



## **Possible impact of the climate change and variations on the weather pattern in relation to wind power resources in East Japan**

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This study investigate about the impact of climate change (and variations) on the both the resource and variability of wind power generations. Self-organizing maps (SOMs) is employed on atmospheric variables derived from the JRA-55 reanalysis over the region, whereby a two-dimensional lattice of weather patterns (WPs) classified during the 1977–2010 period is obtained. The probabilistic relationships between synoptic scale atmospheric variables over East Japan and the local wind power generation/variation in East Japan are established. Future probabilistic projection of wind power under the global warming scenario is derived by this SOM lattices based on the WPs of the large ensemble simulation of the global warming experiments named d4PDF dataset. Because this analog ensemble approach effectively handles the stochastic uncertainties from the large number of ensemble members, a probabilistic wind power generation is easily and quickly obtained from the huge number of ensemble projections. As for the result of the future projection of wind power generation/variation in Japan, we find the relatively increased wind power generation in Japan corresponding with the future increase of the WPs which has advantages for the wind power generations. We also find the increase (decrease) of ramp down (up) probability (defined as a 30% change in power in less than six hours). The additional analysis for the impact of the Arctic Oscillation (AO) on the wind power generation in Japan clearly show that the negative relationship that is consistent with the result of the future projection.