



Distributed sounding of the boundary layer using multiple unmanned aerial systems during the ScaleX campaign 2016

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In order to observe and better understand micro scale processes of interaction between the surface and the atmosphere and to relate them to meso and macro scale processes, an intensive measurement campaign at the TERENO (Terrestrial Environmental Observatories) site Fendt in southern Germany was organized in summer 2016 by IMK-IFU (Institute of Meteorology and Climate Research – Atmospheric Environmental Research) / KIT (Karlsruher Institute for Technology) under participation of a large number of cooperation partners.

While several ground based remote sensing systems were implemented beside already installed long-term observing instruments for turbulence, soil moisture, trace gas emission etc., several flight campaigns with unmanned aerial systems took place. IGUA (Institute for Geography at the University of Augsburg) contributed with spiral profile flights up to 1000 meters above ground level simultaneously at five locations, covering an 1 km x 1 km large area, corresponding to a WRF (Weather and Research Forecast model) grid box. Starting in the afternoon of 6th of July and ending in the morning of 7th of July each full hour an ascent was launched.

While there were several technical problems leading to missing values, an all together useful dataset was produced covering the distribution of temperature, humidity and wind for the diurnal cycle. The contribution presents the interpretation of the profiles in respect to stratification of the planetary boundary layer and comparison to the cooperated instruments. An interesting aspect of the observation data is the modification of the wind field by an nearby terrain step which also influences cold air flow near the ground. These observations are compared to mesoscale model data (METRAS and later WRF) in order to check whether the principle mechanisms can be simulated.