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Modelling of the decrease of tropical-forest resilience in Amazonia as affected by deforestation and fires

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Biome models of the global climate-vegetation relationships indicate that most of the Brazilian Amazon has potential for being covered by tropical forests. From current land-use processes observed in the region, however, several areas of natural forests were lead to different states dominated by degraded and secondary forests or even savannas. This may happen because deforestation and presence of ignition sources frequently cause nearby forests to burn. Fire is a major disturbance in tropical forests, which may substantially increase the mortality of trees and other native species. In a first attempt to generally represent the potential for tropical forest degradation due to fires in Brazilian Amazon, we analyzed large-scale data on fire occurrence and climate factors. Fire-activity information are based on remote-sensing detections with the Tropical Rainfall Measuring Mission - Visible and Infrared Scanner (TRMM-VIRS). Climate information are summarized by a wetness index used as an estimate of dry/wet climate conditions, and a soil-moisture seasonality index. Our results have important implications for evaluating the resilience of tropical forests in the Brazilian Amazonia by presenting general relations between climate and the occurrence of fires/deforestation, which can help to refine the estimates of the allocation of forest-savanna boundaries based on the likelihood for land-use fires in the region.