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Estimation of surface PM2.5 concentration over Seoul using GOCI AOD

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The empirical/statistical models to estimate the surface Particulate Matter (PM2.5) concentration in Seoul from Geostationary Ocean Color Imager (GOCI) Aerosol Optical Depth (AOD) product were developed for the period of 2015. Two vertical correction methods, vertical ratio of aerosol (VRA) calculated from LIDAR vertical profile of backscattering coefficients and AOD below boundary layer extracted from planetary boundary layer height (PAOD), were effective to increase the correlation between the satellite-derived AOD and ground-observed PM2.5. In order to improve the accuracy in PM2.5 estimation, additional meteorological factors (wind speed, visibility, and air temperature, relative humidity) affecting AOD and PM2.5 relationships were considered as predictor variables in the multiple linear regression (MLR) models. Stable atmospheric state with low wind speed and high relative humidity conditions are closely associated with high PM2.5 concentrations in the morning. The estimates show a similar variation in time (day and season), and a high correlation (R=0.85) compared to observed PM2.5 concentration. The models developed in this study are applicable to the surface PM2.5 estimation using AOD retrieved from the future GK-2A and GK-2B.