

CO₂ levels in Earth's atmosphere jumped by a record amount in 2024

The global average concentration of CO₂ surged by 3.5 parts per million to reach 423.9 ppm last year, fuelling worries that the planet's ability to soak up excess carbon is weakening

By [Madeleine Cuff](#) on October 15, 2025



Wildfires, such as this one in Greece, released vast amounts of carbon dioxide in 2024. Xinhua / Alamy Stock Photo

Atmospheric carbon dioxide levels jumped by a record amount in 2024 to push concentrations to their highest point since measurements began, the UN's World Meteorological Organization (WMO) has reported.

Between 2023 and 2024, the global average concentration of CO₂ surged by 3.5 parts per million (ppm) to reach 423.9 ppm, the WMO has said. This is the largest increase since modern measurements started in 1957 and is well in excess of the 2022 to 2023 increase of 2.3 ppm.

It marks the latest in a trend of accelerating annual increases, with growth rates tripling since the 1960s. The last time Earth experienced a comparable concentration of CO₂ was 3 million to 5 million years ago.

Excess CO₂ in the atmosphere will have a warming effect on the planet for centuries to come, the WMO warns. "The heat trapped by CO₂ and other greenhouse gases is turbocharging our climate and leading to more extreme weather," [Ko Barrett](#) at the WMO said in a statement.

Ongoing emissions from fossil fuels, [alongside a surge in emissions from wildfires](#) and a [slump in the carbon uptake by the world's lands and oceans](#), were the key drivers of last year's record surge, according to the WMO.

Researchers expected a slump in the uptake of carbon by oceans, forests and other ecosystems in 2024 due to the [recent El Niño weather pattern](#), which pushed up global temperatures and dulled carbon absorption by driving heat, fires and drought in key regions like the Amazon. [The amount of tropical forest lost in 2024 was double that of 2023](#), scientists noted earlier this year. "It is normal for some tropical lands to be drier and store less carbon during warm El Niño years such as 2024," says [Richard Allan](#) at the University of Reading, UK.

But there is concern that this dip in carbon uptake by the planet – particularly by [the land](#) – is part of a longer-term trend that could mean climate change is weakening the planet's ability to soak up excess carbon.

"There has been some suggestions that the land sink was particularly low in 2023 and 2024, even for El Niño years, and that there has been a worrying reduction over time, [particularly in the northern hemisphere outside the tropics](#)," says [Zeke Hausfather](#), a climate scientist at the Breakthrough Institute. "In short, there are worrying signs that the land sink in particular is declining, but it's too early to know with confidence without another few years of data."

In the meantime, it is more urgent than ever for humanity to curb ongoing fossil fuel emissions, says [Piers Forster](#) at the University of Leeds, UK. "The biggest reason for the ongoing increase [in CO₂ concentrations] is fossil fuel emissions being at a persistent all-time high and not yet coming down."