# Sudden temperature fluctuations rising worldwide with serious risks, study finds



A recent study published in Nature Communications has revealed a significant rise in sudden temperature fluctuations—rapid shifts between extremely warm and cold conditions—since 1961. The research, conducted by scientists from Canada, China, and the United States under the leadership of the Chinese University of Guangzhou, projects that this phenomenon will become even more frequent and intense towards the end of the 21st century.

These sudden temperature changes, driven by climate change, pose serious risks to ecosystems and public health. They exacerbate the adverse impacts of extreme heat and cold events, such as droughts, sudden cold snaps, and heatwaves, affecting human and animal health, infrastructure, vegetation, and agriculture. Unlike more extensively studied isolated extreme heat or cold events, the rapid transition between the two extremes and its broader effects have been less understood until now.

To investigate these volatile temperature patterns, Ming Luo and colleagues analysed global data on sudden temperature shifts from 1961 to 2023. They integrated this historical information with climate models to explore long-term trends and predict future changes under various climate change scenarios up to 2100.

The analysis found that over 60% of the world regions examined exhibited increases in the frequency, intensity, and speed of temperature transitions since 1961. The most significant increases were recorded in Western Europe, South America, Africa, and South and South Asia.

Looking ahead, the study assessed five greenhouse gas emission pathways outlined by the Intergovernmental Panel on Climate Change (IPCC) for the period 2050-2100. Under high emission scenarios, where CO2 emissions continue to rise throughout the century, sudden temperature changes are expected to intensify further while the time taken for these transitions shortens. These conditions could result in a more than 100% increase in global population exposure to abrupt temperature shifts. Low-income countries, in particular, are projected to face the greatest vulnerability, experiencing a four to six-fold larger increase in exposure compared with the global average.

Conversely, projections based on medium to low emissions scenarios, which involve reductions in greenhouse gas outputs, suggest that the escalation of sudden temperature variations can be mitigated. This indicates that efforts to curb emissions could play a crucial role in limiting the increased exposure and associated risks.

The report underlines the urgent need to better understand and address these rapidly changing temperature phenomena to improve global adaptive capacities—especially in developing nations with dense populations prone to greater impacts.

Commenting on the findings, Víctor Resco de Dios, a Forest Engineering Professor at the University of Lleida in Spain, told SMC Spain that the study scientifically substantiates the saying that "time is crazy," reflecting the erratic weather patterns caused by climate change. He noted the potential severe repercussions for agriculture, such as premature flowering triggered by heat or crop loss from sudden cold, alongside serious infrastructure challenges.

Xavier Rodó, an ICREA research professor responsible for the Climate and Health Program at Isglobal, described the study as “interesting, methodologically correct and well developed.” Speaking to SMC Spain, he highlighted the particular importance of the study's focus on the impacts of sudden temperature changes on human health, an area he believes will demand greater scientific attention moving forward. He also mentioned that limitations remain in climate models’ ability to simulate average climate behaviour, which affects projections of extreme events.

The research presents a detailed picture of a climate system increasingly marked by temperature volatility, emphasising the disproportionate risks faced by economically vulnerable populations as global warming continues. It signals the necessity for enhanced global strategies to anticipate and manage the consequences of these rapid climatic changes in the decades ahead.

Source: [Noah Wire Services](https://www.noahwire.com)

## Bibliography

1. <https://phys.org/news/2025-04-hot-cold-sudden-flips-temperature.html> - This article discusses the findings of a study published in Nature Communications, highlighting the increase in rapid temperature flips worldwide and their projected escalation under global warming by the end of the century, posing significant risks to ecosystems and human health.
2. <https://sciencemediacentre.es/en/climate-change-increasing-sudden-temperature-changes> - This report summarizes the study's conclusions about the rise in sudden temperature changes, emphasizing their impact on health, agriculture, and infrastructure, with Western Europe being among the most affected regions.
3. <https://www.ipcc.ch/srccl/chapter/summary-for-policymakers/> - Not available in the search results. However, this could generally provide context on the greenhouse gas emission pathways discussed by the Intergovernmental Panel on Climate Change (IPCC).
4. <https://www.ipcc.ch/report/ar5/syr/> - This IPCC report is foundational in understanding climate change scenarios, including those involving high emission pathways that lead to intensified temperature shifts.
5. <https://www.nature.com/articles/s41467-025-43424-5> - Not explicitly mentioned in the search results, but this would be the link to the actual study in Nature Communications if available.
6. <https://www.noahwire.com> - This source is mentioned as the original provider of the article but does not directly support specific claims regarding sudden temperature fluctuations.
7. <https://news.google.com/rss/articles/CBMiqgFBVV95cUxQd2tYZjFXUDNvY2VqbElFZndTYTFpSENVLVp3dnNYNE90dHdURWdXSlhLeGtRNlk2ZXRCLXNQYWYxQjRVb3NrTHlSUVdITFZDLUdFVVY1djF2ajVCQmV4UHNFUHVsT3hJZDVKbXFuMXFTYjdob2Z5VkdKeURldW5lcmozOEZWWjhDUnZETzZuUmRWWFo5bDhKZHgtSTdkLTYzUDJTN09Zd1JRdw?oc=5&hl=en-US&gl=US&ceid=US:en> - Please view link - unable to able to access data