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Fire patterns in north Australian savannas: extending the reach of incentives for savanna fire emissions abatement*

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Summary

Anthropogenic fires in Australia's fire-prone savannas produce up to 3% of the nation's accountable greenhouse gas emissions. Incentives to improve fire management have been created by a nationally accredited savanna burning emissions abatement methodology applying to 483 000 km^2 of relatively high rainfall (>1000 mm p.a.) regions. Drawing on 15 years of fire mapping, this chapter assesses appropriate biophysical boundaries for a savanna burning methodology extended to cover lower rainfall regions. We examine a large random sample of points with at least 300 mm of annual rainfall, to show that: (1) relative fire frequencies (percentage of years with fire) decline from 33.3% in higher rainfall regions (>1000 mm) to straddling ~10% in the range 300–700 mm; (2) there are no marked discontinuities in fire frequency or fire seasonality down the rainfall gradient; (3) at all annual rainfalls, fire frequency is higher when rainfall is more strongly seasonal (very low rainfall in the driest quarter); (4) below 500 mm fire regimes are particularly variable and a large proportion of sampled sites had no fire over the study period; (5) fire is more likely to occur later in the fire season (generating relatively higher emissions) in the 600–700 mm annual rainfall band than in other parts of the rainfall gradient; (6) woodland savannas are most common above and predominantly grassland systems are more common below ~600 mm annual rainfall.

We propose that development of a complementary lower rainfall savanna burning methodology should apply to regions between 600 and 1000 mm annual rainfall and ≤15 mm of rainfall in the driest quarter, adding an area more than 1.5 times the existing methodology's coverage. Given greater variability in biophysical influences on fire regimes and observed levels of fire frequency within this lower rainfall domain, we suggest that criteria for determining baseline (pre-project) periods require estimates of mean annual emissions equivalent in precision to the project on which the higher rainfall methodology was based.

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