



A rule-based semi-automatic method to map burned areas using Landsat images – revisited and improved

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This study presents an improvement of an old rule-based semi-automatic method to map burned areas by using multi-temporal Landsat images. The rule-based approach consists of a set of rules developed based on spectral properties of burned areas as compared to the pre-fire unburned vegetation and to the spectral signatures of other land cover types found in post-fire satellite scene. Actually, the spectral properties based on which the rules have been developed are presented in two graphs, one that corresponds to spectral signatures plots and the second that corresponds to the histogram data plots. The spectral patterns based on which the rule-based approach has been developed are not always the same. For example, depending on the type of the fire-affected vegetation (e.g. dry vegetation instead of green) the spectral pattern of the SWIR channel that correspond to channel 7 in Landsat 4-7 and 8 is not valid. Instead, there is a similar spectral behaviour but in the SWIR channel that correspond to channel 5 in Landsat 4-7, or channel 6 in Landsat 8. Additionally, the threshold value of 0.10-0.25 of the second rule seems not to be sufficient to cover all variability since there are cases that this value should be higher. Two characteristic examples of the insufficiencies found on the old-rules are concerned in the current analysis, one that presents limitations concerning the rule 5 (Serifos) and one that represents limitations concerning the rule 2 (Portugal).

To revise the old set of rules and create new rules we followed the same methodology as in the original paper from Koutsias et al. (2013). Therefore, sampling plots that correspond to burned surfaces were located on the post-fire Landsat TM images. Additionally, other important land cover types were delineated on the satellite images using the pan-European CORINE 2000 Land Cover database. Radiometric values of the sampling plot pixels were extracted, and simple statistics were generated to characterize the spectral properties of the various land cover categories including the burned area class. Histogram and signature data plots were created to graphically represent the spectral profiles for all land cover types including burned areas. It was also used to compare them with patterns of unburned vegetation when using multi-temporal satellite images and with other land cover types when using only single-date post-fire satellite images.