten *et al* state, "Our simulations present a sobering

outlook for the Amundsen Sea [a section of the West Antarctic Sea]. Substantial ocean warming and ice-shelf melting is projected in all future climate scenarios, including those considered to be unrealistically ambitious. A baseline of rapid twenty-first-century ocean warming and consequent sea-level rise appears to be committed. This warming is primarily driven by an acceleration of the Amundsen Undercurrent transporting warmer CDW (Circumpolar Deep Water) onto the continental shelf. Basal melting increases across all ice shelves in the Amundsen Sea, including in regions providing critical buttressing to the grounded ice sheet."

The CDW is combination of ocean currents at a depth of about 500 m combining currents from the Atlantic, Pacific and Indian oceans.

"It looks like we've lost control of melting of the West Antarctic Ice Sheet. If we wanted to preserve it in its historical state, we would have needed action on climate change decades ago," Naughten told *Science*.

Atmospheric scientist David Karoly at the University of Melbourne, who is a member of the Intergovernmental Panel on Climate Change, predicted worsening conditions for the next year.

"We know that the impact on temperatures associated with El Niño happens the year after the event," Karoly told *Nature*.

The results of important research by climate scientists highlight that we are on the edge of a precipice and that the world's climate is heading into uncharted territory with dire consequences for the future of humanity. Governments internationally, due to their total subordination to big business including the fossil fuel industry, have done nothing to curb the production of greenhouse gases.

The president of the recent climate summit, COP 28, minister of industry and advanced technology of the United Arab Emirates and head of the Abu Dhabi National Oil Company Sultan Al Jaber, spoke for all the gathered dignitaries when he claimed, "There is no science out there, or no scenario out there, that says that the phase-out of fossil fuel is what's going to achieve 1.5C" (the proposed limitation for the rise in global warming).

This underscores that the only way out of this impasse is that the working class, in alliance with principled scientists, has to fight for the socialist reorganization of society through which the energy needs of society can be met without destroying the planetary environment.



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