

SATELLITE SAR APPLIED IN OFFSHORE WIND RESOURCE MAPPING: POSSIBILITIES AND LIMITATIONS

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Satellite remote sensing of ocean wind fields from Synthetic Aperture Radar (SAR) observations is presented. The study is based on a series of more than 60 ERS-2 SAR satellite scenes from the Horns Rev in the North Sea. The wind climate from the coastline and 80 km offshore is mapped in detail with a resolution of 400 m by 400 m grid cells. Spatial variations in wind speed as a function of wind direction and fetch are observed and discussed. The satellite wind fields are compared to in-situ observations from a tall offshore meteorological mast at which wind speed at 4 levels are analysed. The mast is located 14 km offshore and the wind climate is observed continuously since May 1999. For offshore wind resource mapping the SAR-based wind field maps can constitute an alternative to in-situ observations and a practical method is developed for applied use in WAsP (Wind Atlas Analysis and Application Program). The software is the de facto world standard tool used for prediction of wind climate and power production from wind turbines and wind farms. The possibilities and limitations on achieving offshore wind resource estimates using SAR-based wind fields in lieu of in-situ data are discussed. It includes a presentation of the footprint area-averaging techniques tailored for SAR-based wind field maps. Averaging techniques are relevant for the reduction of noise apparent in SAR wind speed maps.

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