



Impact of population density on fire frequency at the global scale

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Wildfires are a major component of most terrestrial ecosystems, and constitute a major hazard for humans. However, the way people influence fire occurrence remains poorly understood, in particular at the global scale. While local studies have found increasing numbers of fires near settlements and roads, a few regional studies for Africa have found that fire frequency (fractional area burned) generally decreases with increasing population density. Charcoal records have also been cited as evidence for a decline in fire occurrence during the last 100 years, which coincided with rapid population growth. Here, we present a global non-linear parameter optimisation complete with posterior uncertainty estimates based on three global burned area data sets. We find that only for sparsely populated areas, fire frequency increases by between 10 and 20% for an increase in population density from 0 to 0.1 people per km². Including all areas not dominated by agriculture results in a decline of fire frequency with population density independent of the burned area data used, with fires essentially suppressed for more than 100 people per km². After applying the results to historical population data and observed burned area, we infer a decline of global burned area by between 4 and 16% (95% confidence interval) since 1800, with most of the decline happening after 1950.