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Meteorological and Aerosol Sensing with small Unmanned Aerial Systems

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Unmanned Aerial Systems (UAS) facilitate the monitoring of several meteorological and aerosol parameters with high resolution in space and time. They are small, easy to operate, cost efficient and allow for flexible application during field campaigns.

We present two experimental payloads for measurement of relative humidity, temperature, aerosol size distribution and the collection of aerosol samples on board the small UAS SIRIUS II. The payload modules are light weight (<1kg) and can be easily switched between two flights. All sensors can be controlled from the ground and the measured data is recorded by the autopilot together with the position data.

The first module contains a sensor package for measurement of relative humidity and temperature and the Compact Lightweight Aerosol Spectrometer Prope (CLASP) for acquisition of aerosol size distributions. CLASP measures aerosol particles with diameters from 0.12μm to 9.25μm in up to 32 channels at a frequency of 10 Hz. The second module also contains a humidity and temperature sensor package and the aerosol sample collection device. The aerosol sampler collects air samples at 2 l/min onto a sample holder. After the flight the ice nuclei on the sample holder are activated in the lab and counted.

In August 2012 the complete setup will be used during a measurement campaign at mount “Kleiner Feldberg” close to Frankfurt. Until then we will perform test flights and additional laboratory tests.