UNIVERSITÄT LEIPZIG

The Leipzig Institute for Meteorology (LIM) of Leipzig University, Germany, invites applications for

Seven PhD Positions

(A) Balloon-borne observations and dedicated simulations of the transitions between typical states of the Arctic atmospheric boundary layer (A02)
(B) Effects of heterogeneous sea ice properties on radiative energy fluxes and its influence on Arctic amplification (C01)
(C) Trends, patterns, and climate effects of aerosol in the Arctic (D02)
(D) Arctic amplification and the influence on extreme weather in the midlatitudes (D06)
(E) The role of atmospheric convection in Arctic feedbacks (E01)
(F) Process-level understanding of sublimation and evaporation of precipitation (E05)
(G) Diagnosing moisture sources, transport and transformation with water vapor isotopes from satellites and in atmospheric modeling (E06)

and

A Position for a Scientific Programmer

(H) Data science for Arctic-midlatitude interactions (D06)

The positions are funded within the Transregional Collaborative Research Center TR172 on "ArctiC Amplification: Climate Relevant Atmospheric and SurfaCe Processes, and Feedback Mechanisms (AC)³" (www.ac3-tr.de) by the German Research Foundation (DFG, Deutsche Forschungsgemeinschaft). Within the TR172, LIM together with the collaboration partners (Universities of Cologne and Bremen, TROPOS and Alfred Wegener Institute) aim to better observe, understand, and simulate processes leading to the current drastic climate changes in the Arctic.

Terms of employment

The PhD positions **(A) – (G)** (75% TV-L E13) are awarded for 3 years with possible extension to up to four years. We offer a productive and interdisciplinary working group including comprehensive supervision and integration into the thriving Leipzig Graduate School on Clouds, Aerosol and Radiation (http://www.lgs-car.tropos.de/).

The position **(I)** (50% TV-L E13) is awarded for up to 4 years. We offer a productive and interdisciplinary working atmosphere including several possibilities for career development.

Details on the individual projects are given below.

Qualification requirements

For the PhD positions **(A) – (G)** we expect strong interest in atmospheric science, in particular in cloud physics, remote sensing, radiative transfer, and climate dynamics. Applicants should have a Master in Meteorology or a related field. Experience in high-level scientific programming for data analysis is desirable. Experience in cloud, aerosol, and/or radiation physics and atmospheric modeling would be advantageous for positions **(C) – (G)** , and scientific programming (Fortran, python) as well as experience with Unix/Linux is required for these positions. Candidates must possess excellent communication skills in written and spoken English.

The scientific programmer position **(H)** should have a completed M.Sc. degree in Meteorology, Atmospheric Science, Climate Physics, Environmental Science or a related discipline, keen interest in understanding processes that lead to extremes, very good analytical, quantitative, and programming skills (e.g. Python), experience with climate data (netcdf), with statistics, machine learning and causal inference are desirable. Candidates should have very good English skills, both written and spoken.

Applications

Interested candidates should send a cover letter describing background and motivation; a CV, training and research interests; certificates; and the contact information of two referees as a single PDF to

m.brueckner[at]uni-leipzig.de.

Please clearly indicate which position(s) you apply for. Review of applications will begin **15 January 2024** and continue until the positions have been filled.

Selection

The selection for the position will be based solely on scientific merit without regard to gender, religion, national origin, political affiliation, marital or family status or other differences. Among equally qualified candidates, handicapped candidates will be given preference.

Detailed project descriptions

Information on the Collaborative Research Center TR172 Arctic Amplification are presented on the web page:

www.ac3-tr.de

(A) Balloon-borne observations and dedicated simulations of the transitions between typical states of the Arctic atmospheric boundary layer (A02)

The tasks of the doctoral candidates are:

- The application of temporally and spatially high-resolution numerical coarse structure simulations (LES) and column models to observationally based case studies of atmospheric boundary layer developments at Station North (North-East Greenland) during the transition from cloudy to cloud-free atmosphere

- Evaluation and interpretation of numerical weather predictions (ICON) of the polar boundary layer at Station North during the transition from polar night to day - comparison of observations and predictions

(B) Effects of heterogeneous sea ice properties on radiative energy fluxes and its influence on Arctic amplification (C01)

The current surface albedo scheme of a coupled regional climate model has shown uncertainties in the representation of the surface type parametrization during Arctic Summer and early Autumn. Within the third phase of the project, we want to update the albedo scheme focusing on a better description of cloud dependence and a better representation of ponded ice.

