Burned area mapping in eastern United States Using MODIS measurements

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Burned area is one of the major fire properties for estimating fire emissions. This property can be efficiently identified using satellite remote sensing because of the significant vegetation changes caused by burning. NDVI (Normalized Difference Vegetation Index) is the most popular vegetation index for burned area mapping. This index, however, has some limitations, especially for those fires with heavy smoke, which is quite common for wildland fires in the eastern States. Our study shows that NIR (Near infra-red) bands and SWIR (short-wave infra-red) bands are less sensitive to smoke and, therefore, especially valuable for more accurate identification of burned area in the eastern States. In this paper, the sensitivity of MODIS bands to vegetation changes caused by fires is first analyzed. A new approach is then developed to discriminate burned areas, unburned areas, smoke plumes, and clouds with combination of selected MODIS VNIR(visible/infra-red), SWIR and TIR (thermal) bands, aimed at mapping burned areas more accurately and robustly. This approach is validated against the fires in the Southeast States. We also integrate this approach into our real-time Earth Observing System (EOS) data processing system to generate real-time fire characteristics products and provide inputs for fire and air quality management and decision making systems such as BlueSkyRAINS.