# Drone for Atmospheric Measurements

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*Small unmanned aerial vehicles (UAVs) also called RPAS (Remotely Piloted Aircraft Systems) have the possibility to revolutionize atmospheric boundary layer research. In this project we developed and tested an instrument-logger package mounted on a commercially available quadracopter platform.*



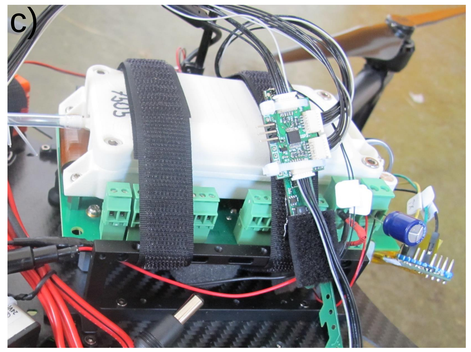


Figure 1a)-b) Drone in action. Platform used is the commercially available DJI Matrice 100 c) Close up on the SenseAir $CO_2$ prototype sensor HPP

## Instrumentation

The system was designed to work in the ongoing greenhouse gas research projects at the department. We incorporated a new prototype version of a high performance $CO_2$ sensor by the Swedish company SenseAir. Additional sensors measured temperature, relative humdity, pressure and position (GPS). Drone platform from DJI (Matrice 100).

The logger unit was based on the same technology as the SparvEmbedded radiosounding system utilizes.

## Results

So far, (2017-06) two flight test have been performed trying out the system performance.

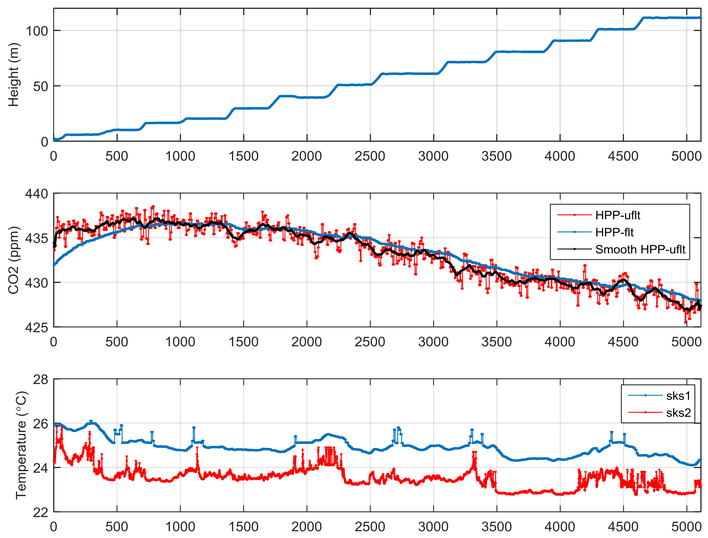


Figure 2) Timeseries of height, $CO_2$ and temperature during a stepwise ascent to 110 m, x-scaling: time in ms. Sks2 temperature sensor not calibrated.

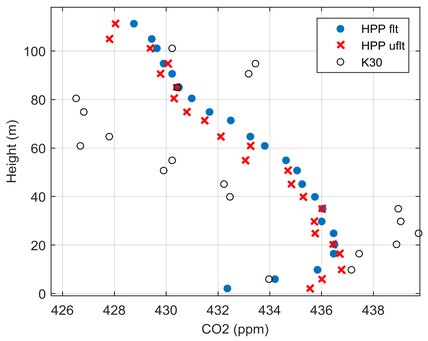


Figure 3) $CO_2$ variation with height during same flight as in 2). Two different signal processing options are shown (HPP) as well as the low cost K30 sensor.

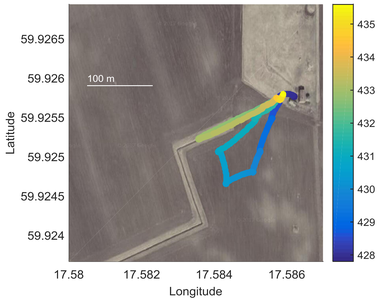


Figure 4) Example of geographic representation for $CO_2$ measurements at 5 m height. Measurements made at the Marsta field station

## Outlook

Results are encouraging. This system should be able to contribute to map/estimate GHG sources. Additional instrumentation for e.g. particles will add to the monitoring and research capabilities.

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