Investigation of impact of Amazon fire on forest productivity using an Earth System Model

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Amazon experiences intensive fires every August to October. On the one hand, fires burn the forest and grass. On the other hand, fires trigger changes in atmospheric composition, which bring broad feedback on unburned forest. The net impact of Amazon fires on Amazon biome is yet unknown. Some changes, such as increasing atmospheric CO2 and SOA, serve as forest fertilizer, while others, such as increasing polluted O3 level, reduce plant photosynthesis. Current studies typically use offline models to trace individual driver. In this study, we will use the NASA GEOS Earth System Model, which couples RRTMG radiation scheme, 2-moment cloud microphysics module, GOCART aerosol module, and land ecosystem module Catchman-CN, to investigate the net carbon change of Amazon biome by fires over seasonal to decadal time scales and disentangle the drivers of the carbon change.