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Turbulence and low-level jet: a case study for 2 July 2011

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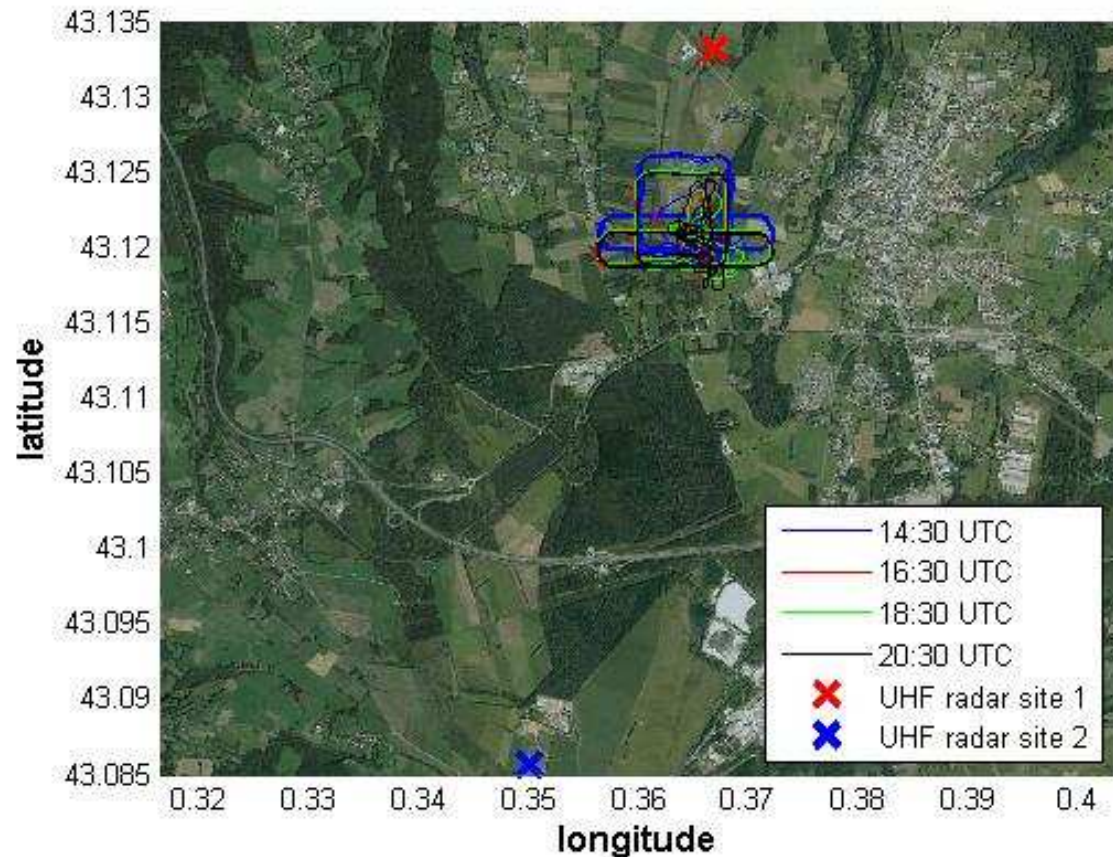
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Data base:

- 4 flights M²AV
- 2 UHF radar (site 1, 2)
- Frequent radiosonde (site 2)
- Sunset 19:42 UTC

Flight	takeoff [UTC]	landing [UTC]
1	14:31	15:14
2	16:36	16:59
3	18:23	19:04
4	20:26	21:10



Lampert, A., Pätzold, F., Lobitz, L., Martin, S., Lohmann, G., Canut, G., Legain, D., and Bange, J.: Observing local turbulence and anisotropy during the afternoon transition with an unmanned aerial system – a case study, *Atmos. Chem. Phys. Discuss.*, doi:10.5194/acp-2015-1060, in review, 2016.

