Geophysical Research Abstracts,
Vol. 11, EGU2009-5772, 2009
EGU General Assembly 2009

The use of satellite data for monitoring temporal and spatial patterns of fire: a comprehensive review

R. Lasaponara
CNR-IMAA, Potenza, Italy

Remotely sensed (RS) data can fruitfully support both research activities and operative monitoring of fire at different temporal and spatial scales with a synoptic view and cost effective technologies. “The contribution of remote sensing (RS) to forest fires may be grouped in three categories, according to the three phases of fire management: (i) risk estimation (before fire), (ii) detection (during fire) and (iii) assessment (after fire)” Chuvieco (2006).

Relating each phase, wide research activities have been conducted over the years.
(i) Risk estimation (before fire) has been mainly based on the use of RS data for (i) monitoring vegetation stress and assessing variations in vegetation moisture content, (ii) fuel type mapping, at different temporal and spatial scales from global, regional down to a local scale (using AVHRR, MODIS, TM, ASTER, Quickbird images and airborne hyperspectral and LIDAR data). Danger estimation has been mainly based on the use of AVHRR (onborad NOAA), MODIS (onboard TERRA and AQUA), VEGETATION (onboard SPOT) due to the technical characteristics (i.e. spectral, spatial and temporal resolution). Nevertheless microwave data have been also used for vegetation monitoring.

(ii) Detection: identification of active fires, estimation of fire radiative energy and fire emission. AVHRR was one of the first satellite sensors used for setting up fire detection algorithms. The availbility of MODIS allowed us to obtain global fire products free downloaded from NASA web site. Sensors onboard geostationary satellite platforms, such as GOES, SEVIRI, have been used for fire detection, to obtain a high temporal resolution (at around 15 minutes) monitoring of active fires.

(iii) Post fire damage assessment includes: burnt area mapping, fire emission, fire severity, vegetation recovery, fire resilience estimation, and, more recently, fire regime characterization.

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