

## Reduction in global area burned and wildfire emissions enhances carbon uptake by land

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The carbon uptake by land and ocean processes currently removes about 55% of the CO<sub>2</sub> emitted into the atmosphere by human activities. The carbon uptake over land is primarily the result of vegetation's response to increasing atmospheric CO<sub>2</sub>, but climate change, nitrogen deposition and other factors also play a role. Here, using results from a terrestrial ecosystem model we identify reduction in global wildfire CO<sub>2</sub> emissions as yet another mechanism that contributes to this carbon uptake over land. Our results show that since the 1950s increasing population densities and cropland area across the globe have acted to decrease area burned, consistent with the sediment charcoal record and the satellite-based observational record for the 1997-2014 period. The associated reduced wildfire emissions from cropland area increases do not enhance carbon uptake since vegetation that is spared wildfire burning was deforested anyway. However, the reduction in wildfire emissions due to population density increases, and the associated direct fire suppression and landscape fragmentation, is calculated to enhance carbon uptake by 0.16 Pg C yr<sup>-1</sup>, or ~23% of the global rate of land carbon uptake (0.7±0.6 Pg C yr<sup>-1</sup>), for the 1960-2009 period.

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