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Scanning 10-W Water Vapor DIAL for the Investigation of Atmospheric Turbulence and Land-Atmosphere Feedback

Andreas Behrendt, Florian Spaeth, and Volker Wulfmeyer

University of Hohenheim, Inst. for Physics and Meteorology, Stuttgart, Germany (andreas.behrendt@uni-hohenheim.de)

We will present recent measurements made with the water vapor differential absorption lidar (DIAL) of University of Hohenheim (UHOH). This scanning system has been developed in recent years for the investigation of atmospheric turbulence and land-atmosphere feedback processes.

The lidar is housed in a mobile trailer and participated in recent years in a number of national and international field campaigns. We will present examples of vertical pointing and scanning measurements, especially close to the canopy. The water vapor gradients in the surface layer are related to the latent heat flux. Thus, with such low-elevation scans, the latent heat flux distribution over different surface characteristics can be monitored, which is important to verify and improve both numerical weather forecast models and climate models.

The transmitter of the UHOH DIAL consists of a diode-pumped Nd:YAG laser which pumps a Ti:sapphire laser. The output power of this laser is up to 10 W. Two injection seeders are used to switch pulse-to-pulse between the online and offline signals. These signals are then either directly sent into the atmosphere or coupled into a fiber and guided to a transmitting telescope which is attached to the scanner unit. The receiving telescope has a primary mirror with a diameter of 80 cm. The backscatter signals are recorded shot to shot and are typically averaged over 0.1 to 1 s.