

The gathering firestorm in southern Amazonia

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ABSTRACT—Forest fires represent a major threat to the ability of Amazonian forests to store carbon. These events can be enhanced by interactions between extreme weather events and changes in land use. Deforestation in the Brazilian Amazon declined by 70% between 2004 and 2014, however, CO₂ emissions and other Greenhouse Gases (GHG, e.g. CO, CH₄, NO_x, and N₂O) associated with forest fires accelerated during this period. Interactions between agricultural activities, illegal fires, and extreme weather events enhanced fire in the Amazon and its associated emissions. We developed and applied a coupled fire ecosystem model to quantify how regional drying and warming committed to the southern Brazilian Amazon would affect forest fires and associated carbon emissions. Our results indicate that climate change projected for the region will double the area burned by forest fires, affecting up to 16% of the region's forests by 2050. Although these fires can emit up to 23.5 Pg of CO₂ equivalent to the atmosphere, canceling further deforestation could reduce the area burned and the net total fire emissions by half and would help prevent fires escaping to protected areas and indigenous lands. Fire regimes in the Amazon are expected to intensify under climate scenarios that represent low and high GHG emissions, emphasizing the need for more comprehensive mitigation measures. Aggressive regional efforts to eliminate ignition sources and smart prevention campaign together with prompt fire combat of forest fires will be fundamental for the conservation of the forests of southern Amazonia.

Keywords: Carbon stock; emissions; greenhouse

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