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Extreme Amazon Tree Cover Loss Induces Non-Local Effects that Threaten Remaining Forests

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Amazon forest loss leads to changes in precipitation and temperature that propagate beyond the deforested regions through non-local effects. However, the responses of remaining forests to such non-local influences are still poorly understood from observations. In this study, we use MODIS satellite data and reanalysis data to analyze the non-local effects of extreme forest loss on precipitation and temperature, and assess the response of remaining forests. We identify areas of extreme tree cover loss by comparing past and present data, and examine changes in precipitation, temperature, and tree cover in remaining forests classified by distance from these loss regions. Our results show that closer to areas of extreme tree cover loss, temperature increased and precipitation decreased. In addition, tree cover growth in remaining forests was less pronounced near loss areas compared to greater distances. These findings indicate that in the Amazon, where ecological resilience is weakening and potential tipping points are increasingly debated, extreme tree cover loss may intensify risks to remaining forests.

Keywords: Amazon, Tree cover loss, Non-local effect, Satellite data