

Autonomous Aerial Sensors for Wind Power Meteorology

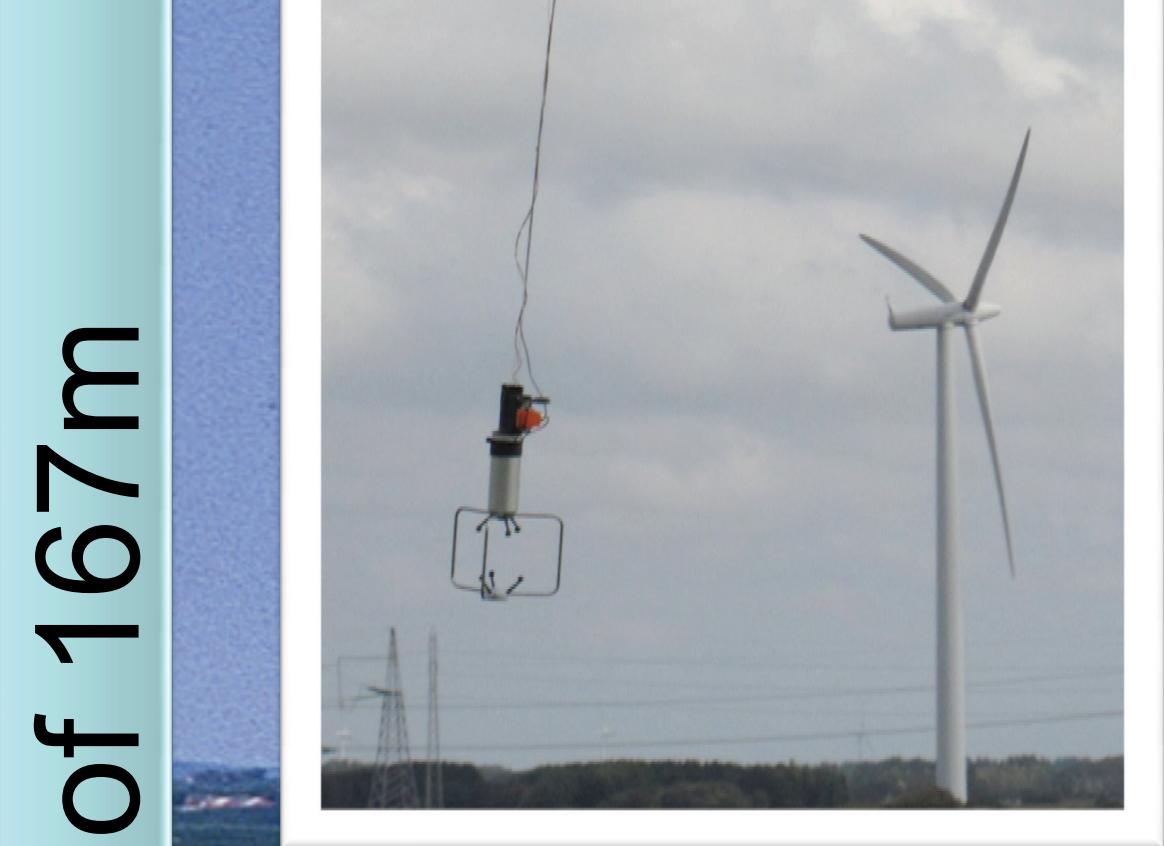
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Project to investigate the applicability of Autonomous Aerial Vehicles with wind sensors for wind power meteorology

This poster describes a new approach for measurements in wind power meteorology using small unmanned flying platforms. During a week of flying a lighter-than-air vehicle, two small electrically powered aeroplanes and a larger helicopter at the Risø test station at Høvsøre [NEWS: due to legal reasons regarding overflight rights, we will fly at Nøjsomheds Odde], we will compare wind speed measurements with fixed mast and-LIDAR measurements, investigate optimal flight patterns for each measurement task, and measure other interesting meteorological features like the air-sea boundary in the vicinity of the wind farm. In order to prepare the measurement campaign, a workshop was held, soliciting input from various communities.

Flight Week at DONG Energy wind farm, Nøjsomheds Odde, Danish National Test Station for Large Wind Turbines, Høvsøre, DK



2 met masts of 167m



Lidars

Risø DTU: **Skydoc**

Lighter-than-air platform
Equipped with GPS, sonic anemometer, and other met sensors. Data acquisition synchronised to 200 ns and 10 cm absolute accuracy from GPS signal.

