Estimating ground-level $PM_{2.5}$ concentration using aerosol optical properties derived from MODIS and sunphotometer at Gosan, Korea

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Abstract

Using Aerosol Optical Depth (AOD) retrievals from the Moderate Resolution Imaging Spectro-radiometer (MODIS) on board NASA's Terra and Aqua satellites along with ground measurements of $PM_{2.5}$ mass concentration, we assess particulate matter air quality over Gosan, Korea. An empirical relationship between AOD and $PM_{2.5}$ mass concentration is obtained and results show that there is a good correlation between the bin-averaged daily mean satellite and ground-based values with a linear correlation coefficient. We also show that the correlation between AOD-derived and measured $PM_{2.5}$ is significantly improved when considering the classification of four major aerosol types (dust, carbonaceous, sea salt and sulfate) derived from MODIS and sunphotometer observation. The aim of this study is to demonstrate the usefulness of $PM_{2.5}$ retrieved from satellite data over Korea and conclude that satellite derived AOD is an excellent tool for air quality studies over a large spatial area.