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The fire-vegetation-climate system - how ecology can contribute to earth system science

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Abstract

Since the time of Darwin, Wallace and Schimper, botanists and ecologists have been interested in understanding the global distribution of vegetation. Such questions are becoming more pressing as Earth System modellers attempt to predict the current and future state of global vegetation. A key complexity that is currently not well captured by Earth System models is that vegetation is not always deterministically responsive to climate and soils. Feedbacks within the Earth System, top-down controls such as fire and herbivory, and historical contingencies related to the phylogenetic origins of the biota all contribute towards explaining the current distribution of vegetation. Here I discuss some of these aspects in more detail and, in particular, how this might shape the character and distribution of the global savanna biome. Specifically, I highlight the role that fire plays as both a driver and a response in the fire-vegetation-climate system.