A predictive fire model for the Amazon Region using Neural Networks

Simon Jones, Andre Zerger,Andreia Siqueira,Ian Bishop
RMIT University

simon.jones@rmit.edu.au

Please note Andreia Siqueira is the 1st author but has been unable to log onto your system.---This paper examines the utility of remote sensing in tropical wildfire risk reduction, its integration with historical and predicted climatic data for fire risk mapping, and presents a framework for synthesising these disparate databases into a spatially explicit wildfire risk model. The state of Mato Grosso lies at the heart of the Southern arc of Amazonian deforestation. Fire is common 'management' tool in Mato Grosso, being used both to clear forest –to 'improve' the land; and also, to ensure a green fodder for pastoral animals after the rains in September-October. Although such fire use is a legal in Brasil, safe burning techniques are often not managed correctly and can result in wildfire spreading to the forested areas. Put another way, 'management burns' become 'feral'. That is, they escape their containment area. These 'wildfires' have the potential to cause considerable damage both ecologically and socio-economically. During El Nino years, when climatic anomalies occur, such feral wildfires have the potential to be catastrophic. This paper presents a model to spatially predict the probability of wildfires in both agricultural and forested landscapes using Neural Networks. The model links climatic anomalies (maximum temperature and precipitation), land use change and topography with remotely sensed observations of fire occurrence over time (fire burn scars). Multi-scale land use change scenarios are then tested. An improved understanding of the land use change process, and its impact on fire danger potentials, for an area with one of the worlds' highest biodiversities can be significantly improved by multi-sensor integration, modelling and analyses. The broader aim of this research is to develop methodologies for predicting Amazonian fire risk to provide managers with tools for mitigating future fire events.