

# **A preliminary study for retrieving smoke reflectance using MODIS measurements**

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**Smoke plume emitted from biomass burning is one of major pollutions, affecting the regional air quality and threatening human health greatly because of its fluidity and uncontrollable motion. Timely collecting the information about smoke plumes is very important and necessary for scientists to understand and analyze their characteristics. We have already developed a multi-threshold testing method for smoke plume detection in the eastern United States using the satellite sensor MODIS (MODerate resolution Imaging Spectro-radiometer) measurements, by combining eight Reflectance Solar Bands (RSBs) and two Thermal Emissive Bands (TEBs). These results provided much information about characteristics of smoke plumes at 1 kilometer spatial and approximate daily temporal resolution, including their location, shape, spread direction, and growth but no smoke reflectance. In general, the smoke reflectance directly computed from MODIS measurements, however, is the value at the TOA (Top Of Atmosphere) level, which is not accurate enough to reflect the magnitude of smoke in that the reflectance at TOA is also the function of the surface reflectance especially for weak smoke. In order to understand smoke features, a simple algorithm based on the basic radiative transfer model has been developed for retrieving the smoke reflectance approximately at the deep blue spectral range. Two blue bands board on MODIS (band 8 and band 9), were used in this approach. These two bands locate in MODIS shortest wavelength ones and are very sensitive to smoke plumes based on our pre-study. To validate our algorithm, the model simulation was also applied in the study.**