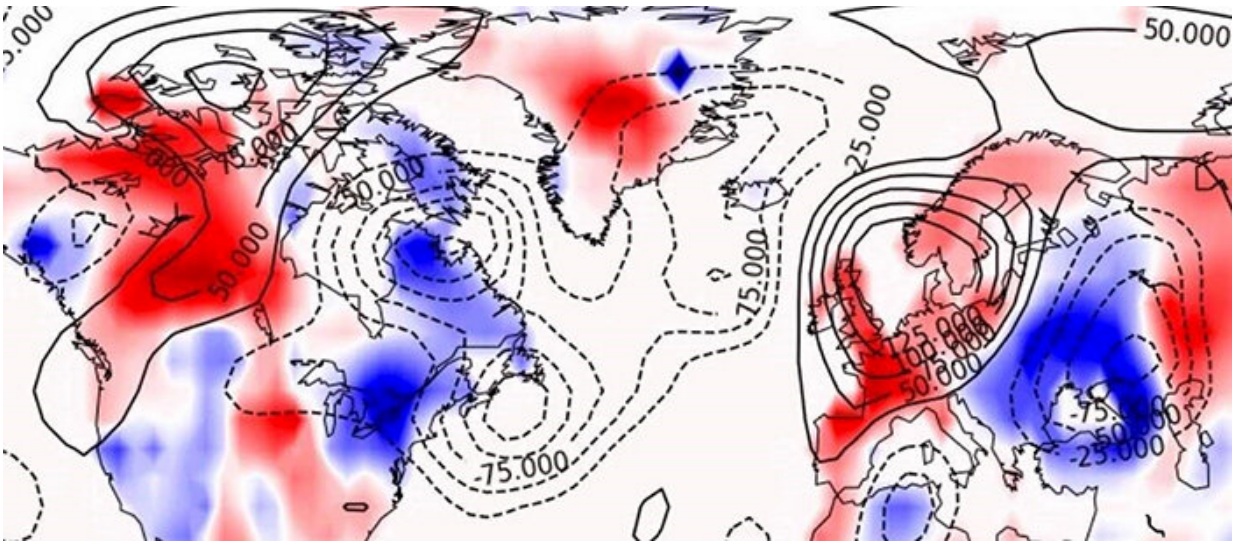


Improved prediction of heatwaves thanks to AI

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Map used for machine learning. It shows the anomalies in temperature (red is hotter than blue) and atmospheric pressure (lines) for a typical atmospheric situation. Credit: Freddy Bouchet

Extreme heatwaves are rare, but they have major consequences on living beings and their environments. Anticipating their arrival is a central challenge.

In an article published in *Physical Review Fluids* on April 4, an interdisciplinary team of French scientists from the CNRS, the CEA, and the Claude Bernard University Lyon unveiled artificial intelligence

that can predict heatwaves. Based on [deep learning](#), it uses statistical models that include numerous parameters, and also draws on a wide range of data.

This probabilistic approach differs from traditional forecasts based on the laws of physics, which are for instance used for [weather forecasts](#). The AI uses [environmental conditions](#) such as [soil moisture](#) and the state of the atmosphere to ascribe a probability for an extreme heatwave up to a month before its arrival. The research team trained the technology on 8,000 years of weather data, which was simulated thanks to the PlaSim climate model from the University of Hamburg.

The AI has the advantage of providing a [statistical model](#) that can make predictions in a matter of seconds, and can also be used to predict phenomena difficult to predict using traditional climate forecasts and climate models because they are rare. However, the study emphasized that in order for the AI to be reliable, it must have a large dataset on which to draw. Yet since these events are rare, little information is available.

To compensate for this weakness, the scientists plan to combine the AI with algorithms for rare event simulation, which they [designed five years ago](#) to improve forecasts.

More information: George Miloshevich et al, Probabilistic forecasts of extreme heatwaves using convolutional neural networks in a regime of lack of data, *Physical Review Fluids* (2023). [DOI: 10.1103/PhysRevFluids.8.040501](#)

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