Geophysical Research Abstracts
Vol. 16, EGU2014-3303, 2014
EGU General Assembly 2014

Estimation of confidence intervals of global horizontal irradiance obtained from a weather prediction model

Hideaki Ohtake (1), Joao Gari da Silva Fonseca Jr (1), Takumi Takashima (1), Takashi Oozeki (1), and Yoshinori Yamada (2)

(1) National Institute of Advanced Industrial Science and Technology, Tsukuba, Ibaraki, Japan (hideaki-ootake@aist.go.jp), (2) Meteorological Research Institute, Tsukuba, Ibaraki, Japan

Many photovoltaic (PV) systems have been installed in Japan after the introduction of the Feed-in-Tariff. For an energy management of electric power systems included many PV systems, the forecast of the PV power production are useful technology.
Recently numerical weather predictions have been applied to forecast the PV power production while the forecasted values invariably have forecast errors for each modeling system. So, we must use the forecast data considering its error.

In this study, we attempted to estimate confidence intervals for hourly forecasts of global horizontal irradiance (GHI) values obtained from a mesoscale model (MSM) de-veloped by the Japan Meteorological Agency. In the recent study, we found that the forecasted values of the GHI of the MSM have two systematical forecast errors; the first is that forecast values of the GHI are depended on the clearness indices, which are defined as the GHI values divided by the extraterrestrial solar irradiance. The second is that forecast errors have the seasonal variations; the overestimation of the GHI forecasts is found in winter while the underestimation of those is found in summer.

The information of the errors of the hourly GHI forecasts, that is, confidence intervals of the forecasts, is of great significance for planning the energy management included a lot of PV systems by an electric company. On the PV systems, confidence intervals of the GHI forecasts are required for a pinpoint area or for a relatively large area control-ling the power system. For the relatively large area, a spatial-smoothing method of the GHI values is performed for both the observations and forecasts. The spatial-smoothing method caused the decline of confidence intervals of the hourly GHI forecasts on an extreme event of the GHI forecast (a case of large forecast error) over the relatively large area of the Tokyo electric company (approximately 68 % than for a pinpoint forecast). For more credible estimation of the confidence intervals, it is required to consider the location of the installed PV systems or its capacity over the region.