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Spatial-temporal comparison between MODIS Burned Area and Thermal Anomalies Products during 2008 in Brazil

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ABSTRACT

Each year, wildfires affect 3 millions of squared kilometers around the world (Van der Werf et al., 2006). Information on fire activity, which is usually characterized by means of burned area or biomass burning maps, is needed in an accurate and cost-effective manner, especially in tropical areas, where the destruction of the landscape due to fire is very rapid. Besides, both the frequency and intensity of wildfires are expected to increase in many regions of the World in the following years, because of the increase of temperature and the reduction of rainfall due to the global warming effect (Magrin et al., 2007). In addition, wildfires release a significant amount of greenhouse gases, particulates and aerosol emissions into the atmosphere, which in turn significantly increases the anthropogenic CO2 emissions and the global warming phenomenon itself (Van der Werf et al., 2006).

One of the most common, direct and useful information about a wildfire is the mapping of the affected area (Lentile et al., 2006). Nowadays, and specially at global scales, burned area is mapped by means of satellite data, being MODIS (MODerate resolution Imaging Spectroradiometer) onboard Terra and Aqua NASA satellites, one of the most extensively used sensors for such task. In particular, the MCD45A1 (MODIS Burned Area Product, Roy et al., 2008) is the burned area product that the MODIS team processes at global level, and it is based on reflective information. Another MODIS product related to fire is the MODIS Thermal Anomalies product (Giglio et al., 2003) which is based on emissive information and that is also used for wildfire statistics production at global level in some way. These two sets of data (the Burned Area and the Thermal Anomalies Product) represent the same reality and are therefore supposed to be spatially consistent. The following paper analyses whether or not the two mentioned product are spatially correlated, based on a 10 by 10km grid. The latter is based on the equal-area MODIS Sinusoidal cartographic projection. The spatial extent of the study is Brazil, whereas the temporal extent is 2008.

Results reached so far reveal some difficulties in finding stable and predictable spatial and temporal relationships between both sets of data: MODIS Burned Area Product and MODIS Thermal Anomalies Product. In this sense, data were analyzed either globally (annually) or locally (monthly), using different sets of cartography to stratify the territory. The lack of good spatial-temporal association between both sets of data also allows us to question their accuracy or their suitability for being used in complex climatic or environmental models.

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