The Institute for Atmospheric Physics at
Johannes Gutenberg University Mainz 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 C08

Convection and its moisture transport into the UTLS in Lagrangian and Eulerian frameworks

In this project, which will be jointly supervised by Prof. H. Tost (JGU Mainz) and Dr. P. Jöckel (DLR, Wessling), the ICON/MESSy (MESSy = Modular Earth Submodel System) modelling system shall be tested, extended and applied to study the role of parameterised convection and associated transport of moisture and trace species for the structure and composition of the UTLS. For that purpose, the new ICON/MESSy modelling system will be augmented by further convection representations which already exist in the MESSy framework. These will include several Eulerian gridpoint convection parameterisations, a Lagrangian transport and convection scheme and a convective superparameterisation. The goal of this project is to identify uncertainties in the transport of moisture and trace species originating from the parameterised convection.

The tasks will be multi-year simulations at relatively coarse model resolutions as applied for current and future global chemistry-climate simulations and a comparison of the different schemes and approaches, including constraints from in-situ and remote measurement campaigns which focus on convection. However, before those simulations can be conducted some model development, i.e., (re-)implementation of the convection representations in the ICON/MESSy system compared to the EMAC (ECHAM/MESSy Atmospheric Chemistry). This work will be conducted in collaboration with both supervisors, group members at both locations as well as other members of the MESSy consortium. After the model development and an evaluation of the extended model version, the strength, frequency and intensity of the vertical transport of both moisture as well as trace gases (and aerosols) will be subject of detailed analysis. A special focus will be on both distinction between the general approaches as well as the individual process formulations, including especially feedback effects. Therefore, strategies for disentangling signals will be developed to identify signals in moisture and convective characteristics as well as trace species suitable for convection analysis, e.g., ^{222}Rn.

The PhD candidate will be located and graduate in Mainz, but it is planned to spend an extended research stay (~12 months) at the DLR. Whereas the Eulerian parameterisations and superparameterisation will be worked on mostly during the time at JGU, the Lagrangian approach will be dealt with during the time at the DLR (near Munich), given the expertise at the respective locations. A close collaboration of the PhD candidate with other projects in the CRC is anticipated, especially with the other projects developing and applying the new model system ICON/MESSy.

Requirements

The ideal candidate holds a MSc in natural sciences (particularly physics, meteorology, chemistry, computer or environmental science) and has a strong interest (and preferentially background) in modeling work. Advanced computer skills are essential. Additionally, substantial interest in a wide range of topics associated to the project are required. Scientific data analysis using Python or similar tools is of advantage. We expect the candidate to work in a team of experts from different research areas (modeling, experimental work, gas and aerosol processes, diabatic processes) requiring strong communication skills.

Employment conditions

The wage classification of the job is EG 13 TV-L (75 %) and the place of employment will be Mainz. The targeted starting date is 1st January 2026 and the project will last until 30th June 2029.

Applications and deadline

Please send applications with reference to the code **C08-PHD-JGU** as one single pdf file to **tpc_jobs@uni-mainz.de**, including a motivation letter for your preferred project, CV, copies of relevant certificates, preferred starting date, and potential references.

Review of all applications will start on **4th December 2025** and will continue until the position is filled.

For further information, please contact Prof. Dr. Holger Tost. (tosth@uni-mainz.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.

Johannes Gutenberg University Mainz actively supports equality, diversity and inclusion, and as an equal opportunity employer, Johannes Gutenberg University Mainz 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!