



## **Applications of Self Organizing Maps in Wind Energy Meteorology**

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Self Organizing Maps (SOMs) is an unsupervised neural network-learning algorithm that has been proved to be an effective method for feature extraction and classification in meteorological problems. In synoptic climatology applications, the method is often used to find significant features that characterize the daily atmospheric circulation. Two examples of the use of the SOMs technique in wind energy meteorology applications are presented. In the first, the SOMs method used to identify the most likely synoptic patterns that generate high-frequency oscillations in the near-surface wind speed in the North Sea. These oscillations cause unexpected drops in energy production at offshore wind farms, which must be compensated by expensive reserve power. In the second, the SOMs method is used to select large-scale weather regimes used in a statistical-dynamical downscaling technique for determining regional wind resources. Results will be shown for the Scandinavia and the North Sea area where a long-term dynamical downscaling simulation was been run using the mesoscale model WRF driven by the NCAR/NCEP reanalysis.