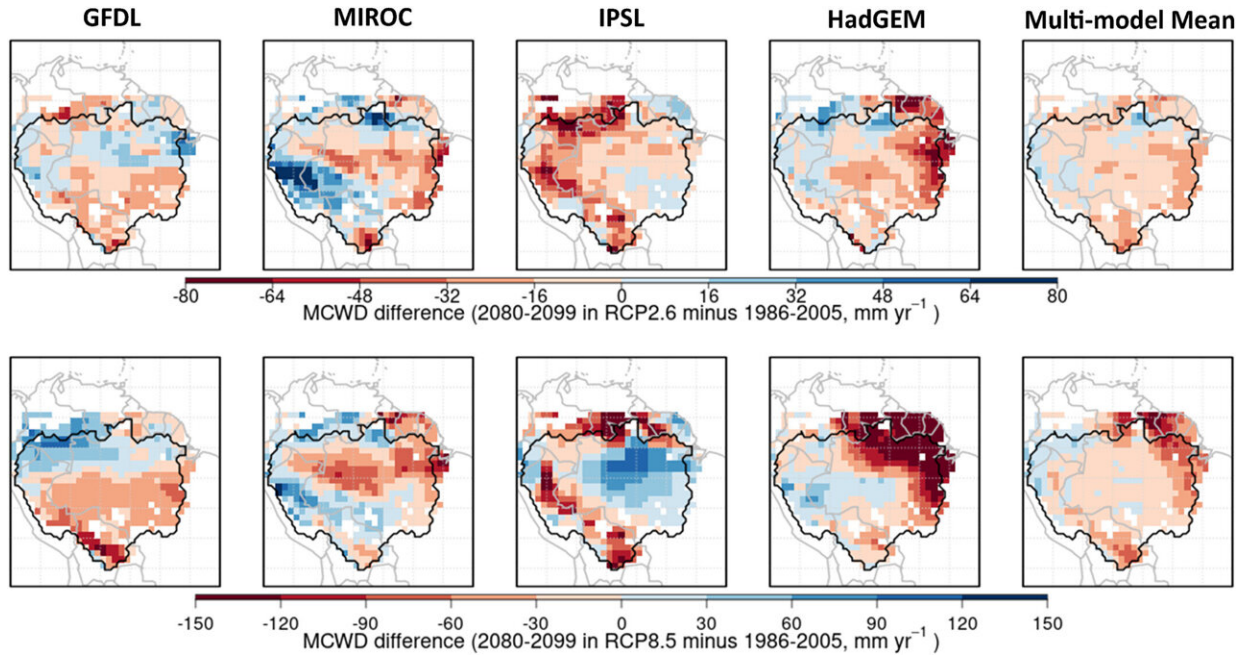
Tree mortality may lead to carbon tipping point in the Amazon by 2050s

August 15 2024, by Rebecca Owen



Evolution of maximum cumulative water deficit (MCWD) changes. Credit: *Earth's Future* (2024). DOI: 10.1029/2023EF003740

The Amazon rainforest is home to a diverse cast of plants and animals. This vital, verdant landscape also plays a crucial role in managing the effects of climate change by storing significant amounts of carbon and helping regulate temperatures and rainfall both regionally and globally.

But as drought conditions, extreme weather, and deforestation in the

Amazon increase, trees, which absorb carbon via photosynthesis when they are living, are dying—and releasing carbon into the atmosphere as they decay. These drought-induced tree deaths may turn the rainforest from a carbon sink to a carbon source.

Using models that predict tree mortality and the subsequent changes in carbon balance, Yitong Yaoand colleagues suggest in a new study published in *Earth's Future*, that certain regions of the Amazon rainforest may pass a tipping point by the middle of the 21st century.

Researchers used ORCHIDEE-CAN-NHA, a state-of-the-art land surface model, to simulate Amazon tree death and regrowth in the face of drought conditions. The model was calibrated and evaluated using historical data from past drought events.

The scientists combined use of this land surface model with four different climate scenarios to project further changes in carbon movement and tree loss between now and 2100. Though the four climate models offered different specific outcomes, such as variations in wetting and drying, they all agreed on a warming trend over the coming decades, especially throughout the northeastern Amazon rainforest.

Knowing which sections of the Amazon rainforest are most at risk for drying out and dying helps inform researchers about the carbon balance in the region—and provides information about how to protect such a vulnerable ecosystem from the effects of a changing climate.

More information: Yitong Yao et al, Future Drought-Induced Tree Mortality Risk in Amazon Rainforest, *Earth's Future* (2024). DOI: 10.1029/2023EF003740

Geophysical Union. Read the original story here.

Provided by American Geophysical Union

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