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Selection of wind farm placements oriented towards intermittency-mitigation: an assessment of two different methodologies in the Iberian Peninsula.

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Intermittency poses a severe limitation to the availability and a challenge to the assimilation of wind power in the energy supply. Diverse approaches have been applied to reduce this intermittency, one of them consisting in the use of climate information regarding the spatiotemporal structures of wind variability in the domain of interest, with the specific purpose of taking advantage of out-of-phase variations in different locations within the region, whose interconnection might contribute to stabilize the wind power supply. The present work provides an assessment of the performance of two techniques in achieving this goal: Principal Component Analysis (PCA), and Empirical Orthogonal Teleconnections (EOT). The test dataset is formed by three-hourly wind speeds from a simulation of the atmospheric evolution over the Iberian Peninsula from 2001 to 2012, with the regional atmospheric model REMO, at a horizontal resolution of 11 km. Wind speed is converted into wind power yield at each location by means of a suitable equivalent power curve. PCA and EOT are applied to this wind power data, and the ability of their resulting patterns to form supply-stabilizing combinations is assessed through a Montecarlo procedure. The sensitivity of the results to different parameters, such as wind farm number or minimum requested mean power at each location, is checked. Results suggest that EOT offers some advantages over PCA in terms of the number and quality of the spatial patterns displaying some utility in the selection of wind farm placements. EOT also appears to suffer from a lower sensitivity to modifications in the procedure parameters.