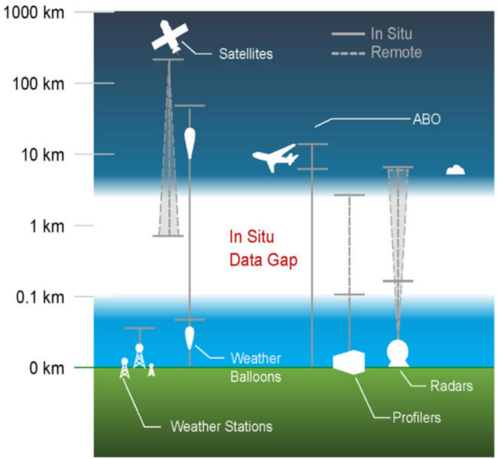
Testing of an automated meteorological drone at the Lindenberg Observatory (DWD)

Goal of my project

- Help to reduce the data gap in the lower atmosphere with high freqent measurements
- Evaluation of the Meteodrone in terms of:
  - data quality
  - availability
  - cost
  - benefits



Bulletin of the American Meteorological Society 102, 11; 10.1175/BAMS-D-20-0138.1

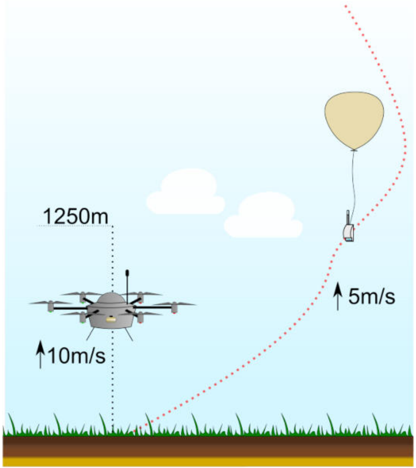
Key parameter of the UAV (Meteodrone MM-760)

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

- Manufacturer: Meteomatics
- Ø: approx. 96 cm
- Mass: approx. 5 kg
- Flight duration: approx. 20 min
- Max. flight altitude: 6000 m AMSL
- Max. wind speed: 90 $\mathrm{km\,h^{-1}}$
- Max. climb rate: 10 $\mathrm{m\,s^{-1}}$
- Temperature range: -40 °C bis 50 °C
- Heatable rotors
- Integrated parachute system

Mode of operation

- Vertical profiles (due to flight restrictions):
  - up to 2 km during nighttime
  - up to 1.2 km during daytime
- Profiles parallel to radiosonde ascents (within a 20 s time window)
- Additional profiles are taken 15 min before and after each launch




PRELIMINARY RESULTS !

Example measurments (night time)

