

Linking field observations with remote sensing to determine grassland fire hazard

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This Bushfire CRC project aims to develop methods for assessing the degree of curing in grasslands of Australia and New Zealand. Degree of curing refers to the proportion of dead material in a grassland fuel complex, and is a critical input into determining fire danger and potential fire behaviour in grassland fuels. Field-based visual estimates of curing are often inaccurate, and the current remote sensing techniques need to be reviewed to incorporate the latest technology and to allow extension and application to a range of Australasian grasslands.

Research has focussed on the collection of high-quality field observations of curing, to provide valuable data to develop and validate remote sensing techniques. A range of field data collection techniques have been trialled and the method currently in use is delivering promising results at most locations. Investigation into the use of digital imagery either in the laboratory or field is underway, and this method in particular could offer a very easy and reliable method of field assessment for the research project as well as end-users. Remote sensing work is focussed on evaluating the use of spectral indices applied to readily available MODIS (MODERate resolution Imaging Spectrometer) satellite data products to predict the state of grassland curing in Australia and New Zealand. The MODIS (MOD09A1) surface reflectance product delivers seven spectral bands ranging from visible reflectance (blue, green and red) to near infrared and shortwave infrared. Combining different spectral bands into vegetation indices minimizes the effects of external factors, such as soil background reflectance and canopy geometry, on the reflectance signal of vegetation. Several image analysis techniques are investigated, including the application of existing vegetation indices and the development of new indices and spectral assessment techniques that are optimized to the Australasian landscape.

The satellite curing products that are currently available for south-eastern Australia were developed in the 1980 and based on older AVHRR satellite technology. These products were found to have limited global applicability. Developing assessment techniques based on newer satellite technology and advances in the understanding of the interaction of different landscape elements with sunlight will produce a product(s) that can be applied to a wider range of grasslands. Ideally, the end-product will be a curing map, updated on a weekly basis, which can be used to support fire management activities such as preparedness planning, mitigation actions and scheduling and conducting prescribed burning operations.

Remote sensing presents exciting opportunities to provide quick and reliable assessments over large areas. However factors such as tree density, vegetation type and soil background may confound the results. Reliable field data from a large variety of landscapes will help identify any confounding factors. This will facilitate the development of indices that can accurately estimate the state of grassland curing over large areas, providing end-users with reliable and accurate tools to assist fire management.