**Validation of a Simplified Aerosol Retrieval Algorithm (SARA) over Beijing**

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Simplified Aerosol Retrieval Algorithm (SARA) retrieves aerosol optical depth (AOD) by incorporating a wide range of aerosol types ($ω\_{o }$= 0.30–1.0) and independent of the common technique of constructing a look–up–table (LUT). In this study, the SARA AOD was retrieved at 500 m resolution using MODerate resolution Imaging Spectroradiometer (MODIS) data products (MOD02, MOD03, and MOD09) and local AErosol RObotic NETwork (AERONET) site “Beijing” over urban areas of Beijing for the year 2010. For the comparison purposes, the MODIS Dark–Target (DT) AOD observations at 10 km resolution were obtained from MODIS Collection 5.1 (C5.1) aerosol product for the same time period. The retrieved AOD observations from both algorithms (SARA and DT) were validated against Beijing\_RADI AERONET AOD measurements and the data quality was evaluated using the Confidence Envelope of Expected Error (CEE). The SARA algorithm achieved better data quality of 98.08% with higher correlation (R ~ 0.990) than the MODIS DT algorithm with very poor data quality of 21% with lower correlation (R ~ 0.946). Data quality was also evaluated for low (AOD < 0.40) to high (AOD > 0.40) aerosol loadings using the Fraction of Expected Error (FEE) and as a result the SARA algorithm achieved 67–69% better data quality than MODIS DT algorithm. The results demonstrate that the SARA algorithm is better than MODIS DT algorithm to retrieved AOD over Beijing under low to high aerosol loadings, including dust storms.

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