PhD Position on turbulent heat flux parameterization at Karlsruhe Institute of Technology (KIT)

The Institute of Meteorology and Climate Research – Tropospheric Research (IMK-TRO) at the Karlsruhe Institute of Technology (KIT) in Karlsruhe, Germany, is searching a PhD student for the project "Improving the turbulent flux parameterization in regional and global climate modelling systems by extending the classic Monin-Obukhov Similarity Theory with Artificial Neural Networks", funded by the Deutsche Forschungsgemeinschaft (DFG).

The turbulent fluxes of heat and momentum between the land surface and the atmosphere are fundamental processes in Earth's energy balance. In weather and climate models, these turbulent fluxes are generally calculated using the Monin-Obukhov Similarity Theory (MOST). The general concept of the MOST approach is based on some simplifying assumptions, like for example prevailing steady state conditions over a homogeneous land surface structure. For deviating conditions, the simulated turbulent fluxes with MOST are consequently prone to errors, leading to uncertainties in weather and climate models. Therefore, the aim of the project is to reduce these uncertainties, by improving the calculation of the turbulent fluxes in situations when MOST has clear shortcomings. The aim is to extend the applicability of the classic MOST approach to non-stationary boundary conditions over heterogeneous land surface structures using Artificial Neural Networks (ANNs).

The PhD student will develop an extended MOST parameterization by training an ANN on observed and simulated turbulent heat fluxes. This extended MOST approach will then be implemented in the ICON modelling system and its capability to improve weather and climate simulations will be assessed. The obtained results will be presented and published in peer-reviewed scientific journals.

The applicant should have a degree (MSc) in atmospheric science, physics, environmental science or a related field. Experience in scientific programming (e.g. Linux, Python, Fortran, CDO, Matlab, R) is strongly recommended.

We offer a proficient and inspiring research environment at one of Germany's largest research institutions for Atmospheric Sciences, which was ranked #1 in Germany in the last Shanghai Rankings in the area of Atmospheric Science.

Deadline for applications is January 10th, 2021. The position is offered for 3 years, starting as soon as possible. Please send applications including a motivation letter, a CV, BSc and MSc transcript of records and other qualifications all in one pdf file to Dr. Marcus Breil (marcus.breil@kit.edu). For additional information on the position, please contact Dr. Marcus Breil under the above e-mail address.

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.