



Turbulence measurements in a wind park with the Micro-UAS SUMO

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The Small Unmanned Meteorological Observer (SUMO), a micro-UAS with a length and wingspan of around 80 cm, has been equipped with a miniaturized 5-hole probe for turbulent flow measurements with 100 Hz temporal resolution. It has for the first time been operated in and around a wind farm during a 5 day field campaign in May 2011 close to Vindeby, Lolland in Denmark, a small wind farm consisting of 21 Bonus 1 MW-turbines. The campaign was dedicated to the investigation of the effects of wind turbines on boundary layer turbulence.

A total of 20 SUMO flight missions carrying the turbulence system have been performed during the campaign. In spite of a few pitfalls related to the fine-tuning of the autopilot system and in the configuration and synchronization of the corresponding data logging systems, this campaign provided promising results indicating the capability and future potential of small UAS for turbulence characterization in and around wind farms. Subsequent flights upwind and downwind of the park revealed qualitatively a distinct enhancement in the turbulence level behind the wind farm.