

大気循環場を考慮した日射量予測の大外し事前検出手法 Advance detection method of large forecast error on surface solar radiation considering atmospheric circulation patterns

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Prediction of surface solar radiation (SSR) using numerical weather prediction (NWP) models usually use at several hours to several days forecast. Large forecast errors (forecast busts) for SSR and therefore photovoltaic power generation may lead to either a shortage of power supply or production of excessive surplus power.

Previous study proposed the detection method of forecast busts using lognormal ensemble spread (standard deviation of ensemble forecast). This study also evaluates lognormal ensemble spread as the four NWP centers (Japan Meteorological Agency: JMA, European Centre for Medium-Range Weather Forecasts: ECMWF, National Centers for Environmental Prediction: NCEP, United Kingdom Met Office: UKMO) and a multi-center grand ensemble (MCGE). However, this study assessed the detectability each atmospheric circulation patterns. The detectability was assessed using ROC diagram. The study period is January 2014 to May 2017 in five winter months (January, February, May, November, December), and forecast lead time is from 24 to 144 hour every 24hours. The forecast busts were defined as the top 5, 10, 15, 20, 25, 30% absolute forecast error. The atmospheric circulation patterns are categorized Winter monsoon (WM), Winter Pacific (WP), High Pressure (HP), Low Pressure (LP), Southerly Flow (SF) using 500hPa height.

As the results, the proposed method in this study indicate higher detectability of forecast bust than the non-categorized detection (previous study) method. For instance, the WP and SF patterns are higher than the non-categorized detection method. Particularly, the hit rate on proposed method was improved more large forecast error event (top 5% forecast busts events), false alarm rate was improved almost all forecast lead time and fix forecast busts cases.

キーワード：太陽光発電予測、アンサンブル予測、予測の大外し

Keywords: Prediction of surface solar radiation, Ensemble forecast, Forecast busts

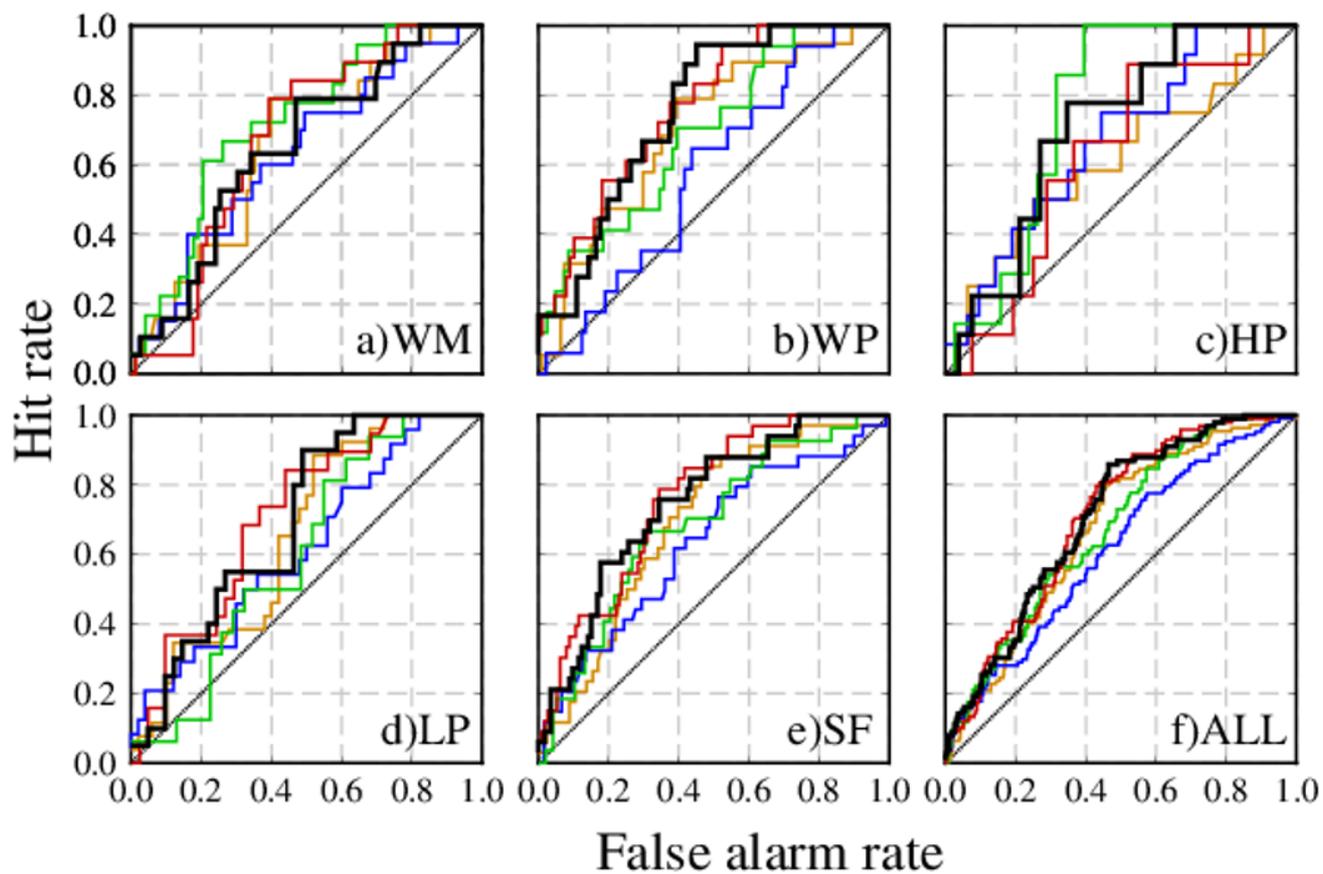


Fig. ROC diagram each circulation patterns (a-e) and non-categorized (f) curve at 24 hours forecast lead time. The forecast busts was defined as the top 20%. The black thick line indicate MCGE, color thin lines indicate JMA (red), ECMWF(Yellow), NCEP (green), UKMO(blue).