
The Institute for Atmospheric and Environmental Sciences at Goethe-Universität Frankfurt invites applications for a



PhD position (m/f/d)

funded within the Transregional Collaborative Research Centre 301

TPChange – The Tropopause Region in a Changing Atmosphere

by the German Research Foundation (DFG, Deutsche Forschungsgemeinschaft).

Within TPChange we aim to improve the understanding of relevant multiscale processes in the tropopause region and to specify their impact on composition, dynamics and ultimately on future climate and climate variability. The PhD candidate will work in project B06

Impact of small-scale dynamics on UTLS transport and mixing

Project leaders: Prof. Juerg Schmidli, in collaboration with Prof. Ulrich Achatz and Dr. Daniel Kunkel

Zonal-mean tracer transport through the UTLS is characterised by the Brewer-Dobson circulation (BDC) that is predominantly due to mean-flow forcing by breaking Rossby waves (RW) and gravity waves (GW), and that is affected essentially by mixing due to turbulence, partly generated by GW dissipation. Both GWs (in part) and turbulence (in total) fall in the scale below weather-forecast and climate model resolutions so that these effects need to be described by parameterisations. Indications are strong, however, that the present-day parameterisations are not sufficiently accurate to describe the effects on tracers in a reliable manner.

Because present-day operational turbulence parameterisations do not take the complex nature of turbulence in the strongly stratified UTLS into account, which is non-homogeneous, anisotropic, non-Kolmogorov, patchy, and three-dimensional, the corresponding approach in ICON will be adapted. The successful candidate will do large-eddy simulations (LES) to quantify the transport and mixing in the UTLS and investigate the contribution of turbulent mixing in the UTLS. These simulations will serve, as a data base for the validation and adaptation of the turbulence parameterisation in ICON. The influence of gravity wave breaking on the generation of turbulence will be analysed in more detail via scale separation of the LES data. A possible coupling between the GW parameterization and the turbulence parameterisation will be investigated.

The project will be supervised by Professor Juerg Schmidli. In addition, collaborations within the TP Change project are planned (projects B04, B05, B07, Z03 and a close collaboration with project B03 is expected).

Requirements

The ideal candidate holds a MSc in meteorology, geophysics (or related field) and has a strong background in atmospheric dynamics. Experience with numerical modelling and/or Large Eddy Simulation is required. Knowledge of, or experience with, parameterization of turbulence and/or gravity waves is highly desired.

Employment conditions

The position is offered for 3.5 years and the place of employment will be Frankfurt am Main. The targeted starting date is January 2022.

Applications and deadline

Please send applications to tpc_jobs@uni-mainz.de, including a motivation letter including your preferred project, CV, copies of relevant certificates, preferred starting date, and the names of at minimum two references. Review

of all applications will start on **03 October 2021** and will continue until the position is filled. For further information, please contact schmidli@iau.uni-frankfurt.de.

TPChange offers a comprehensive and structured training for early career researchers. In addition to self-organised activities such as workshops, trainings and a guest program, the successful candidate will have the opportunity, if desired, to pursue international research visits. The consortium conducts an ambitious program to gradually enhance gender equality on all career levels.

Goethe-Universität Frankfurt actively supports equality, diversity and inclusion, and as an equal opportunity employer, Goethe-Universität Frankfurt explicitly encourages applications from women as well as from all others who will bring additional diversity to the university's research and teaching. Applicants with disabilities will be preferentially considered if suitably qualified.

We look forward to your application!

Notes on Data Protection

<https://www.verwaltung.personal.uni-mainz.de/files/2020/09/Datenschutz-BewerberInnen.pdf>