PhD position in experimental meteorology at the Karlsruhe Institute of Technology (KIT) within the DFG-funded project LIVAVERT(EX)² – "Linking valley flow and vertical exchange in complex terrain"



Figure 1: Airborne Doppler lidar measurements of the vertical wind across the main Alpine Crest using the novel AIRflows system onboard the TU Braunschweig Cessna F406 research aircraft. For the first time a spatial resolution on the order of 100 m can be achieved, providing new insight into exchange processes.

Job description

The Institute of Meteorology and Climate Research - Tropospheric Research (IMKTRO) with its 100 employees investigates atmospheric processes experimentally and numerically, from the local to the global scale, and from the short term to climatology. The working group "Boundary-layer and convective systems" focuses on experimental studies of the link between boundary-layer dynamics and convective systems. The **KITcube** is our integrated atmospheric observation system which is used on campaigns worldwide. The KITcube consists of state-of-the-art remote-sensing instrumentation and is Europe's largest mobile measurement infrastructure for atmospheric measurements. The KITcube is extended by airborne measurements using a research aircraft (Cessna F406) from the TU Braunschweig. Onboard the Cessna F406, a novel multi-beam airborne Doppler lidar (**AIRflows**, <u>www.imk-tro.kit.edu/12875</u>) is deployed for its first measurement campaign. AIRflows has been developed at IMKTRO recently and enables high resolution observations of flow and exchange processes in complex terrain at unprecedented resolution.

As part of the PhD position, you will analyze measurement data collected during the international TEAMx measurement campaign in the Alps (www.teamx-programme.org). The position is part of the project LIVAVERT(EX)² - LInking VAIley flow and VERTical EXchange in complEX terrain, funded by the German Research Foundation (DFG). The project strives to improve the characterization of multi-scale exchange processes in complex terrain. For this purpose, a novel quantification of valley flows using Doppler lidar measurements will be implemented. The comparison of ground-based Doppler lidar measurements with high-resolution AIRflows measurements allows new insights and a validation of the measurements. Finally, the interaction of valley flows and vertical exchange, with a focus on the initiation of deep convection, will be investigated in detail.

Your tasks will include:

- Developing algorithms and procedures for measuring volume fluxes in valley cross-sections from groundbased and airborne Doppler lidar measurements.

- Analyzing the volume flux measurements using the world's largest network of ground-based Doppler lidars in complex terrain up to date.

- Combination of the obtained volume fluxes with other information and data sources (e.g. radar, satellite, model information) to generate a comprehensive and in-depth analysis.

- Evaluation of the results in relation to meteorological phenomena, discussion and reference to existing theories as well as publication in specialist journals.

A 3-month research stay at the University of Innsbruck is planned as part of the project.

Your qualification

You have a university degree (Diploma/Master) in meteorology, physics, mathematics or computer science. In the case of a degree in physics, mathematics or computer science, you will need proof of basic meteorological knowledge. Comparable natural science or engineering degrees may be considered if you have sufficient experience in the field of fluid dynamics or remote sensing and are willing to take additional courses in meteorology offered by IMKTRO. We also expect profound programming skills in a script-based language (e.g. Matlab, Python, R). Existing knowledge of remote sensing / boundary layer meteorology / exchange processes in complex terrain, as well as experience in the evaluation of complex measurement or model data, is an advantage. Fluency in written and spoken German or English, the ability to work in a team and the willingness to travel and participate in measurement campaigns and scientific conferences are required.

Salary

The remuneration is based on the collective agreement of the public service in the remuneration group TVL E13. The scope of employment is 75 % E13, i.e. the standard salary for PhD candidates in physics in Germany.

Organizational unit

Institute for Meteorology and Climate Research Tropospheric Research (IMKTRO). The position is located at the KIT Campus North.

Starting date

As soon as possible.

Duration of contract 3 years.

Application deadline until

09.06.2025

Contact person

For further information please contact Dr. Philipp Gasch (Email: philipp.gasch@kit.edu).

How to apply

Please apply by sending your application documents to Dr. Philipp Gasch (Email: philipp.gasch@kit.edu) by 09.06.2025. The application documents must be compiled into a single PDF document not larger than 10 MB and contain the following documents:

- Cover letter with a maximum of 1.5 pages, including your scientific interests and what motivates you to apply for this position.

- Curriculum vitae.

- Qualifying degree certificates (university entrance qualification, Bachelor, Master). Provisional transcript of records, if the Master's degree has not yet been completed.

- Transcript of records of courses and credits completed as part of the degrees, including a Master thesis abstract.

- Contact details (telephone/email) of at least one reference. Letter of reference, if available (optional).

The candidates will be short-listed based on the materials in the application. The top ranked candidates will be interviewed digitally and the references will be collected.