



NCAS Science Highlight

The key role of ozone in global warming experiments

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What are the new findings?

Ozone is a naturally occurring gas in our atmosphere which is also affected by human emissions. Ozone can respond to a changing climate and this can alter the overall magnitude of climate change. We show that including this effect produces a 20% reduction in the warming of global surface temperature caused by an increase in atmospheric CO₂.

Why are these findings important?

The full effects of ozone on atmospheric wind patterns and chemistry are ignored in many of the simulations used to make projections of future climate. Our work suggests that these simulations could be missing an important process that can impact on these climate change projections and should therefore be included. Our research has important implications for understanding factors that contribute to global surface temperature change in climate simulations, and is therefore relevant to the Assessment Reports published by the Intergovernmental Panel on Climate Change and to policymakers.

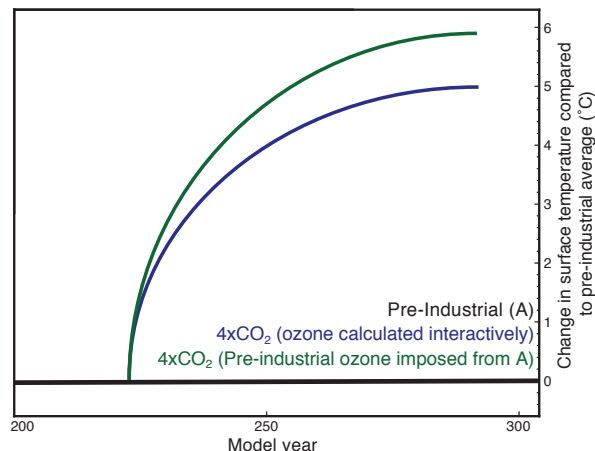
How did we discover this?

We developed a new state-of-the-art chemistry-climate simulation that includes key climate processes and also calculates its own atmospheric ozone as the simulation progresses. The experiment performed is commonly used to understand how the Earth system responds to increases in atmospheric CO₂, but we also included changes to atmospheric ozone that are often neglected.

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Above: Simplified schematic showing simulations of global average surface temperature change. When ozone is calculated realistically (blue curve) after 75 years the global-mean surface warming is about 20% smaller than when pre-industrial ozone stays at pre-industrial levels (green curve).

Find out more:

- See [Luke's webpage](#)
- Email n.luke.abraham@ncas.ac.uk
- Take a look at the [journal article](#)
P.J. Nowack, N.L. Abraham, A.C. Maycock, P. Braesicke, J.M. Gregory, M.M. Joshi, A. Osprey, & J.A. Pyle: A large ozone-circulation feedback and its implications for global warming assessments. *Nature Climate Change*, **5**, 41 (2015). DOI: [10.1038/NCLIMATE2451](https://doi.org/10.1038/NCLIMATE2451)

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