

On the use of the (V,W) Burn-Sensitive Vegetation Index System to monitor the spatiotemporal distribution of burned areas in Portugal

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The use of remotely sensed information for burned area detection is well established and there is a general consensus about its usefulness from global down to regional levels. In this particular, the combined use of near and middle infrared (NIR and MIR) channels has shown to be particularly suitable to discriminate burned areas in a variety of ecosystems. The so-called (V,W) system [1,2] is a burn-sensitive vegetation index system defined in a transformed NIR-MIR space that has proven to be capable of discriminating burned pixels in the Brazilian biomes.

A procedure based on the (V,W) system is here presented that allows discriminating burned areas and dating burning events. The procedure is tested over Portugal using NIR and MIR data from the Terra/Aqua MODIS Level 1B 1 km V5 product (MOD021/MYD021) together with active fire data from the MODIS V5 product Thermal Anomalies/Fire 5-Min L2 Swath 1km (MOD14/ MYD14).

First monthly minimum composites of W are computed for July and August 2015. Burned pixels are then identified as the ones that are located close to hot spots (detected during August) and that present low values of composited minimum of W in August (characteristic of a burning event) together with a sharp decrease of composited minimum of W from July to August (that is expected to occur after a burning event). Burned pixels are then successively identified by a seeded region-growing algorithm. The day of burning of each pixel classified as burned is finally identified as the one that maximizes an index of temporal separability computed along the respective time series of available values of W in August.

Results obtained are validated using as reference burned scars and dates as identified by the Rapid Damage Assessment (RDA) module developed by the European Forest Fire Information System (EFFIS); the EFFIS mapping process consists of an unsupervised procedure that uses MODIS bands at 250 m resolution combined with information from the CORINE Land Cover, followed by a seeded region-growing algorithm [3].

Almost half (49%) of the burned pixels are correctly identified, less than one fifth (18%) are false alarms and the total burned area is overestimated by 18%. On the other hand more than three fourths (76%) of estimated days of burning presented deviations from reference data between -1 and 4 days. Performance of the proposed algorithm is to be viewed as highly satisfactory taking into account the coarser resolution of the procedure being validated (1 km) compared to the reference data (250 m).

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[1] Libonati et al. (2011), *Remote Sensing of Environment*, 115(6), 1464–1477.

[2] DaCamara et al. (2016), *IEEE Geoscience and Remote Sensing Letters* 13(12), 1822-1826.

[3] Salvador Civil & San-Miguel-Ayanz (2002), *International Journal of Remote Sensing*, 23(6), 1197-1205.