



## RPA-borne Measurements of Vertical Profiles and Turbulent Fluxes of the Near-Coastal North Sea Boundary-Layer during Strong Winds

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There is interest from the offshore wind energy sector in obtaining in-situ measurements of the vertical profiles and turbulent statistics of atmospheric properties. The Multi-Probe Airborne Sensor Carrier (MASC), developed at the University of Tübingen, is a remotely piloted aircraft of approximately 3 m wingspan, and 5 kg in weight. MASC is capable of making turbulent-scale measurements of the wind vector, temperature, and humidity, up to altitudes of several hundred metres.

To date, forty flights of 30 minutes duration were made during October 2014 and February 2015, as part of the OWEA Loads project (University of Oldenburg). The flights were 1 km off the shore of Helgoland, a North Sea island 50 km to the north of Germany. This site was chosen because during prevalent westerly winds, conditions should represent those at a wind park 70 km to the west of Helgoland. Flying directly at the site was not possible, so a compromise had to be reached.

Strong winds were experienced during both campaigns: 10 m wind speeds of up to 15 m/s, and 300 m wind speeds of up to 23 m/s were measured. Preliminary analysis has revealed a variety of fetch influences on the measurements: near-neutral boundary layers with a logarithmic wind profile during northerly and westerly winds; near-surface stable layers possibly related to the proximity of the relatively cold German landmass during southerly winds in February; and clear influence of the island, immediately upwind during easterly winds. Thus there are several potential research questions which we may begin to address, with our dataset.