

FIRE ESTIMATES IN SAVANNAS OF CENTRAL BRAZIL WITH THERMAL  
AVHRR/NOAA CALIBRATED BY TM/LANDSAT

Alfredo C. Pereira Jr.  
Alberto W. Setzer  
João Roberto dos Santos

Instituto Nacional de Pesquisas Espaciais - INPE / Brasil

SUMMARY

Cerrados (savannas) in Brazil occupy  $2.4 \times 10^6$  km<sup>2</sup>, a third of which presumably burns every year associated to various agricultural uses, pasture maintenance, and deforestation, causing environmental concerns. No inventories exist describing the location, extent and frequency of the widespread use of fires, and orbital remote sensing presents a potential tool for first evaluations of the problem. This paper examines a technique to estimate the number and extent of natural and man-caused fires in savanna regions of Central Brazil, based on AVHRR/NOAA band 3 (3.6-3.9um) thermal images with spatial calibration obtained from TM/Landsat color composites.

Digital full 1.1km resolution AVHRR/NOAA-11 images from the June-September dry season in 1989 were analysed to determine pixels with nominal radiometric temperature above a 315K threshold ("fire pixels"). For a TM/Landsat scene control area digitally processed, all the fires in the AVHRR images previous to the TM pass were counted and cumulatively located to allow comparison of estimates. All fire pixels detected by AVHRR were located in fire scars of the TM image, and some TM fire scars had no corresponding AVHRR fire pixels. The area of the fire pixels was about 13% larger than the area of the corresponding fire scars in the TM image. A  $R^2$  correlation coefficient of 0.9 was found between the areas measured on TM images and those of the fire pixels.

Considering the common burning practices in Brazil this simple AVHRR image processing technique is proposed to evaluate on near-real time and at relative low cost the location, extent and frequency of biomass burning in the cerrados.