



Anholt offshore wind farm winds investigated from satellite images

Hasager, Charlotte Bay; Badger, Merete; Volker, Patrick; Hansen, Kurt Schaldemose; Pena Diaz, Alfredo; van der Laan, Paul

Publication date:
2017

Document Version
Peer reviewed version

[Link back to DTU Orbit](#)

Citation (APA):
Hasager, C. B., Badger, M., Volker, P., Hansen, K. S., Pena Diaz, A., & van der Laan, P. (2017). Anholt offshore wind farm winds investigated from satellite images. Abstract from Offshore Wind Energy 2017, London, United Kingdom.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

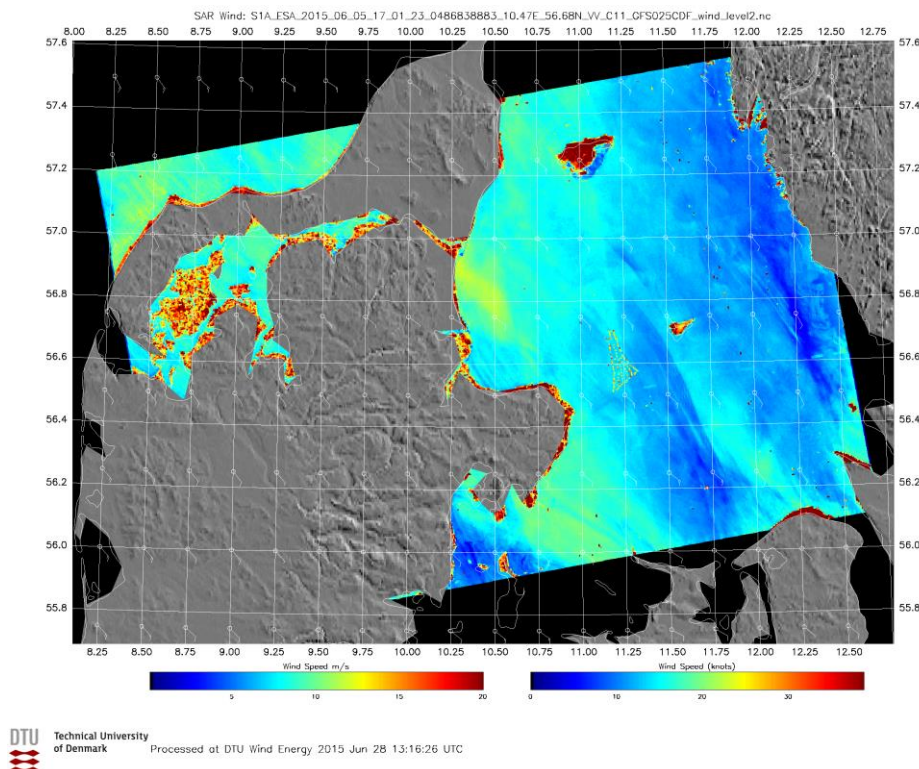
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Anholt offshore wind farm winds investigated from satellite images

C. B. Hasager^a, Merete Badger^a, Patrick Volker^a, Kurt S. Hansen, Alfredo Peña^a, Paul van der Laan^a

The Anholt offshore wind farm in the Kattegat Strait has its centre position around 56.6°N and 11.2°E. The Sentinel-1 satellite carries a C-band Synthetic Aperture Radar (SAR). A SAR-based instantaneous wind speed map from May 5th, 2015 at 17:01 UTC is shown below (See¹). The wind speed is low at this particular moment and the backscatter from the wind turbines is much higher than that from the sea. Therefore the wind turbines are contrasted clearly as yellow/orange dots at the Anholt wind farm. Along the Swedish coast several ships (red dots) are visible. The SAR-based wind speeds can be trusted at around 1 km distance from any coastline except in grid cells with wind turbines, ships and other hard targets. The grid resolution is 1 km by 1 km. The wind direction is from the south west.

The satellite SAR analysis is based on ~1.000 SAR images from Envisat ASAR recorded from August 2002 to April 2012, i.e. before the wind farm was constructed. Based on these data the wind resource is estimated. Concurrent Sentinel-1 SAR data and available SCADA and lidar data, kindly provided by DONG Energy and partners, for the period January 2013 to June 2015 account for ~70 images, while ~300 images are available for Sentinel-1 from July 2015 to February 2017. The Sentinel-1 wind maps are investigated for wind farm wake effects. Furthermore the results on wind resources and wakes are compared to the SCADA and model results from WRF, Park, Fuga and RANS models.



¹ Figure 1. Sentinel-1 satellite SAR wind speed map covering the Kattegat Strait on May 5th, 2015 at 17:01 UTC.

^a DTU Wind Energy, Roskilde and Lyngby, Denmark