Effect of atmospheric and surface properties on the retrieval of aerosol optical depth from geostationary satellite

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The impact of atmospheric aerosols on the earth's climate has been recognized as an important problem for understanding the climate change, especially after numerous previous studies have pointed out that aerosols are the source of the large uncertainties in evaluating climate forcing. But the retrieval of aerosol optical depth(AOD) method using low-earth-orbit satellites such as MODIS(Moderate-Resolution Spectroradiometer) or MISR(Multiangle Imaging SpectroRadiometer) has limitation in temporal resolution. Understanding temporal variation of aerosols, we can introduce benefit from geostationary satellite. In order to obtain the surface reflectance, we convert minimum TOA reflectance for 30 days into surface reflectance using calculated LUT(Look Up Table) by radiative transfer model, 6S. The LUT for surface reflectance is calculated as functions of TOA reflectance, AOD, surface reflectance, and geometric variables. With the known surface reflectance, TOA reflectance can provide information of AOD through a separate LUT for AOD. This study presents retrieval processes of AOD using a single visible channel of geostationary satellites. The retrieved results are compared with the AODs observed by AERONET and the MODIS to investigate the quality of retrieval. Many uncertainties exist in the AOD retrieval algorithm, for example the background optical depth, radiative transfer model, atmospheric properties, and surface reflectance. The uncertainties in this retrieval process are investigated for BRDF, gaseous transmittance and background optical depth. This result can be applied to the aerosol events in the East Asian region.