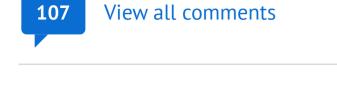
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ENVIRONMENT CLIMATE CHANGE GLOBAL WARMING

Sensitive planet: Scientists narrow the expected heating from CO2 rise



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By Peter Hannam

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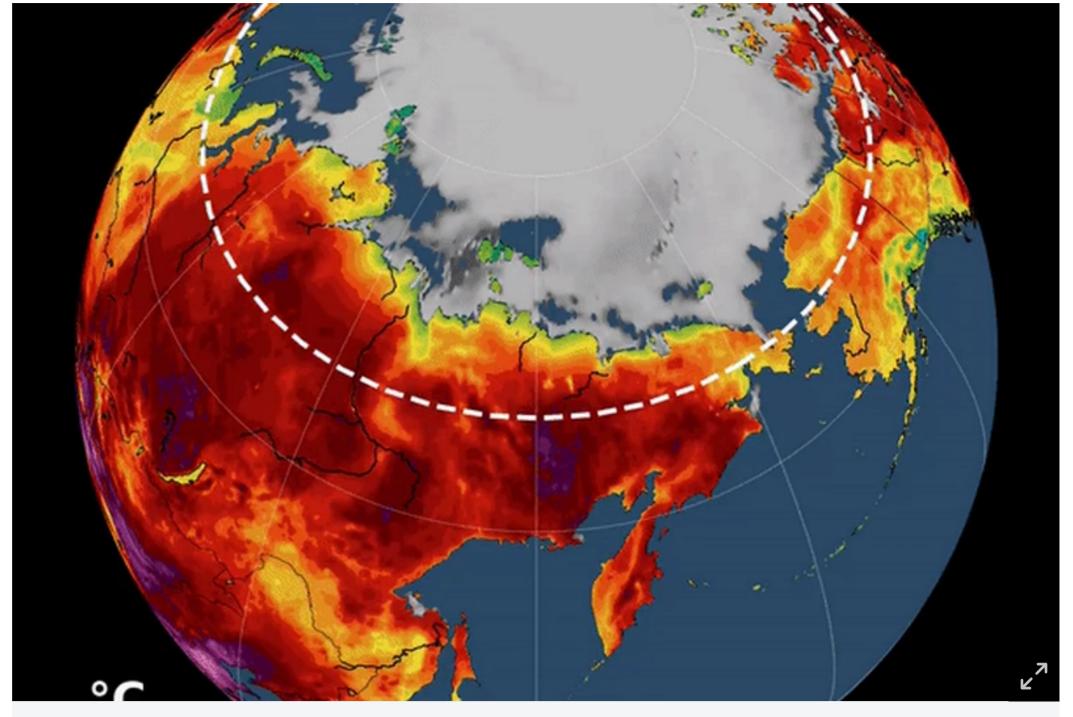
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Researchers have found doubling the atmosphere's carbon-dioxide levels will warm the planet about 3 degrees from pre-industrial times, narrowing the predicted range that had guided policymakers for decades.

The major study, involving 25 scientists from 20 institutions, found the most likely range for the earth's so-called climate sensitivity was 2.6-3.9 degrees for a doubling of CO2. The long-standing estimate, assessed by the US National Research Council in 1979, had placed the range at 1.5-4.5 degrees.



The planet will warm about 3 degrees if the atmospheric levels of carbon dioxide double from pre-industrial times. TWITTER.COM/SCOTTDUNCANWX

"Narrowing the range of climate sensitivity has been a major challenge," said Steven Sherwood, a University of NSW researcher with the ARC Centre of Excellence for Climate Extremes, and lead author of the studyin *Reviews in Geophysics* journal. "We've been able to rule out some of the more extreme sensitivities."

Advances included a better understanding of complex feedback processes, particularly of clouds, and the use of paleo-climate information absent in many previous studies, Professor Sherwood said.



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The results are likely to inform the next round of global climate talks – postponed until 2021 in Glasgow, Scotland – and remind policymakers that the chances of keeping warming to much below 2 degrees from pre-industrial times as agreed in the Paris climate accord are diminishing.

CO2 levels at the end of June were about 416 parts per million in the atmosphere, or more than a third higher than the 280 or so mark in 1750. Annual CO2 growth rates accelerated by 60 per cent in the decade of 2010-19 compared with 1990-99, according to US data collected at Mauna Loa in Hawaii.

Professor Sherwood said the planet had warmed about 1.1 degrees since the late 1800s, and "people should not be complacent" about what a 3-degree hotter world would be like, including the large cumulative effects on life.

"Extreme heat events could be 6 to 8 degrees more," he said. "That makes a big difference."



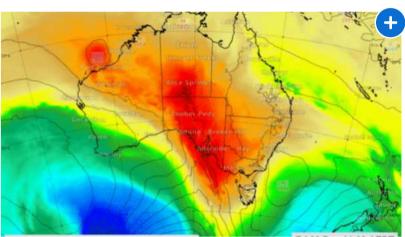
Professor Steven Sherwood, Director, Climate Change Research Centre - University of New South Wales. JAMES BRICKWOOD

While the paper did not estimate when CO2 levels would double, emission levels if sustained should see that mark reached in about 60 to 80 years.

Gavin Schmidt, director of NASA's Goddard Institute for Space Studies and a contributing author of the paper said the research was "the first credible assessment that does a 'proper' integration of the different kinds of constraints [such as the] processes, historical trends and paleoclimate".

