



Mapping of forecast errors of global horizontal irradiance obtained from the Ja-pan Meteorological Agency mesoscale model

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In order to forecast a photovoltaic (PV) power production accurately or the manage-ment of planning energy supply efficiently, forecasts of global horizontal irradiance (GHI) by a mesoscale model (MSM) for one-day ahead and its forecast errors are a useful dataset in Japan. The Japan Meteorological Agency (JMA) developed the opera-tional MSM for Japan. Recently, the GHI forecasts by the MSM are considered useful information for forecasting the PV power production in Japan. However, it is certainly that the forecast of the GHI have errors. This study investigated the model performance associated with the GHI with ground measured data at the JMA stations in Japan (about 50 stations). Validation results showed regional and seasonal characteristics of forecast errors of the GHI; under or overestimations of the GHI in summer or winter were found for the whole of Japan. Mean bias error (MBE) values of the GHI ranged from -50 to 25 W/m² and its root mean square errors (RMSE) ranged from 95 to 175 W/m², respectively. Mapping of both MBE and RMSE of the GHI forecasts in Japan showed under-estimations of GHI (negative MBE) and large RMSE values in the Nansei Islands (South western part of Japan) were significant in summer. The result suggested that the problem for the GHI forecasts by the MSM of the JMA for the region in the lower lati-tudes (subtropical climatic regions) are remained, compared to the mid latitude regions. In order to manage the power supply with other renewable energies in Japan, forecast errors of the GHI at a target area (for a point or an area forecast) will be useful infor-mation.