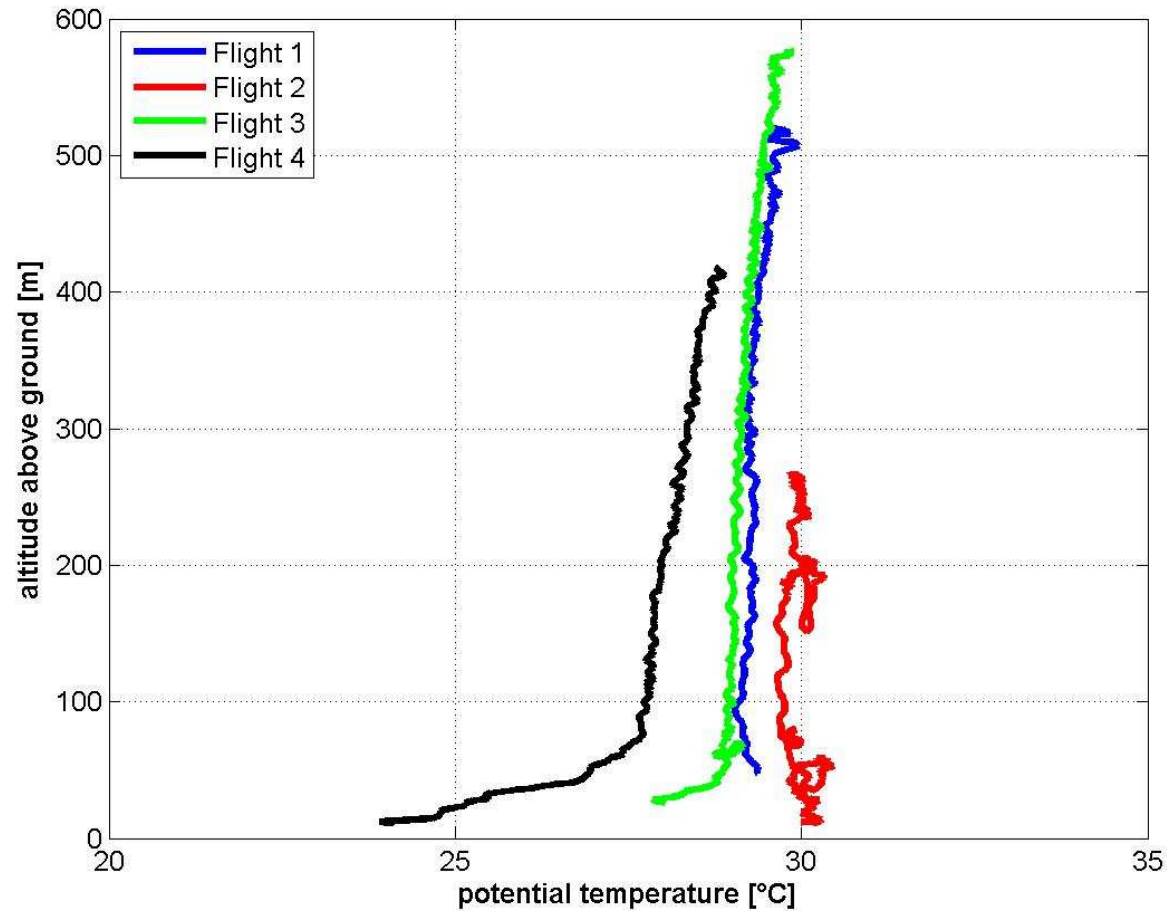


Meteorological Mini Aerial Vehicle (M²AV)

