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Boundary layer dynamics in a small shallow valley near the Alps (ScaleX campaign)

M. J. Zeeman (1,*), B. Adler (2), T. Banerjee (1), P. Brugger (1), F. De Roo (1), S. Emeis (1), M. Mauder (1), K. Schaefer (1), H. P. Schmid (1), and B. Wolf (1)

(1) Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research (IMK-IFU), Garmisch-Partenkirchen, Germany, (2) Karlsruhe Institute of Technology (KIT), Institute of Meteorology and Climate Research (IMK-TRO), Eggenstein-Leopoldshafen, Germany, (*) Corresponding author (matthias.zeeman@kit.edu)

The diurnal evolution of the atmospheric boundary layer was investigated with focus on the connection between surface exchange processes and atmospheric circulations at the regional to local scale. Our experiment is part of an ongoing, multi-disciplinary study on scale dependencies in the transport of energy and matter (ScaleX) at the TERENO Prealpine observatory in Germany.

Vertical profiles of wind speed and air temperature were observed up to 1000 m above ground during June and July 2015 in a small shallow prealpine valley in Bavaria, Germany. Wind vectors and temperature were observed using ground-based optical, acoustic and radiometric remote sensing techniques. Spatial patterns in wind speed and direction were determined using eddy covariance systems, 3D Doppler LIDAR and acoustic sounding (RASS). Three Doppler LIDAR units (Halo Photonics Streamline) were configured to form a virtual tower at the beam intersect. Temperature profiles were observed using radio-acoustic sounding (RASS) and a microwave radiometer (HATPRO). The spatial resolutions of the resulting vertical profiles were between 3–100 m in intervals between 1–15 min.

The observed variability in wind vectors and stability showed evidence of the link between flow phenomena at micro- to mesoscale and local biosphere-atmosphere exchange processes. We present first results and discuss the predictability of the impact of local and regional (alpine) landscape features on flow and structures in the atmospheric boundary layer.