

The research group Theory of Atmospheric Dynamics and Climate at the **Institute of Atmospheric and Environmental Sciences** of the Goethe University in the city of Frankfurt (<https://frankfurt.de/english/about-frankfurt>) invites applications for a

**Research Assistant (m/f/d)**  
**PhD Student position**  
**(E13 TV-G-U, 75%)**

The position is limited until 30.06.2025. It is funded in parts within the Transregional Collaborative Research Centre 301 "TPChange – The Tropopause Region in a Changing Atmosphere" by the German Research Foundation (DFG, Deutsche Forschungsgemeinschaft). The salary grade is based on the job characteristics of the collective agreement (TV-G-U) applicable to the Goethe University.

Within TPChange (<https://tpchange.de/>) 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 characterized 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 parameterizations. Indications are strong, however, that the present-day parameterizations 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. Idealized 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)).

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.

#### **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.

The university is committed to equal rights for women and men and therefore strongly encourages women to apply. Severely disabled persons are given priority in the case of equal qualifications.

#### **Applications and deadline**

Please send applications with reference to the code B06\_PhD\_GUF as one single pdf file to [achatz@iau.uni-frankfurt.de](mailto:achatz@iau.uni-frankfurt.de), including (i) a letter of motivation, (ii) a CV, (iii) copies of all relevant certificates, and at least two contacts for reference letters **by 04.07.2021**. Applications beyond this date will be considered until the position has been filled. For further information, please contact [achatz@iau.uni-frankfurt.de](mailto:achatz@iau.uni-frankfurt.de).

We look forward to your application!