



## **Description of the RPAS "MASC" as a measuring platform for thermodynamic processes in the ABL**

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The remotely piloted air system (RPAS) system MASC (Multipurpose Airborne Sensor Carrier) was developed at the University of Tübingen in cooperation with the University of Stuttgart, University of Applied Sciences Ostwestfalen-Lippe and "ROKE-Modelle". Its purpose is the investigation of thermodynamic processes in the atmospheric boundary layer (ABL), including observations of temperature, humidity and wind profiles, as well as the measurement of turbulent heat, moisture and momentum fluxes.

The aircraft is electrically powered, has a maximum wingspan of 3.4 m and a total weight of less than seven kilogram. This includes the standard meteorological payload consisting of temperature sensors, a humidity sensor, a flow probe, an inertial measurement unit and a GNSS. In normal operation, the aircraft is automatically controlled by the ROCS (Research Onboard Computer System) autopilot to be able to fly predefined paths at constant altitude and airspeed.

Since 2010 the system has been tested and improved intensively. In September 2012 first comparative tests could successfully be performed at the test site of Germany's National Meteorological Service (DWD). In the three day period of the experiment, vertical profiles in synchronization with radiosonde ascents and square patterns surrounding the 99 m tower at three levels were performed to test the airborne measurements. Also, legs of 1 km length were flown for comparison of flux measurements.

The results that will be presented show good agreement between temperature, humidity and wind measurements of the UAV and local tower data, radiosondes and remote sensing systems like wind profiler and SODAR.

In 2013 several campaigns are planned and executed. These campaigns include basic atmospheric boundary layer research, but also wind energy meteorology. Preliminary results of the most recent experiments will be presented.