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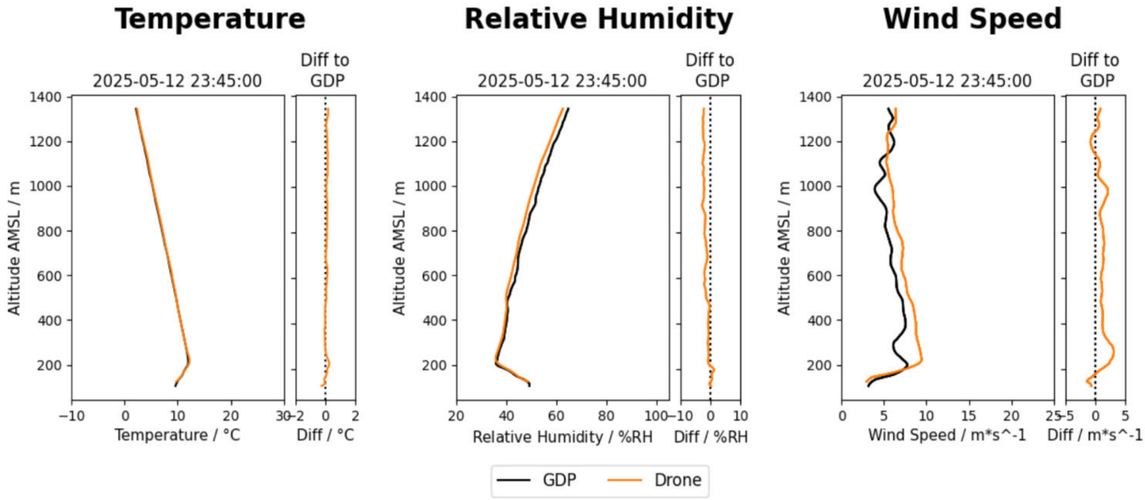
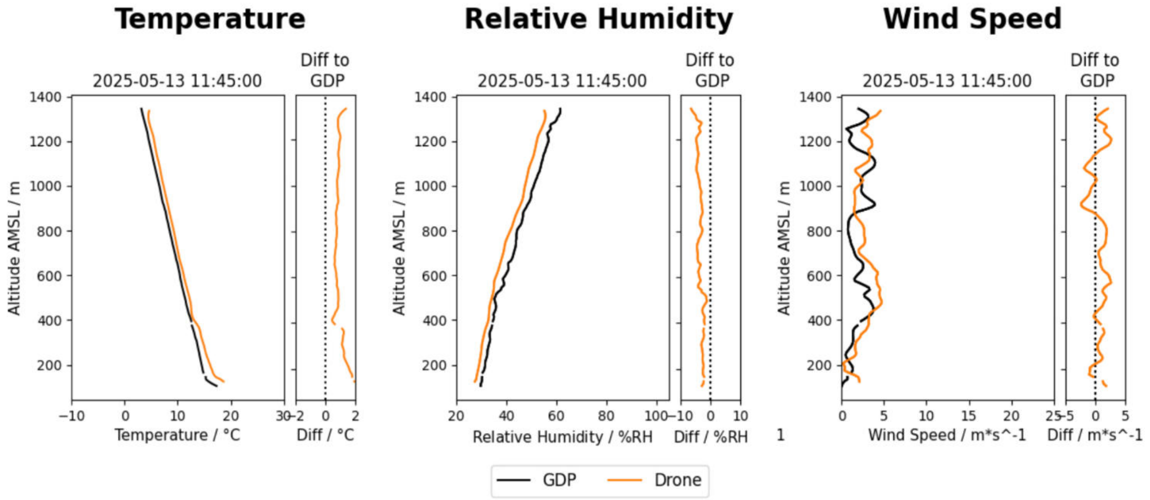


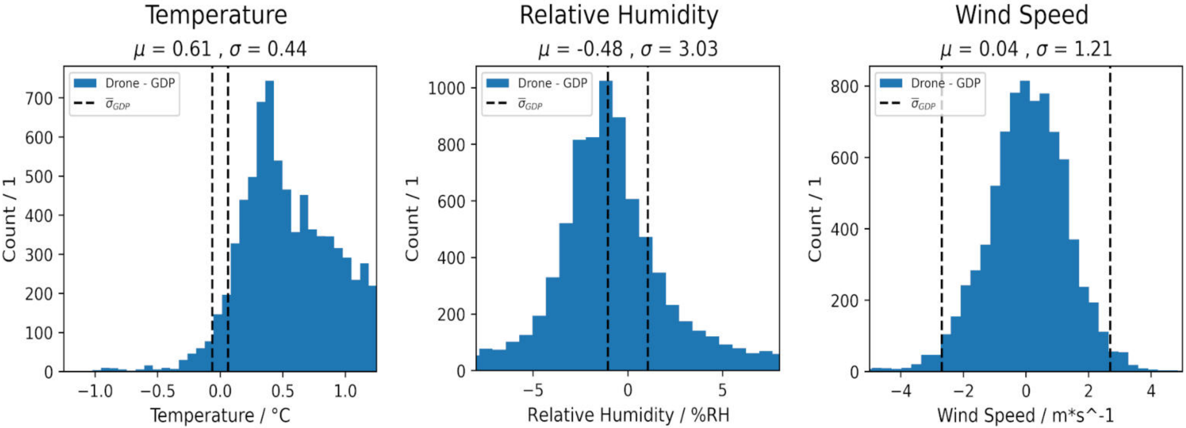
Example measurments (day time)

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



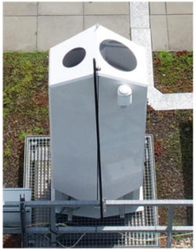
Difference Drone - GDP

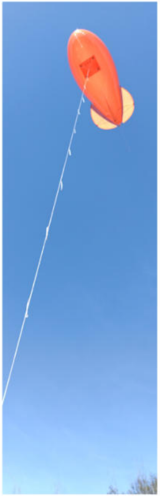
Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Further comparative measurements

- Radiosondes
  - Regular
  - Mounted to the drone
- Tethered ballon
- Remote sensing systems
  - Lidar
  - Wind profiler
  - DIAL





Future Goals

Deutscher Wetterdienst
Wetter und Klima aus einer Hand
DWD

- Evaluate the use of more complex flight patterns to monitor a specific air volume in more detail.
- Establishment of autonomous flights 24/7
- Simultaneous use of several drones

