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MERIS burned area algorithm in the framework of the ESA Fire CCI Project

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The Fire-CCI project aims at generating long and reliable time series of burned area (BA) maps based on existing information provided by European satellite sensors. In this context, a BA algorithm is currently being developed using the Medium Resolution Imaging Spectrometer (MERIS) sensor.
The algorithm is being tested over a series of ten study sites with a area of 500x500 km2 each, for the period of 2003 to 2009. The study sites are located in Canada, Colombia, Brazil, Portugal, Angola, South Africa, Kazakhstan, Borneo, Russia and Australia and include a variety of vegetation types characterized by different fire regimes.
The algorithm has to take into account several limiting aspects that range from the MERIS sensor characteristics (e.g. the lack of SWIR bands) to the noise presented in the data. In addition the lack of data in some areas caused either because of cloud contamination or because the sensor does not acquire full resolution data over the study area, provokes a limitation difficult to overcome. In order to overcome these drawbacks, the design of the BA algorithm is based on the analysis of maximum composites of spectral indices characterized by low values of temporal standard deviation in space and associated to MODIS hot spots.
Accordingly, for each study site and year, composites of maximum values of BAI are computed and the corresponding Julian day of the maximum value and number of observations in the period are registered by pixel . Then we computed the temporal standard deviation for pixels with a number of observations greater than 10 using spatial matrices of 3x3 pixels. To classify the BAI values as burned or non-burned we extract statistics using the MODIS hot spots. A pixel is finally classified as burned if it satisfies the following conditions: i) it is associated to hot spots; ii) BAI maximum is higher than a certain threshold and iii) the standard deviation of the Julian day is less than a given number of days.