



## **A "Remotely Piloted Air System" (RPAS) as complementary measurement tool for wind energy site evaluation, using the example of the project "Lidar Complex"**

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The project "Lidar Complex", funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, is part of the research network "WindForS", based in Southern Germany. The goal of the project is to establish lidar technology for wind energy plant site evaluation in complex terrain. Meteorological towers, CFD-simulation and measurements with small RPAS should help to validate lidar data, find systematical errors and correct them eventually.

At the Center of Applied Geoscience at the University of Tübingen, the research UAV MASC (Multi-purpose Airborne Sensor Carrier) was developed. RPAS of type MASC have a wingspan of 3 m and a maximum take-off weight of 7 kg, including payload. The standard meteorological payload includes instruments for temperature, humidity, pressure and wind measurements. It is able to resolve turbulence fluctuations up to 20 Hz.

The autopilot ROCS (Research Onboard Computer System), which is developed at the Institute of Flight Mechanics and Control, University of Stuttgart, makes it possible to automatically follow predefined waypoints at constant altitude and airspeed. At a cruising speed of 24 m/s and a battery life of approx. one hour, a range of 80 km is possible.

In wind energy meteorology, RPAS have the clear advantage compared to manned aircraft that they are be able to fly very close to the ground and in between individual wind turbines.

In the project lidar complex, the turbulence measurements of MASC should be used as boundary condition for CFD simulation to be able to realistically model the wind field in the sites of interest.

Preliminary results of first measurements in spring 2013 at the test site near Stötten in the Swabian Alb will be presented.