



Relative contributions of aerosol and cloud to the surface shortwave irradiance change in East Asia

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The surface shortwave irradiance change has been discussed in the past decade, particularly on its long-term trend. The surface shortwave irradiance is mainly related to cloud amount, cloud optical thickness, aerosol optical thickness and precipitable water. In the present study, a recently-proposed index of the potential radiative forcing (PRF, Kawamoto and Hayasaka, GRL2008) is used to evaluate the effects of those atmospheric parameters on the surface shortwave irradiance. The effect of atmospheric parameter change on the shortwave irradiance is dominated by an average condition of the atmosphere, for example, aerosol change affects the irradiance under the clear sky condition while cloud optical thickness change affects it under the cloudy sky condition. We quantified relative contributions of cloud amount, cloud optical thickness, aerosol optical thickness and precipitable water to the change of surface shortwave irradiance over East Asia by using ISCCP cloud and radiation data, and MODIS aerosol data. The contribution of precipitable water is found to be rather small compared to other parameters'. It is shown from the analysis that the cloud amount, cloud optical thickness, and aerosol optical thickness contribute to the inter-annual change of surface shortwave irradiance in the same order over the East Asia region. Seasonal and geographical properties of those relative contributions to the surface shortwave irradiance change as well as the long-term trend property will be shown and discussed in the presentation.