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**Mapping Solar Radiation with Satellite Data over Taiwan**

**Abstract**

Solar radiation at Erath surface has notable impacts on the sustainability of ecology, management of agriculture, and even changes of regional climate. In order to monitor the variation of surface solar irradiance, scientists have built many networks measuring atmospheric radiation with high accuracy since 1990s. However, while looking for a location for new photovoltaic (PV) plant, it is not reliable to use the nearest surface measurement of irradiances representing solar energy of the site since the surface solar measurements vary significantly over space. Therefore, this study provides a method to derive daily regional 2-D surface solar irradiance from 9am to 3pm based on satellite measurements and one-layer radiative transfer model. Data from MTSAT-2 visible band are used as a sum of out-going visible radiation. The absorption of ozone is calculated with total column ozone from OMI/AURA. Precipitable water from MERRA2 reanalysis data are used to calculate the absorption of water vapor. Attenuation of aerosol is calculated from MODIS 8-day averaged aerosol dataset. Surface measurement of solar irradiance from some locations are also needed to train the model. Finally, the datasets in 2013 and 2014 are used to construct the model, and data in 2015 were used to validate the accuracy of the derived daily surface solar irradiance. As the preliminary results, this model shows a high consistency of daily irradiance with a relative mean bias error of +2.50% and relative root mean square error of 14.31% when it compared with 22 surface solar measurement sites in Taiwan. Although the precision of the method is not as good as surface measurements, this work provides a reliable and efficient database for the site survey of PV plants over Taiwan.

**Keywords**

Solar radiation attenuation 太陽輻射衰減

One layer radiation model 單層輻射傳遞模式