

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

## PhD-Student 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

## Unresolved-dynamics impact on transport and mixing in the UTLS

Project leaders: Prof. Ulrich Achatz (Goethe University Frankfurt), in collaboration with Dr. Daniel Kunkel (University Mainz) and Prof. Juerg Schmidli (Goethe University Frankfurt)

Zonal-mean tracer transport through the upper troposphere and lower stratosphere (UTLS) is characterised by the Brewer-Dobson circulation that is predominantly due to mean-flow forcing by breaking Rossby waves and gravity waves, and that is affected essentially by mixing due to turbulence, partly generated by gravity-wave dissipation. Both gravity waves (in part) and turbulence (in total) fall in 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 effects on tracers in a reliable manner.

The position to be filled will address the dynamics of gravity waves and their impact on tracers within the new gravity-wave model MS-GWaM, recently implemented and validated in the weather and climate code ICON. The direct coupling of MS-GWaM to tracers, by Stokes transport and by mixing due to breaking GWs, will be addressed systematically. Idealised investigations and developments derived therefrom will be followed by an implementation of these effects into ICON/MS-GWaM, and a systematic investigation of the consequences with regard to large-scale UTLS tracer transport.

Information on the research group where the position will be located can be found at <http://www.goethe-university-frankfurt.de/45681958/Theory-of-Atmospheric-Dynamics-and-Climate>. Its focus is on scale interactions in atmospheric dynamics, applied e.g. to large-scale low-frequency variability or gravity-wave dynamics. Middle-atmosphere dynamics is another field of work. Methods employed are e.g. multi-scale asymptotics, stochastics, and numerical simulations. Inquiries should be addressed to Prof. Ulrich Achatz ([achatz@iau.uni-frankfurt.de](mailto:achatz@iau.uni-frankfurt.de)).

### Requirements

Applicants should have a very good diploma/Master's degree in meteorology, physics, applied mathematics, fluid dynamics, or a related field. Expected is a strong background in theory and/or modeling.

### Employment conditions

The position is offered for 4 years and the place of employment will be the Goethe University Frankfurt. It will be open beginning July 1<sup>st</sup> 2021.

### **Applications and deadline**

Please send applications with reference to the code **B06-PHD1-GUF** as one single pdf file to [tpc\\_jobs@uni-mainz.de](mailto:tpc_jobs@uni-mainz.de), including (i) a letter of motivation, (ii) a CV, (iii) copies of all relevant certificates, and at least two contacts for reference letters. Review of all applications will start on **1 June 2021** and will continue until the position is filled. For further information, please contact [achatz@iau.uni-frankfurt.de](mailto:achatz@iau.uni-frankfurt.de).

The Goethe University Frankfurt is an equal opportunity employer and places particular emphasis on fostering career opportunities for women. Qualified women are therefore strongly encouraged to apply. If equally qualified, severely handicapped persons are given preference.

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.

We look forward to your application!