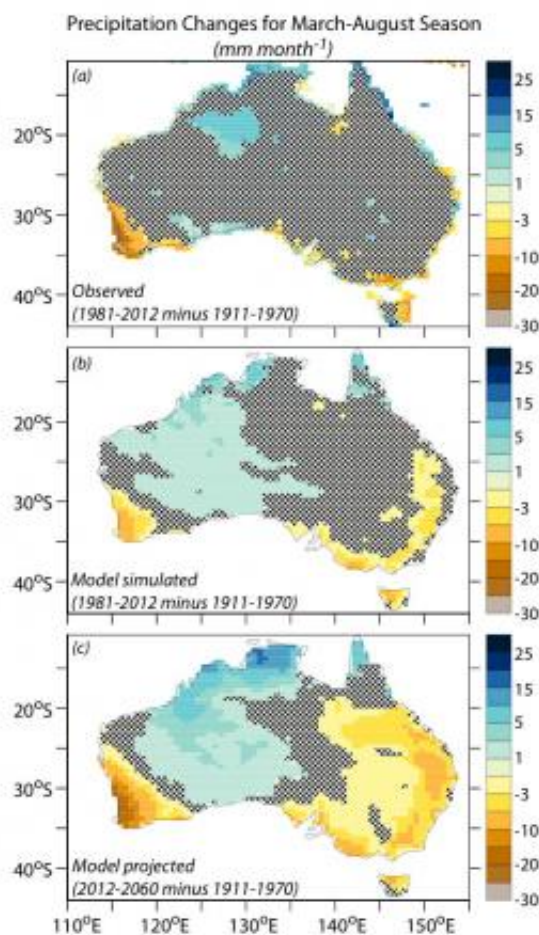


Australia drying caused by greenhouse gases and ozone

July 13 2014



The agreement between observed and model simulated rainfall changes supports the idea that human activity contributed to the drying of southwestern Australia and that the drying will increase in the 21st century. Changes in fall-winter rainfall from observations (top panel) as compared to model simulation of the

past century (middle panel), and a model projection of the middle of the 21st century. Credit: NOAA's Geophysical Fluid Dynamics Laboratory

NOAA scientists have developed a new high-resolution climate model that shows southwestern Australia's long-term decline in fall and winter rainfall is caused by increases in manmade greenhouse gas emissions and ozone depletion, according to research published today in *Nature Geoscience*.

"This new high-resolution climate model is able to simulate regional-scale precipitation with considerably improved accuracy compared to previous generation models," said Tom Delworth, a research scientist at NOAA's Geophysical Fluid Dynamics Laboratory in Princeton, N.J., who helped develop the new model and is co-author of the paper. "This model is a major step forward in our effort to improve the prediction of regional climate change, particularly involving water resources."

NOAA researchers conducted several climate simulations using this [global climate model](#) to study long-term changes in rainfall in various regions across the globe. One of the most striking signals of change emerged over Australia, where a long-term decline in fall and winter rainfall has been observed over parts of southern Australia. Simulating natural and manmade climate drivers, scientists showed that the decline in rainfall is primarily a response to manmade increases in [greenhouse gases](#) as well as a thinning of the [ozone](#) caused by manmade aerosol emissions. Several natural causes were tested with the model, including volcano eruptions and changes in the sun's radiation. But none of these natural climate drivers reproduced the long-term observed drying, indicating this trend is due to human activity.

Southern Australia's decline in rainfall began around 1970 and has

increased over the last four decades. The model projects a continued decline in winter rainfall throughout the rest of the 21st century, with significant implications for regional water resources. The drying is most severe over southwest Australia where the model forecasts a 40 percent decline in average rainfall by the late 21st century.

"Predicting potential future changes in [water resources](#), including drought, are an immense societal challenge," said Delworth. "This new climate model will help us more accurately and quickly provide resource planners with environmental intelligence at the regional level. The study of Australian drought helps to validate this new model, and thus builds confidence in this model for ongoing studies of North American drought."

More information: Regional rainfall decline in Australia attributed to anthropogenic greenhouse gases and ozone levels, *Nature Geoscience*, [dx.doi.org/10.1038/ngeo2201](https://doi.org/10.1038/ngeo2201)

Provided by NOAA Headquarters

Citation: Australia drying caused by greenhouse gases and ozone (2014, July 13) retrieved 1 May 2024 from <https://phys.org/news/2014-07-australia-greenhouse-gases-ozone.html>

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