

Fire Severity Mapping System for Australia

Andrew Edwards^{1*}, Patrice Weber¹, Jeremy Russell-Smith¹, Cameron Yates¹

ABSTRACT – “Savanna Burning” methodologies to calculate greenhouse gas emissions (GHGEs) are applied across the tropical savannas and rangelands of north Australia. The program generates tens of millions of dollars annually by promoting improved fire management regimes with positive social and ecological outcomes. The current methodologies utilise the seasonality of fire to infer the combustion efficiency, such that Late Dry Season (LDS) fires (August-December) produce almost twice the GHGEs of Early Dry Season (EDS) fires (January-July). In the high rainfall region of the north Australian tropical savannas, 85% of EDS fires are low severity, 10% moderate and 5% high. In the LDS it's 30% (low), 40% (moderate) and, 30% (high). Although burning in the EDS for vegetation fuel types under “Savanna Burning” methodologies is ecologically beneficial, the financial inducement can cause land managers to sometimes undertake prescribed burning techniques that are efficient but not ecologically beneficial. There is also a perceived, but currently unsubstantiated, error associated with extrapolating a single cut-off date across 25° of longitude. As part of a larger refinement of the methodology, we have collated many years of fire severity mapping techniques using earth observing satellite data, to develop a scale appropriate medium resolution (MODIS 250m) near real time fire severity map across the north Australian rangelands and savannas (~ 4.1M km²). The technique uses the brightness of ground calibrated active fire data points to locally calibrate Δ NIR 250 m imagery throughout varying geography and season. Overall map accuracy at this scale over such a large area, has previously not reached beyond 70%; with this new method, we hope to vastly improve map accuracy and provide land managers with a better reflection of the effects of fire to integrate into fire management planning and practice.

Keywords: Fire severity; improved fire management; prescribed fire; north Australia; tropical savannas; rangelands

¹Darwin Centre for Bushfire Research, Charles Darwin University, Darwin, NT, Australia

*Corresponding author: andrew.edwards@cdu.edu.au