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Effects of cloud, aerosol, and ozone on surface spectral Ultraviolet and total irradiance observed in Seoul, Korea

Hana Lee (1), Jhoon Kim (1), Woogyung Kim (1), Yun Gon Lee (2), and Hi Ku Cho (1)

(1) Global Environment Laboratory/Department of Atmospheric Sciences, Yonsei University, Seoul, Korea, (2) Chungnam National University, Daejeon, Korea

In recent years, there have been substantial attempts to model the radiative transfer for climatological and biological purposes. However, the incorporation of clouds, aerosols and ozone into the modeling process is one of the difficult tasks due to their variable transmission in both temporal and space domains.
In this study we quantify the atmospheric transmissions by clouds, aerosol optical depth (AOD at 320 nm) and total ozone (Ozone) together with all skies in three solar radiation components of the global solar (GS 305-2800nm), total ultraviolet (TUV 290-363nm) and the erythemal weighted ultraviolet (EUV 290-325nm) irradiances with statistical methods using the data at Seoul. The purpose of this study also is to clarify the different characteristics between cloud, AOD and Ozone in the wavelength-dependent solar radiation components.
The ozone, EUV and TUV used in this study (March 2003 - February 2014) have been measured with Dobson Spectrophotometer (Beck #124) and Brewer Spectrophotometer (SCI-TEC#148) at Yonsei University, respectively. GS, Cloud Cover (CC) are available from the Korean Meteorological Agency.
The measured total (effect of cloud, aerosol, and ozone) transmissions on annual average showed 74%, 76% and 80% of GS, TUV and EUV irradiance, respectively. For the comparison of the measured values with modeled, we have also constructed a multiple linear regression model for the total transmission. The average ratio of measured to modeled total transmission were 0.94, 0.96 and 0.96 with higher measured than modeled value in the three components, respectively, The individual transmission by clouds under the constant AOD and Ozone atmosphere on average showed 68%, 71% and 76% and further the overcast clouds reduced the transmissions to the 45%, 54% and 59% of the clear sky irradiance in the GS, TUV and EUV, respectively. The annual transmissions by AOD showed on average 67%, 70% and 74% and further the high loadings 2.5-4.0 AOD reduced the transmission to 50%, 52% and 55% of clear sky irradiance under the contact cloud and ozone atmosphere in the GS, TUV and EUV, respectively. And annual average EUV transmission by Ozone was 75 % of the clear-sky value under the constant CC and AOD.
In future study, we are compare OMI data with ground-based instruments in order to use measured data for scientific studies.