Development and Testing a Method for Retrieving Atmospheric Aerosol Optical Thickness based on the Solar Intensity from the Sun-photometer Data

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Abstract	The context of atmospheric aerosols is an indispensable aspect in studying the EarthÃ¢Â€Â™s radiation budget, climate change, and air quality. Therefore, the quality technique in retrieving aerosol parameters is important for a better understanding their characteristics. The precise calculating of the aerosol physical parameter in the planetary boundary layer will increase the accuracy of evaluation of their impact on environmental conditions. In several atmospheric corrections of optical remote sensing using satellite sensors, the AOTÃ¢Â€Â™s values play an important role in arranging a Look Up Table (LUT) for scattering parameters. Therefore, this study aims to develop a method for processing and correcting the sun-photometer data to obtain the original AOT in the planetary boundary layer. In AOT calculation using the sun-photometer data, the solar radiation at the extraterritorial of the atmosphere is determined using the Langley plot. Then, using the target data at the same season as the data for the Langley plot, the temporal change of AOT is estimated by employing the Lambert-Beer Law with some corrections. The major correction for the AOTÃ¢Â€Â™s values computation in the measurement target is the contribution of molecule from the local station and Ozone (O3) from the GOME-2 satellite data. The result has been compared with an independent measurement using a sky-radiometer at the same time as the sun-photometer monitoring. From the overall procedure, the AOTÃ¢Â€Â™s values have uncertainties at approximately 2-5% compared to the sky-radiometer. Therefore, the procedure will be useful for studying aerosol optical properties in the lower troposphere.
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