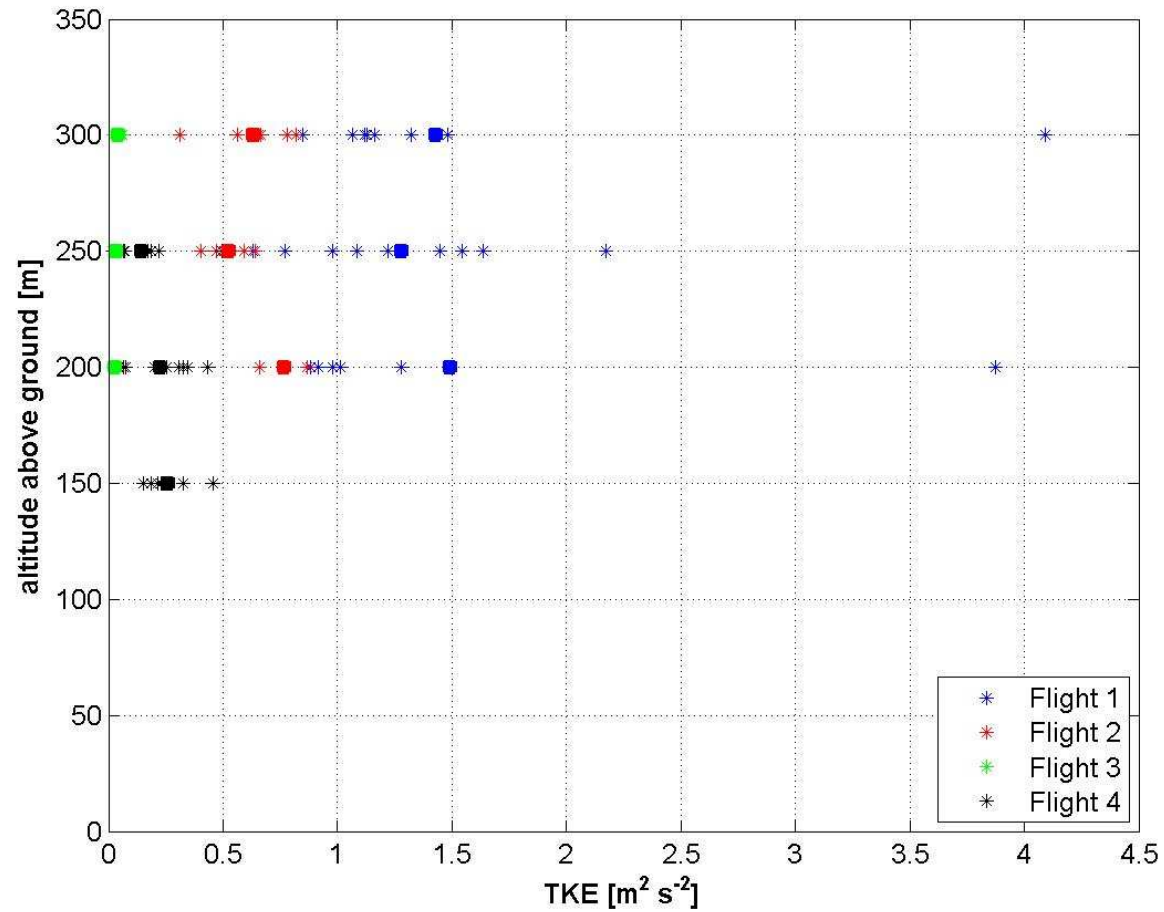


- In operation since 2005
- Automatic turbulence measurement system
(3D wind, temperature, humidity)
- air speed 22 m/s
- Weight: ca. 6 kg
- Payload: 1,5 kg
- Data acquisition rate: 100 Hz
- Wing span: 2 m