The PhD will work on the improvements of the current albedo scheme and their evaluation against airborne and ground-based measurements that were taken within the frame of the (AC)3 project within the last eight years. Implementing the new parameterizations in the coupled regional climate model will allow to investigate the sensitivity of climate variables to the tempo-spatial variability of surface albedo and the contribution to Arctic Amplification. For more information contact: evi.jaekel[at]uni-leipzig.de

(C) Trends, patterns, and climate effects of aerosol in the Arctic (D02)

The climate forcing by anthropogenic aerosols is one of the drivers of Arctic climate change. Increasingly negative forcing over the mid-latitude continents in the 20th century turned to decreasing one in the 21st century, and this trend will continue. The PhD project will improve the representation of these mechanisms on the Arctic in a climate model, and use to model to anticipate future changes. For further information please get in touch with jan.kretzschmar[at]uni-leipzig.de.

(D) Arctic amplification and weather in the midlatitudes (D06)

As a PhD candidate you will apply causal inference methods to large climate model ensembles and observations to understand the physical pathways through which Arctic Amplification and Arctic sea ice loss can affect midlatitude weather extremes. In particular the relationship between Arctic changes and changes in atmospheric blocking frequency and persistence in both summer and winter will be investigated. Finally, plausible effects of a changing Arctic on future midlatitude weather (extremes) will be assessed using a storyline approach. For more information contact: marlene.kretschmerl[at]uni-leipzig.de

(E) The role of atmospheric convection in Arctic feedbacks (E01)

The Arctic increasingly loses its distinction from lower latitudes, at least in certain regions and seasons. Convection plays an increasingly large role. The idea of this PhD project is to investigate, when and how this exactly happens, and what the consequences are for future Arctic climate change, for climate feedbacks, and for Arctic amplification of climate change. The PhD project will work with new-generation kilometre-resolution climate modelling, in combination with satellite data and analysis of other observational datasets. For more information contact: johannes.quaas[at]uni-leipzig.de

(F) Process-level understanding of sublimation and evaporation of precipitation (E05)

Precipitation is an essential component of the Arctic climate system as part of the hydrological cycle but much of the Arctic precipitation sublimates before it reaches the ground due to dry sub-cloud layers. Despite the importance of this process, atmospheric models have difficulties in simulating sublimation rates correctly because this process depends on complex, hydrometeor dependent properties and can feed back on cloud properties. The PhD student of E05 will participate in ground-based and airborne in-situ and remote sensing observations of sublimation. The data will be used to improve the understanding of sublimation and the associated feedback processes and to improve the parameterization of sublimation in atmospheric models. For more information contact: maximilian.maahn[at]uni-leipzig.de

(G) Diagnosing moisture sources, transport and transformation with water vapor isotopes from satellites and in atmospheric modeling (E06)

The measurement of water isotopes from satellites is an emerging new observational dimension capable of enabling better constraining and understanding mechanisms of the water cycle. The proposed PhD project will adapt an innovative double-representation of the water cycle in the new-generation kilometre-resolution climate model in order to diagnose water isotopes. Specific simulation results will be evaluated using the new satellite measurements. The project will proceed to use the model to better understand feedback mechanisms relevant for Arctic amplification of climate change. For more information contact: johannes.quaas[at]uni-leipzig.de

(H) Data science for Arctic amplification (D06)

As a data scientists you will establish and maintain best practices for software development within the research group and supervise software development efforts to model non-linear, causal interactions. Moreover, you will be responsible for data management and will curate and process large climate model simulations and observation data on the in-house high-performance computing cluster. For more information contact: marlene.kretschmerl[at]uni-leipzig.de .