

The Institute for Atmospheric Physics at the 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 A07

Processing of organic compounds in ice particles during deep convective transport into the UTLS

One of the most important and yet unresolved issues in cloud chemistry and global models is how the ice phase in tropical deep convective clouds and in extratropical warm conveyor belts contributes to the redistribution of atmospheric trace substances from the boundary layer to the UTLS. The understanding and proper representation of the underlying microphysical and transport processes are especially important in terms of the formation and the atmospheric life cycle of secondary organic aerosol (SOA) particles. Our CRC subproject aims to conduct laboratory measurements under simulated tropospheric conditions, i.e. at temperatures spanning a range from the melting level (0 °C) up to those prevailing in the upper troposphere (-60 °C). The following set of investigations will serve to better understand the processing pathway of chemical compounds and focus on scavenging mechanisms involving the ice phase which finally determine the chemical composition in the upper troposphere:

- Determination of the retention coefficients of SOA precursor gases and their mixtures during liquid-to-ice phase changes.
- Derivation of ice partitioning coefficients during the co-condensation of SOA precursor gases and water vapor during ice crystal growth.
- Development of a single drop freezing model by implementing new parameterizations based on our experimental findings to derive retention coefficients of SOA precursor gases.

To reach the goals of our subproject we will design and conduct extensive studies in the Mainz vertical wind tunnel laboratory. The world-wide unique vertical wind tunnel facility of the Johannes Gutenberg University Mainz allows the free suspension of single ice particles of moderate size in a vertical airstream. In the walk-in cold room of the laboratory, an acoustic levitator is installed. Based on an earlier setup developed in our laboratory, we will construct a new diffusion chamber to grow ice crystals by water vapor deposition. A one-dimensional model that simulates drop freezing and solute transport during liquid-to-ice phase changes will be further developed with new parameterizations derived from our experimental results.

The candidate will be supervised by the two PIs of the project, PD Dr. Miklós Szakáll and Dr. Alexander Theis.

Requirements

The candidate will conduct experiments on the trace gas uptake of growing ice crystals and perform numerical simulation on distribution of chemical compounds during the different investigated freezing processes. Ideally, the candidate holds a MSc in meteorology/physics/computational sciences/or chemistry and possess knowledge on programming.

Employment conditions

The position is offered for 4 years and the place of employment will be Mainz. The targeted starting date is 1 July 2021.

Applications and deadline

Please send applications with reference to the code **A07-PHD2-JGU** as one single pdf file to tpc_jobs@uni-mainz.de, including a CV, copies of university certificates, and the names of at minimum two references.

Review of all applications will start on **1st June 2021** and will continue until the position is filled.

For further information, please contact PD Dr. Miklós Szakáll (szakall@uni-mainz.de) or Dr. Alexander Theis (ajost@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.

The Institute for Atmospheric Physics at the JGU actively supports equality, diversity and inclusion, and as an equal opportunity employer, The Institute for Atmospheric Physics 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>