Temperature profiles M²AV

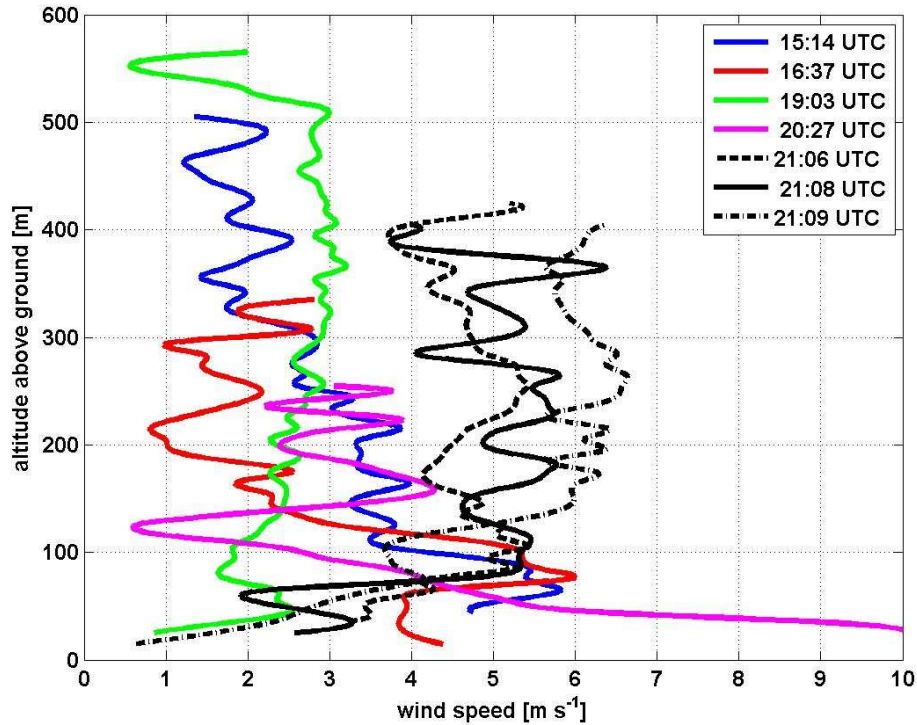


TKE

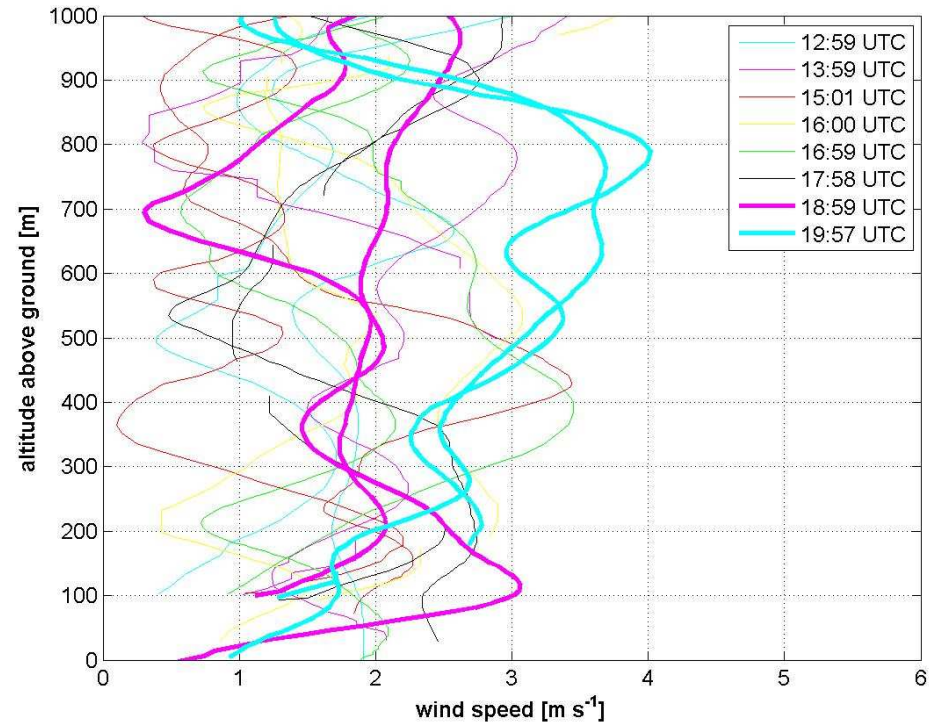


→ increase of TKE after sunset (Flight 4)

