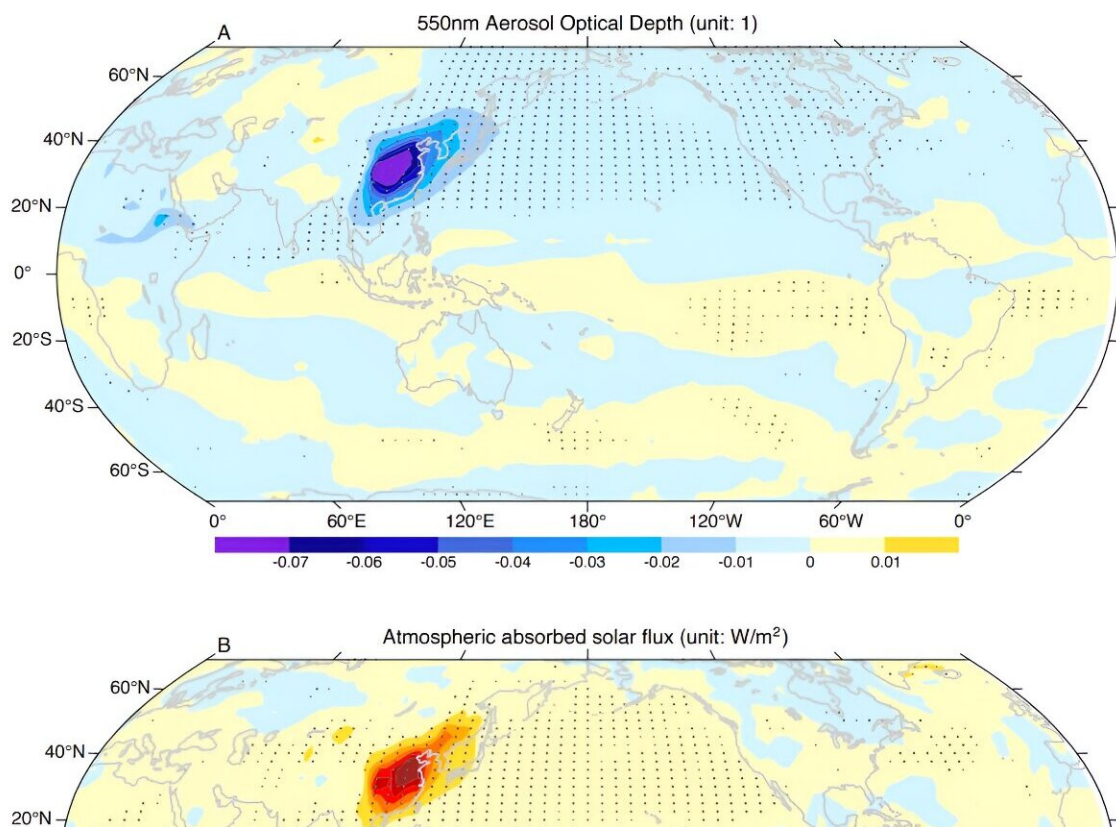


# Computer models show heat waves in north Pacific may be due to China reducing aerosols

May 7 2024, by Bob Yirka



550nm AOD and atmospheric absorbed shortwave radiation in the CESM2 experiments. (A) Ensemble mean response of 550nm AOD (in 1) between the noCN and CTRL simulations. (B) Same as A but for the responses of atmospheric absorbed shortwave radiation (in W m<sup>-2</sup>). Credit: *Proceedings of the National Academy of Sciences* (2024). DOI: 10.1073/pnas.2313797121

A team of oceanographers and planetary scientists at the Ocean University of China, working with a pair of colleagues from the U.S. and one in Germany, has found via computer modeling, that recent heat waves in the north Pacific may be due to a large reduction in aerosols emitted by factories in China.

In their [paper](#) published in the *Proceedings of the National Academy of Sciences*, the group describes how they used several [climate models](#) and various factors that allowed them to find patterns that might be linked to the reduction of aerosols emitted into the atmosphere by China.

Over the past decade, the north Pacific has experienced multiple [heat waves](#), leading to fish die-offs, toxic algae blooms and missing whales. Such heat waves have been generally attributed to global warming, but to date, no research has been able to pinpoint how [global warming](#) could cause such sudden and variable increases in a specific part of the planet.

In this new effort, the research team noted that the onset of the heat waves appeared to follow successful efforts by the Chinese government to reduce [aerosol emissions](#) from their country's factories. Beginning around 2010, factories and power generating plants in China began dramatically reducing emissions of aerosols such as sulfate, resulting in much cleaner air.

Noting that aerosols can act like mirrors floating in the air, reflecting heat from the sun back into space, and also pointing out that earlier research efforts had suggested that massive reductions of aerosols in one place could [lead to warming in other places](#)—they wondered if reductions of aerosols in China might be playing a role in the heat waves that began happening in the north Pacific.

To find out if that might be the case, the team began collecting data and then input it into 12 different computer climate models. They ran them

under two conditions—one where emissions from East Asia remained as they were over the past several decades and one where they dropped in the way they had in reality. They found that the models with no declines did not cause much change elsewhere, whereas those with aerosol drops showed heat waves occurring in the northeast parts of the Pacific Ocean.

The models also showed why—as less heat was reflected back into space over China, warming of coastal regions in Asia began, resulting in the development of high-pressure systems. That in turn made low-pressure systems in the middle Pacific more intense. And that resulted in the Aleutian Low growing bigger and moving south which weakened the westerly winds that typically cool the sea surface. The result was hotter conditions.

**More information:** Hai Wang et al, Atmosphere teleconnections from abatement of China aerosol emissions exacerbate Northeast Pacific warm blob events, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2313797121](https://doi.org/10.1073/pnas.2313797121)

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