The Institute of Meteorology and Climate Research, Department Troposphere Research (IMK-TRO), at Karlsruhe Institute of Technology (KIT), Germany invites applications for

**2 PhD positions on convective-scale numerical weather prediction**

embedded in the project INVACODA – *Increasing the value of campaign observations through data assimilation to advance convective predictability* – and the Italy-Germany science-4-services network in weather and climate (IDEA-S4S). The PhD students will either work on

**Evaluating convective-scale ensemble forecasts: representation of the mesoscale dynamic and thermodynamic environment in convective summer-time conditions over complex topography**

(PhD project 1)

and

**The added value of high-resolution observations for convective-scale NWP:**

*Can high-resolution observations improve predictions of summer-time convection*  
(PhD project 2)

Forecasting intense summer-time convective storms in Central and Southern Europe remains a challenge. Recently developed convective-scale data assimilation and ensemble forecasting systems aim at providing high-resolution forecasts of such extremes. The project addresses the key question of whether suitable high-resolution observations can improve convective-scale numerical weather prediction, either through their assimilation in operational systems or through model evaluation and development. Both PhD projects will exploit synergies between convective-scale ensemble forecasts and field campaign observations. The projects include

- data analysis and numerical modeling with a state-of-the-art convective-scale ensemble forecasting system,
- the unique opportunity to actively participate in field campaigns in the Black Forest this summer and 2025 in the Alpine region with the KITcube, one of the largest and most comprehensive mobile measurement platforms worldwide,
- international experience during several months research visits at the Italian partner institutes (University of Bologna and CNR-ISAC),
- and close cooperation with the German Weather Service (DWD) and the IDEA-S4S network.

We offer an exciting and dynamic work environment in a Junior Research Group at the Institute of Meteorology and Climate Research (IMK-TRO) at KIT, one of the largest institutions of research and higher education in natural sciences and engineering in Europe. We offer extensive scientific support, supervision and interdisciplinary collaboration in an international network of research institutes and operational weather services. Further networking and training opportunities are offered in IDEA-S4S and at KIT. As one of Germany’s largest research institutes for Atmospheric Science and number one in Germany in the 'Shanghai Ranking' 2022, IMK has strong expertise in observations and numerical modeling of the atmosphere and provides fruitful scientific exchange and a lively workspace.

Comparison of airborne Doppler lidar observations with the convective-scale D2-analysis during the Swabian MOSES 2021 campaign in the Black Forest.
Your requirements:
We are looking for excellent and highly motivated candidates and welcome applicants with a Master’s degree (MSc or equivalent) in meteorology, physics, mathematics, or data science with a background in atmospheric sciences and strong interest in meso-scale dynamics, predictability, and numerical modeling. In particular for PhD project 2, experience and interest in data assimilation are welcome. Requirements include proficient English language skills in oral and written communication and good scientific programming skills (e.g., python, fortran, ncl, cdo, R, linux). We welcome candidates with good communication skills and the ability to work in a team. Its is expected that the successful candidate cooperates with the project partners at CNR-ISAC, the University of Bologna, and DWD. Preference is given to candidates with a background in numerical modeling, data assimilation, and/or experience in synergistic analysis of observations and NWP model output.

Your tasks:
Specific tasks of PhD project 1 include
- Characterisation of the dynamic and thermodynamic environment in observations and convective-scale ensemble forecasts and their systematic comparison,
- Validation of the model representation of mesoscale circulation and convergence patterns,
- Multi-model comparisons of high-impact convective storms,
- Collaboration and coordination with project partners and within the IDEA-S4S network.

Specific tasks of PhD project 2 include
- Analysis of ‘campaign ensemble forecasts’ with assimilated campaign observations and their comparison to the operational ensemble forecasts,
- Assimilation of KITcube observations in the quasi-operational ensemble forecast suite of the German Weather Service (DWD),
- Observation system experiments to quantify observation impact of individual observations in different synoptic situations,
- Collaboration and coordination with project partners and within the IDEA-S4S network.

Details:
The position is offered for 4 years (75% E13 TV-L salary, depending on the fulfillment of professional requirements), starting as soon as possible. The position is based at Campus North at the Institute of Meteorology and Climate Research, Department Troposphere Research (IMK-TRO), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, and includes several months research visits in Bologna, Italy.

Application:
Please send your application, including a CV, documentation of scientific degrees, and a motivation letter describing scientific background, training, and research interests as one pdf file of less than 5 MB to annika.oertel@kit.edu. Please also include two referees and your preferred starting date in your CV. Application deadline is 14. May 2023.

We aim to balance the number of employees (f/m/d). Therefore, we encourage female applicants to apply. Preference will be given to persons with recognized severe disabilities among equally qualified applicants.

For further information about this position please contact Annika Oertel (annika.oertel@kit.edu).