Wind speed profiles

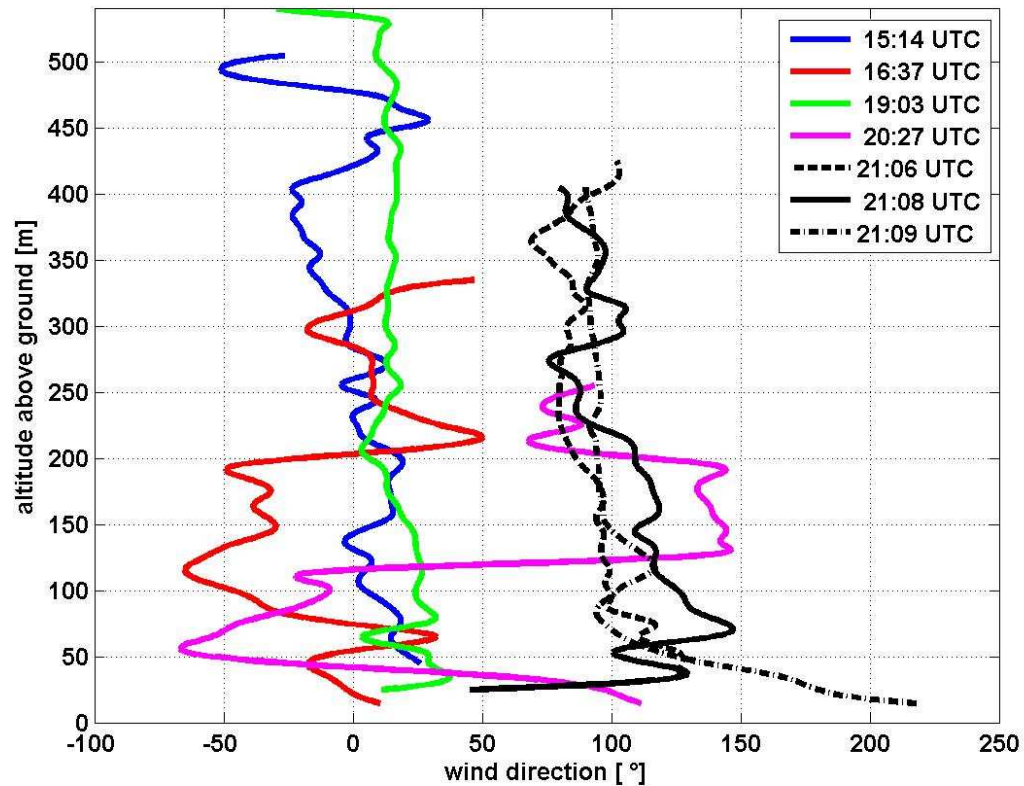


→ M²AV near site 1



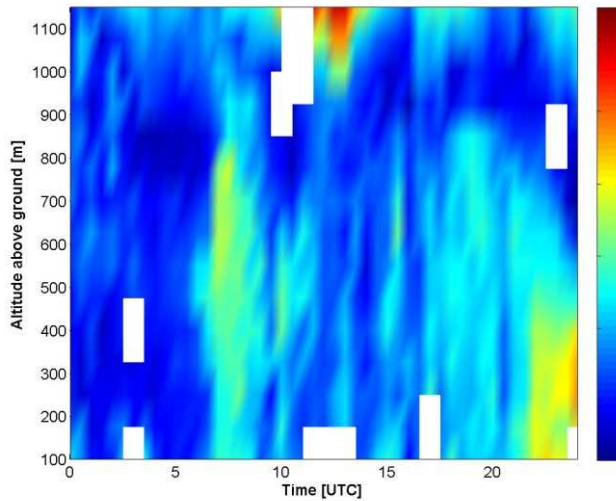
→ Frequent radiosonde near site 2

Wind direction profiles

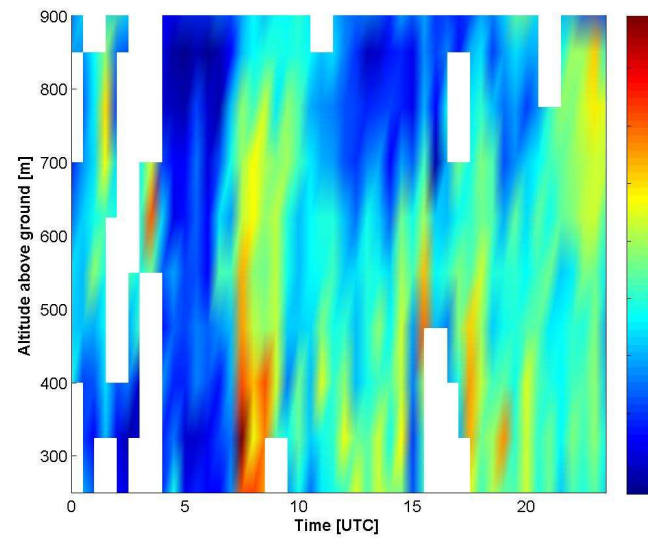


→ M²AV near site 1: change in wind direction from N to E after sunset

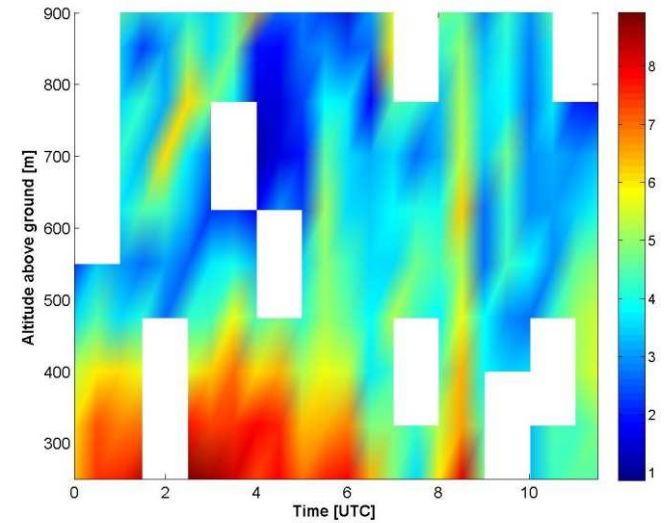
Nocturnal low-level jet



→ UHF site 2 (S)
LLJ earlier



→ UHF site 1 (N)
LLJ later



Anisotropy ratio

$$A = \frac{\sigma_v^2}{\sigma_w^2}$$

Ratio of
wind speed variances
in vertical and
horizontal direction

