

A5: “Role of multi-scale dynamical processes for the development of heat waves over Germany in the present and future climates” (DynProHeat)

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Secondary Supervisor: Stefan Pfahl (FU Berlin)

The “Atmospheric Dynamics” and “Regional Climate and Weather Hazards” groups at the Institute of Meteorology and Climate Research (IMK) at the Karlsruhe Institute of Technology (KIT) offers a jointly supervised PhD position within the ClimXtreme initiative of the German Ministry of Education and Research (BMBF). KIT is a distinguished research university that combines three core tasks — research, education and innovation — into a single mission. With 9,400 employees and 25,000 students, it is one of the largest institutions of research and higher education in natural sciences and engineering in Europe. KIT was awarded the title “University of Excellence” within the German Excellence Strategy launched by the federal and state governments on 19 July 2019. In the area of Atmospheric Science KIT was ranked #1 in Germany and #8 worldwide in the last Shanghai Ranking.

The PhD position is within the sub-project A5 DynProHeat, which aims at comparing the large to mesoscale dynamic and thermodynamic processes that shape present-day and future heat waves. Present-day and future heat waves will be identified using a heat wave index applied to data from ERA5 reanalyses, CMIP5/6, and EURO-CORDEX historical runs and climate projections. The role of the large- (e.g. Rossby wave activity, persistent and recurrent blocking) to synoptic-scale (i.e. temperature advection, adiabatic compression by subsidence) dynamic set up of heat waves will be considered vs. thermodynamic aspects like heat accumulation in the boundary layer and the role of desiccated soils. The project shall find answers to changes in the frequency, spatial extent and duration of future heat waves, and if dynamic processes cause heat waves over and above values expected from thermodynamic forcing.

The project is designed as a twin project of KIT and the Institute for Meteorology at the FU Berlin. The PhD student will work and potentially spend some time with the group of Prof. Dr. Stefan Pfahl. DynProHeat will also collaborate with the “Waves two Weather” CCR project C4 “Predictability of European heat waves”¹. As part of this collaboration, the PhD will also interact with a PhD student from Prof. V. Wirth (Institute for Atmospheric Physics, Johannes Gutenberg-University) and Prof. Fink at KIT by using and advancing tailored diagnostic tools. Thus, the PhD will find an exciting collaborative research environment.

The ideal candidate holds an MSc in Meteorology, Physics, or a closely related discipline and has a strong background in atmospheric dynamics or climate-change related research. Experience with scientific programming (e.g. linux, python, fortran, idl, ncl, cdo, R) is required. Experience with handling large datasets would be beneficial.

The position offer is subject to the reception of the formal approval letter by BMBF. The positions is remunerated according to TV-L E13 75% for three years starting on 01 October 2019. Applicants are asked to provide two academic referees. Please send applications including a motivation letter, a CV, BSc and MSc transcript of records, and other qualifications to Andreas Fink (andreas.fink@kit.edu) and Joaquim Pinto (joaquim.pinto@kit.edu). The positions can be upgraded to 100% Post-Doc positions given an adequate qualification.

KIT actively supports equality, diversity and inclusion, and as an equal opportunity employer, KIT explicitly encourages applications from women as well as from all others who will bring additional diversity to the university’s research and teaching. KIT provides support for dual career couples and families. Applicants with disabilities will be preferentially considered if suitably qualified.

¹ https://www.wavestoweather.de/research_areas/phase2/c4/index.html