

Representative Modeling Method in Each Climatic District for Forecast of Nationwide Daily-Solar-Irradiance Curve

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Daily-solar-irradiance curve forecast with higher precision is required for more efficient operation of energy supply system utilizing solar energy. The technique of the daily-solar-irradiance curve forecast which used feed-forward neural network (NN) and ERDI (Error Reduction method of Daily-total-irradiance by integrating the forecasted daily-solar-irradiance curve) has been developed. However, the technique needed to construct NN and to generate correction curve of ERDI. This back breaking process was called “Forecast method for Individual Site (FIS method)”. The present paper presents the simpler method, in which a representative model was individually applied for 10 climatic districts, named the method of “Climatic-District Representative modeling in Japan (CDR method)”. CDR method obviously makes it possible that the daily-solar-irradiance curve can be forecasted in the site where the weather data is not available.

The forecasting flow of the daily-solar-irradiance curve forecast using NN and ERDI method is shown in Fig. 1. If the daily-solar-irradiance curve would have been forecasted by FIS method, fiddly procedures such as selection of available data, training of the neural network, and generation of correction curve in ERDI method should be required for every forecast sites. In contrast, the daily-solar-irradiance curve would have been forecasted by CDR method, these fiddly procedures should not be required for every forecast sites. It should be required for 10 representative sites in each climatic district.

The daily-solar-irradiance curve was forecasted by CDR and FIL methods. Forecast errors between CDR and FIS methods were almost similar, which were in the range of 110 to 130 Wh/(m²·h) nationwide.

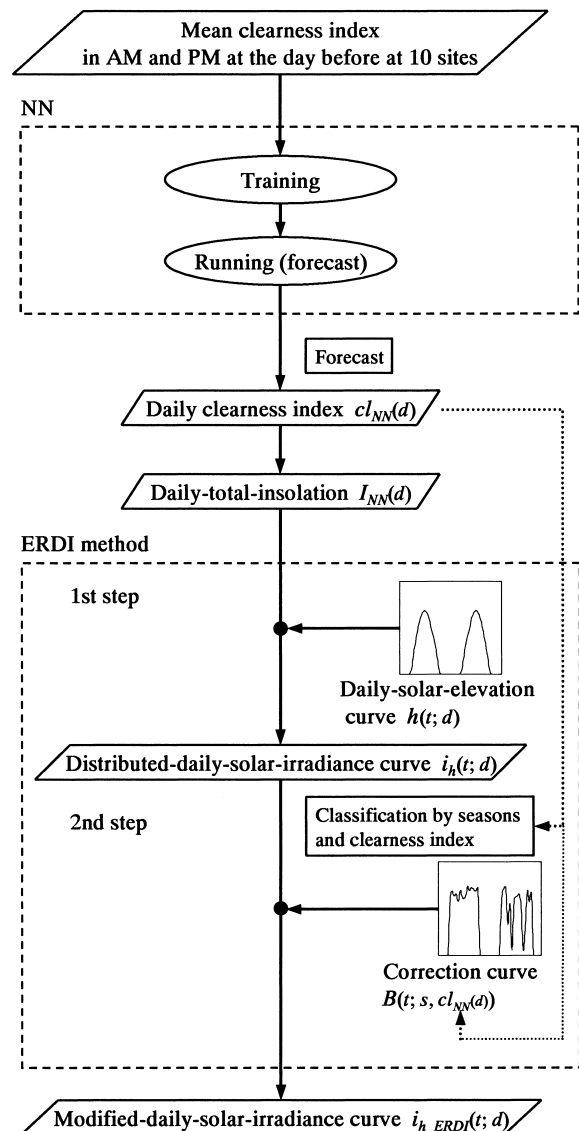


Fig. 1. Forecasting flow of the daily-solar-irradiance curve forecast using NN and ERDI method