Wakes

Taylor's hypothesis

Flight patterns

Loads

Questions to answer from the project

Air-sea boundary

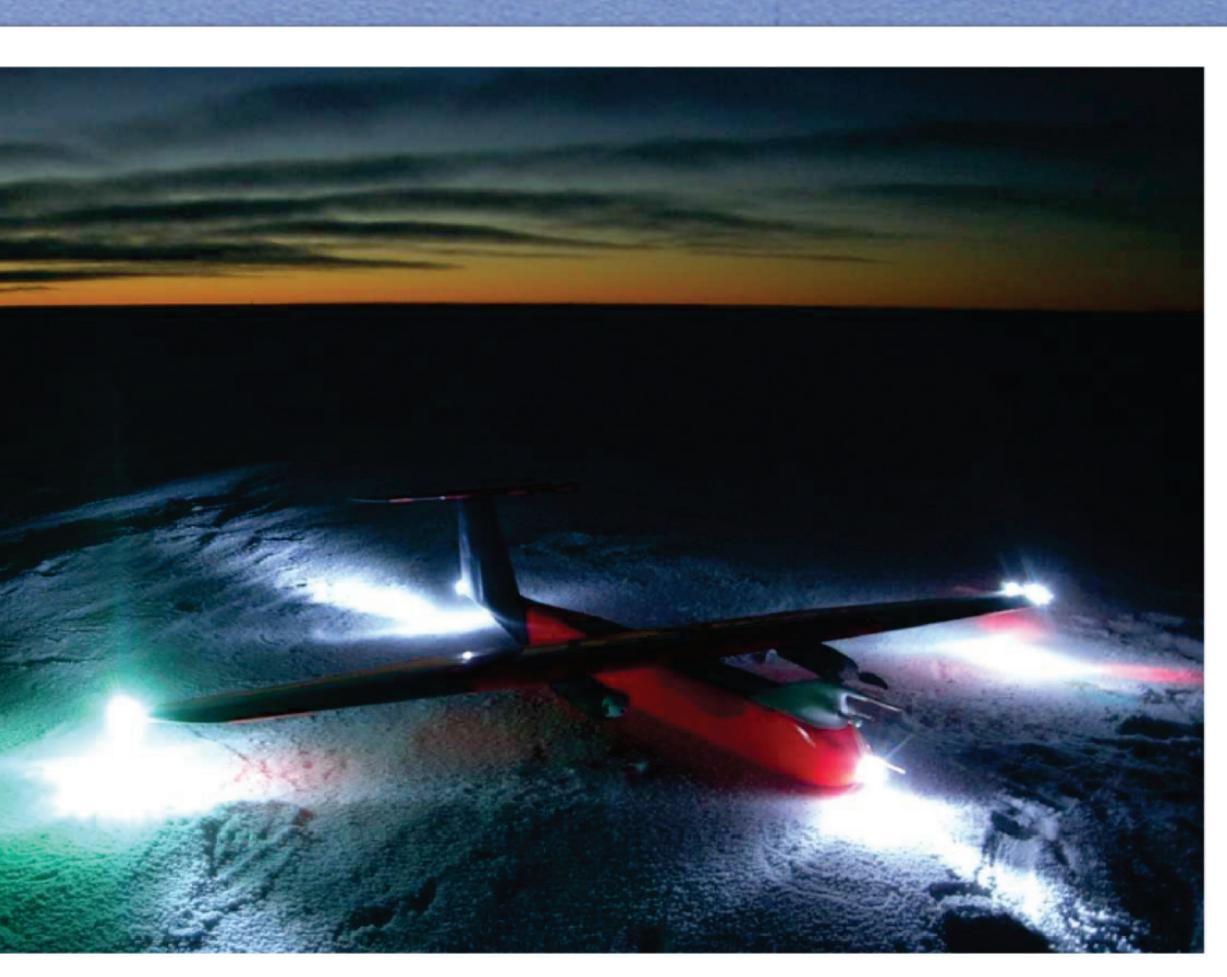
Profiles

Distance to turbines?

Accuracy?

Flight envelope

Website: aerialwindsensors.risoe.dk



Uni Tübingen: **M²AV**

2-m plane with high-resolution pitot tubes and other met sensors. Electrically flying, flight system developed by Mavionics.



Aalborg University: **Helicopter**

Equipped with laptop, GPS, sonic anemometer, and other met sensors. Total weight <25 kg.



Uni Bergen: **SUMO**

Small Unmanned Meteorological Observer
Up to 5 planes, 580g each, equipped with GPS, temperature, pressure and humidity sensors.
Potential for very small Pitot tube.