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# Can fire regimes in savannas be managed to reduce greenhouse gas emissions: evidence from northern Australia?

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Burning of savannas and grasslands consumes more than one third of the total annual biomass burning globally while in Australia, savanna burning comprises 2% to 4% of national greenhouse gas (GHG) emissions. This national significance of this has led to efforts to reduce savanna burning emissions by better managing the extensive fires that burn across northern Australia each year. The approach is to use early dry season fires to create burnt fire breaks and reduce the frequency of late dry season fire and fires overall. Underpinning these mitigation programs is a requirement for robust GHG accounting. While extensive field programs have addressed some of the issues, including fuel loads and combustion properties within some of the potential project areas, other assumptions have not been rigorously analyzed. These include the seasonality in fuel dynamics and fuel moisture and their effect on emission processes. The Intergovernmental Panel on Climate Change (IPCC) argues that as fuel dries progressively through the dry season combustion efficiency increases and consequently methane (CH4) emission factor (EF) can decrease by 50% to 75%. If this was indeed the case, it would invalidate the approach to managing savanna burning for greenhouse gas abatement in northern Australia.
Australian savanna differs substantially from the African savannas from which the IPCC advice was drawn. In Australian savanna woodlands a large fraction of the fuel is comprised of tree leaf litter and associated twigs and branches in contrast to African savannas where grasses assume a more dominant role. In this paper we analyze how variation in fuel composition across the northern Australian savanna plant communities influences combustion and GHG emission properties and conclude that fuel dynamics and composition can explain most of the observed variation in emission properties. The implications of this for greenhouse gas accounting in northern Australia is assessed.