"People have often looked at a single one of these constraints in isolation, and there have been a couple of

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attempts to link them together, but not in as good a fashion as here," Dr Schmidt said.

The low-end of the range had been ruled out, which "means it's simply not credible to argue climate sensitivity is small enough that we don't have to deal with emissions – or that we can wait decades to do so".

While the high-end of the range beyond 4.5 degrees for a doubling of CO2 was "not quite so thoroughly ruled out", it was very unlikely, Dr Schmidt said.

The findings may also trigger a review of the next generation of climate models being developed by the World Climate Research Program, the institution that had backed the four-year study into sensitivity.





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Australia's latest ACCESS model, for instance, put the range as high as 4.7 degrees "so it remains on the edge of plausibility", Dr Schmidt said.

Zeke Hausfather, a climate researcher at the University of California, Berkeley, and another of the paper's authors, said current policies likely put the world on track for about 3 degrees warming by the end of the century.

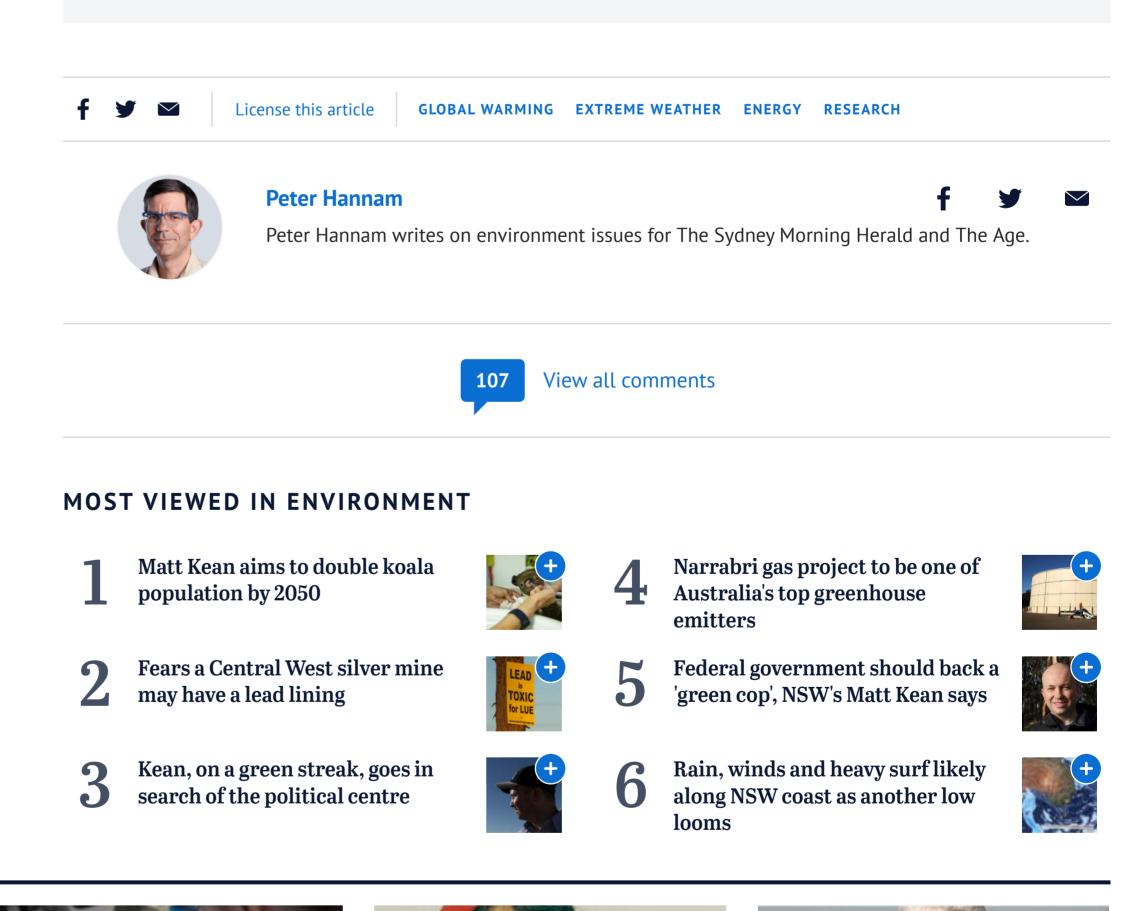
There remains, though, a wide uncertainty between 2 and 4 degrees heating "based on what climate sensitivity we end up with, as well as the magnitude of carbon-cycle feedbacks", Dr Hausfather said.

"This is still far from where we need to be to limit warming below 2 degrees but at the same time some of the 5-degree warming outcomes that seemed possible when China was building a coal plant every three days seem much less likely in a world where solar is cheaper than coal in many countries", he said.

"Climate change was always going to be a roll of the dice given the enormous complexity of the earth's climate and the challenge of predicting precisely how it will change due to human activity." Dr Hausfather said. "What we've done in this new study is find that rolling either a 1 or a 6 is a lot less likely than we previously thought."

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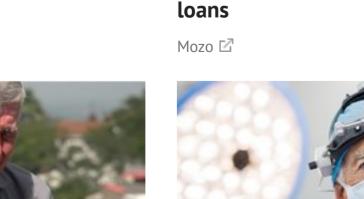


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