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Validation of OMI UV measurements against ground-based measurements at a station in Kampala, Uganda

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We present solar ultraviolet (UV) irradiance data measured with a NILU-UV instrument at a ground site in Kampala (0.31°N, 32.58°E), Uganda for the period 2005–2014. The data were analyzed and compared with UV irradiances inferred from the Ozone Monitoring Instrument (OMI) for the same period. Kampala is located on the shores of lake Victoria, Africa's largest fresh water lake, which may influence the climate and weather conditions of the region. Also, there is an excessive use of worn cars, which may contribute to a high anthropogenic loading of absorbing aerosols. The OMI surface UV algorithm does not account for absorbing aerosols, which may lead to systematic overestimation of surface UV irradiances inferred from OMI satellite data.

We retrieved UV index values from OMI UV irradiances and validated them against the ground-based UV index values obtained from NILU-UV measurements. The UV index values were found to follow a seasonal pattern similar to that of the clouds and the rainfall. OMI inferred UV index values were overestimated with a mean bias of about 28% under all-sky conditions, but the mean bias was reduced to about 8% under clear-sky conditions when only days with radiation modification factor (RMF) greater than 65% were considered. However, when days with RMF greater than 70, 75, and 80% were considered, OMI inferred UV index values were found to agree with the ground-based UV index values to within 5, 3, and 1%, respectively. In the validation we identified clouds/aerosols, which were present in 88% of the measurements, as the main cause of OMI inferred overestimation of the UV index.