Measurement highlights of temperature and aerosol fields with rotational Raman lidar at Hornisgrinde

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**Measurement site**

The scanning rotational Raman lidar (RRL) of University of Hohenheim (UHOH) was deployed on top of Hornisgrinde (Supersite SuSi H), the highest peak in the Northern Black Forest at an elevation of 1161 m above sea level (ASL).

**IOP 9c, 20 July 2007: Forced convection**

- **Fig. 1.** The supersite transect in the Northern Black Forest region. T. H and U are the three COPS supersites: Rohr, Hornisgrinde and Mug Valley, respectively.

- **Fig. 2.** Measurements in the pre-convective period in the morning at SuSi H. Particle backscatter coefficient measured with the UHOH RRL. The data resolution are 10 s and 75 m, respectively. A gliding average of 3 minutes and 300 m were applied to the signals.

- **Fig. 3.** Same period as Fig. 2 but gradient of potential temperature measured with the UHOH RRL. The temporal and spatial resolution are 10 s and 75 m, respectively. A gliding average of 3 minutes and 300 m were applied to the signals.

- **IOP 3a, 14 June 2007: Weakly forced diurnal convection**

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- **Fig. 4.** a: Time-height cross section of particle backscatter coefficient at 355 nm on 14 June 2007. b: same as (a) but for temperature.

- **Fig. 5.** a: Profiles of potential temperature measured by the UHOH RRL and radiosonde (launched at SuSi H) and relative humidity measured by radiosonde. The range resolution of the lidar data is 37.5 m. The lidar data were averaged for 30 minutes and b, c: Wind speed and wind direction measured by the Doppler lidar of IMK-FKZ with a range resolution of 50 m (courtesy of A. Wieser and K. Träumner).

- **Fig. 6.** Power spectra of temperature fluctuations at 3 different heights calculated with the data shown in Fig. 4b. The $-5/3$ slope of the inertial subrange is shown additionally.

- **Fig. 7.** Second order autocorrelation function (ACF) around the zero lag obtained from the temperature data shown in Fig. 4b at 468.75 m, 371.25 m and 993.75 m AGL, and the power law fit for the zero-lag variance estimation.

- **Fig. 8.** a: Calculated noise variance by applying the ACF at each height using the power law fit. The upper axes show the temperature error. Statistical temperature uncertainties arising from the photon-counting data are shown for comparison. b: Resulting profile of temperature variance. Error bars show the noise error of the variance and the sampling error.

**UHOH RRL measurements during COPS**

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**References:**

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