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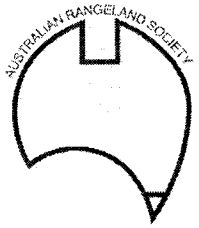


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# MONITORING AUSTRALIAN FIRES FROM SPACE

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The Australian landscape has been transformed by fire through both natural and anthropogenic causes. The monitoring of fires over the whole Australian continent has only become possible since satellite data has been available, The first national coverage was obtained during 1998/1999 as a result of funds provided through the national State of Environment Reporting group within Environment Australia. Satellite Remote Sensing Services (SRSS), a group within the Western Australian (WA) Department of Land Administration (DOLA), was contracted by the Tropical Savanna Cooperative Research Centre (TSCRC) to provide a two year study of the fire regimes observable from satellite over Australia.

The satellite sensor chosen for this survey was the Advanced Very High Resolution Radiometer (AVHRR) which flies on the U.S. National Oceanic and Atmospheric Administration (NOAA) satellites which orbit the earth from pole to pole each day. There are currently four active NOAA satellites, each with the AVHRR sensor on board. DOLA, as a partner in the Western Australian Satellite Technology and Applications Consortium (WASTAC), receives data from these satellites at the Perth receiving station. Other receiving stations are present in Darwin, Melbourne, Hobart, Brisbane, Townsville and Alice Springs, thus providing national coverage on a daily basis. The AVHRR sensor observes the earth in five wavelengths or bands, from the red through to the thermal parts of the electromagnetic spectrum. It has an effective ground resolution of 1.1 km when looking vertically, and up to 4 km when looking at the edge of its view. Two bands are used to measure vegetation cover, through their chlorophyl sensitivity, one is used to measure active fires, and two are used to measure ground, cloud or ocean temperature.

SRSS began using the AVHRR data in 1990 to measure occasional fires in the Kimberley region of WA and by 1993 (Craig *et al.*, 1995) provided a regular service to the fire authorities in WA. The delivery of the information was by fax maps drawn by hand. The service has been upgraded to provide World Wide Web and automatic fax services to SRSS's clients which now include the Northern Territory through the NT Bush Fire Council and the TSCRC.

The size of a fire affected area that can be measured from the AVHRR satellite is limited by its ground resolution and the intensity of the fire burn. Since the ground resolution is 1.1 km, fires need to significantly affect an area of at least 2 to 3 square kilometres to be reliably measured from this sensor. The individual fires measured using band 3 of the sensor can be as small as 30 metres across and still be measured by this band due its very high sensitivity to hot fires.

For the two years April 1998 to March 2000 the entire continent and islands were mapped for fire hot spots and fire affected areas from the AVHRR sensor, with the fire hot spots measured daily and the fire affected areas measures every nine days. The data from the two year study were accumulated in a Geographic Information System (GIS) and linked for further analysis with the Interim Biogeographical Regions of Australia (IBRA) (Thackway and Cresswell, 1995). Using the IBRAs, various reports have been created indicating annual variations in the number and area of fires detected (Craig *et al.*, 2000). The accumulated results show over 300,000 fires detected during the two years, with over 300,000 square kilometres affected by fire in 1998/1999 and over 700,000 square kilometres in 1999/2000.

Two satellites have been launched recently which have on board the MODIS sensor. This sensor has a much higher ground resolution of 250 metres in its vegetation bands, with two days required to cover Australia. SRSS is processing this data, received by WASTAC in Perth, for fire and vegetation products on daily and fortnightly bases. The measurement of currently burning fires each morning and

afternoon from the MODIS sensor will provide the fire authorities and land managers with greater detail than is currently available from AVHRR, to assist in their management.

The creation of fire histories for pastoral properties and government managed lands using AVHRR and MODIS data is continuing for WA, using both the ten year archive of AVHRR data held by DOLA and the new MODIS data received by WASTAC. These histories are used as part of fire management plans assisting in the long term sustainable management of pastoral properties as well as by other state agencies that are involved in landscape monitoring.

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