Request for advice

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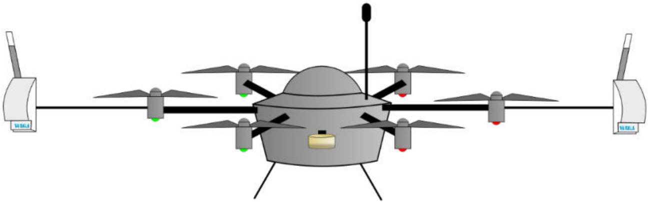
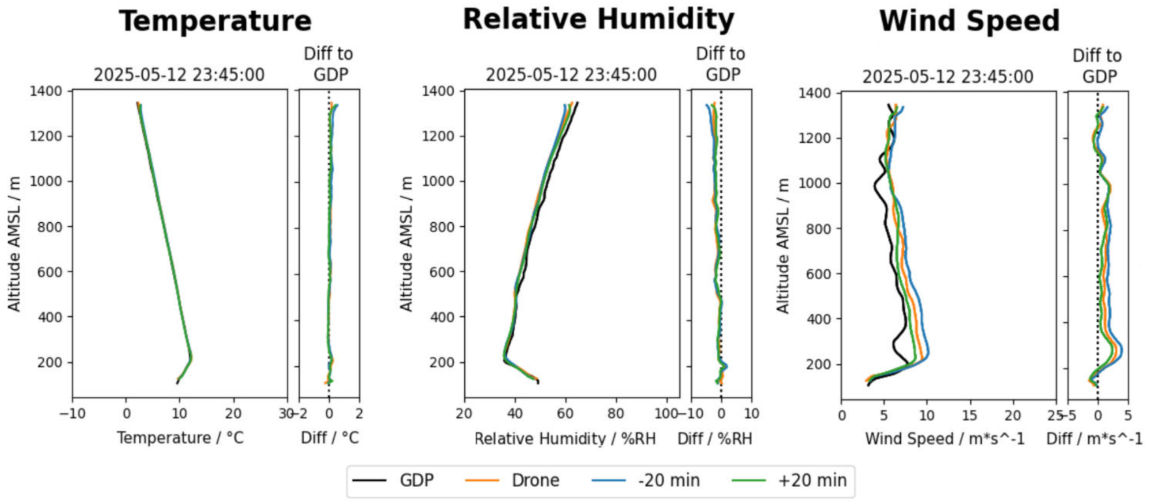


Thank you for your attention !

Example Measurments (multible drone flights)

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Example Measurments (multible drone flights)

Deutscher Wetterdienst
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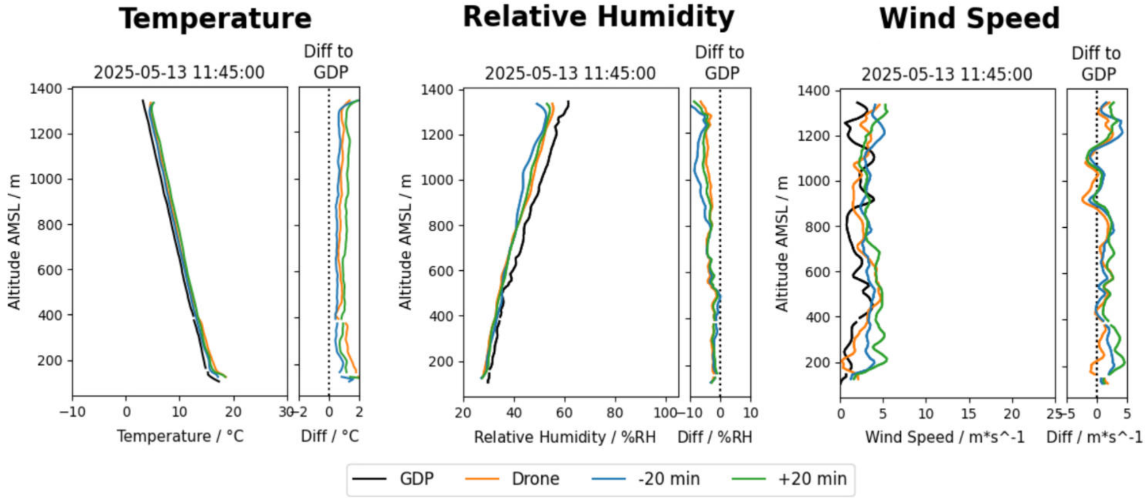

Difference GDP - Drone (All Parameter)