

THE OPERATIONAL DETECTION OF FIRES IN BRAZIL WITH NOAA-AVHRR

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SUMMARY

Biomass burning associated mainly to agriculture, pasture renovation, and deforestation, is a common practice in Brazil with significant environmental consequences as detected by orbital remote sensing. This paper describes the operational system currently in use in Brazil to detect fires in the dry season with the use of band 3 (3.6-3.9 μ m) thermal images produced by the NOAA series polar orbiting satellites.

The system evolved from preliminary work for very large fires on a few days in Amazonia during 1985, to automatic daily processing on near-real time from June through November for parks, forests and wild life reserves, and for most Brazilian states. Users range from state and federal environmental agencies to newspapers. AVHRR bands 2 and 3 afternoon passes are received by INPE at C. Paulista, SP, with a tracking antenna, a full 10 bits resolution receiver, and fed to a 386 PC computer where the processing takes place. Navigation parameters obtained from NASA bulletins are adjusted through image shifting, based on the location of control points visible in the band 2 image. Accuracy of navigation obtained is one pixel, as verified by extensive field work. Next, 70 pixels on the edges of the image are disregarded to avoid analysis of geometrically distorted pixels and subject to long atmospheric paths. Then, scanning of each band 3 image line takes place, and all pixels above a nominal radiometric temperature of 317 K have their geographical coordinates calculated and stored in numerical order in a file. This temperature was found to be the limit to detect active fires. The file is next screened for regions of interest such as parks or states previously mapped through a geographical information system.

Files for individual users are then automatically prepared and sent by telex or accessed through computer networks. For each region the files contain coordinates of each fire associated with a hot pixel, its intensity, and a summary of all fires for the region. Maps with the fires for specific days or cumulative for each region are also prepared. Field verification of fires yielded about 96%. From these products users have been able to identify fires otherwise not noticed, and to take effective measures to control them. A detailed description of the system and examples of all products are presented.