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Future Drying of the Southern Amazon Projected by IPCC Climate Models

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Many subtropical regions are expected to become drier due to climate change. This will lead to reduced vegetation which may in turn amplify the initial drying. Using a coupled atmosphere-ocean-land model with a dynamic vegetation component that predicts surface albedo change, here we simulate the climate change from 1901 to 2099 with CO_2 and other forcings. In a standard IPCC-style simulation, the model simulated an increase in the world's 'warm desert' area of 2.5 million km2 or 10% at the end of the 21st century. In a more realistic simulation where the vegetation-albedo feedback was allowed to interact, the 'warm desert' area expands by 8.5 million km2 or 34%. This occurs mostly as an expansion of the world's major subtropical deserts such as the Sahara, the Kalahari, the Gobi, and the Great Sandy Desert. It is suggested that vegetation-albedo feedback should be fully included in IPCC future climate projections.