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Kompaktes automatisches Raman-Lidar für kontinuierliche Temperatur-, Wasserdampf- und Aerosol-Messungen

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Water-vapor and temperature profiles with high accuracy and vertical resolution from the surface to the lower troposphere are fundamental for accurate weather forecasts, process studies, and validation of satellites. Within the ACROSS project (Advanced Remote Sensing - Ground Truth Demo and Test Facilities) of the Helmholtz Alliance, a new remote sensing system fulfilling these requirements are being developed by the Institute of Physics and Meteorology (IPM) at the University of Hohenheim (UHOH).
The aim of the ACROSS project is close the gap in the data assimilation of satellite-based earth-observing systems, offering reference data of environmentally essential parameters in different spatial and temporal resolution, in order to enable its interpretation in the field of environmental science.
This new remote sensing system will be a robust, portable, high-power, scanning rotational Raman lidar. It will be based on the knowledge acquired at the IPM in the development of different generations of rotational Raman lidar systems in the recent years. The system is intended to measure atmospheric temperature profiles with high resolution, even in daytime conditions due to the use of a strong UV laser radiation and an optimized receiving chain in each one of the implemented channels.
It is well known that different parts of a pure rotational Raman backscatter spectra show different temperature dependence. Therefore, the ratio from two backscattered signals from two of this parts can be used to obtain a temperature profile of the atmosphere. Besides, an elastic and water-vapor profile can be measured.
First atmospheric measurements have been obtained during the Land-Atmosphere Feedback Experiment (LAFE) at the Southern Great Plains (SGP) central facility in August, 2017. Measurements taken at the new UHOH Land-Atmosphäre Feedback Observatorium (LAFO) between August and November 2018 will be shown.
The new lidar will enhance the Terrestrial Platform planned inside the ACROSS project, showing the potential of remote sensing systems gathering ground-truth information about the land-surface-atmosphere feedback, the behavior of the atmospheric boundary layer and the lower troposphere.