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A global comparison between MODIS hotspot and high resolution burned area data

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Forest fires are an important environmental factor at a global scale, influencing vegetation dynamics, carbon stocks, land-use change and being an important emission source of CO_2 and aerosols. However, large uncertainty exists on the distribution, extend and intensity of fire occurrence over the world. Satellite products are the only source of information on fire occurrence which gives a good spatial resolution at a global scale. Two types of satellite data products have been widely used to study fire occurrence, hotspots and burned area (BA) maps. Hotspots are temperature anomalies registered by the thermal channels of the satellites, while the BA is detected by the contrast between the unburned land and the black carbon, ashes,... and the change between these two states. Till now the existing datasets have been poorly validated, with the hotspot global datasets only been validated by other thermal anomaly detections at higher resolution. Here we studied the relationship between high resolution BA datasets and the global MODIS hotspot dataset (MOD14).
The high resolution BA dataset was produced from Landsat-TM/ETM+ scenes covering 10 different areas distributed over the globe. These areas include boreal, temperate, Mediterranean and tropical areas with important fire activity. For each BA dataset a pre and post fire image was analysed and BA, non-burned land and no-data (clouds,...) detected using the ABAMS software. This database, >100 separate BA maps, was produced under the framework of the Fire_cci project (http://www.esa-fire-cci.org/).
For each of these BA datasets the MODIS hotspots were extracted for the same spatial and temporal extend. The analysis performed consists in determining the number and size of the omitted fire scares and the commission errors of the hotpots, being those hotspots that could not be related to any fire polygon. Regression analysis was performed to study more in depth the relation between number of hotspots and BA/number of fires. These results were then related to the some characteristics of the fire regime and environmental factors such as fire size, fire number, ecozone and vegetation type.