Retrieval of aerosol properties for fine/coarse mode aerosol mixtures from PARASOL observations

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The retrieval of aerosol properties for fine/coarse mode mixtures over urban areas is the most challenge objective in satellite remote sensing of aerosols. In this study a new aerosol retrieval algorithm using PARASOL observations is proposed. The spectral multi-angle unpolarized (total) radiances are used for the preliminary choice of possible AODs and aerosol models based on the spectral reflectance shape invariance assumption. Then the fine mode AOD derived from polarized measurements is used to finally constrain the previous results, yielding the total AOD and fine mode volume weighting (FMVW). Case studies are conducted in Beijing and evaluated using the coincident AERONET measurements. The results show a significant correlation of 0.92 and a high Gfrac (fraction of accurate retrievals) of 82%. Analysis on the retrieval accuracy illustrates that the algorithm capability depends significantly on the data quality index, as the AOD retrieval accuracy is obvious lower for the data with $QI < 0.75$. The other error source for the aerosol retrieval comes from the discrepancy in the pre-assumed and the true aerosol models.