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

Two PhD Positions

(A) Spatial and seasonal variability of cloud radiative forcing
(B) Moist static energy transport variability
climate simulations

and

Two Postdoc Positions

(C) Characterization of Arctic mixed–phase clouds by airborne in–situ remote sensing
(D) Remote sensing of Arctic clouds and sea ice

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) – (B)** (65% TV-L E13) are awarded for 3 years with possible extension to up to four years. The positions are open starting from January 2020. 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 positions **(C) – (D)** (100% TV-L E13) are awarded for up to 4 years, they are also open starting from January 2020. 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) – (B)** we expect strong interest in atmospheric science, in particular in cloud physics, remote sensing, radiative transfer, and climate. 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 modelling would be advantageous for position **(B)**, 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 postdoctoral positions **(C) – (D)** are appointed primarily for research. We expect experiences in either or both, observations and/or modelling of clouds and remote sensing of clouds. Applicants must hold a doctoral degree in Meteorology, Physics, or Geophysics. Experience in scientific programming (Matlab, Python, IDL), preferably in a UNIX/LINUX environment, and knowledge in handling of big-data programming is desirable. Candidates must possess excellent communication skills in written and spoken English.

Applications

Interested candidates should send a cover letter describing background; 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 immediately 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) Spatial and seasonal variability of cloud radiative forcing

Airborne remote sensing within two campaigns in spring and summer 2020 during the Multidisciplinary drifting Observatory for the Study of Arctic Climate project (MOSAiC, www.mosaic-expedition.org) and in spring 2021 during HALO-(AC)³ (www.halo-spp.de) will be used to study the seasonal dependence of the cloud impact on the atmospheric boundary layer processes and energy budget. The candidate will operate on the broadband and spectral flux instrumentation during the campaigns. Based on existing software from (AC)³ phase I, data will be processed and applied to quantify the vertical radiative flux profiles, the respective cloud radiative forcing and cooling/heating rates. The results will be interpreted with respect to the influence of cloud- and sea-ice cover, seasonal and meteorological dependence. Experience regarding airborne measurements or experimental field work in Polar regions would be advantageous. For more information contact: michael.schaefer[at]uni-leipzig.de

(B) Moist static energy transport variability

Understanding Arctic amplification requires quantification of the contributions due to atmospheric moist static energy (MSE) transport. One focus will be the question, how much are the changes in horizontal MSE transports impacted by the ocean-atmosphere background state, changing patterns of climate forcing, and stratospheric variability. Using a series of ICOsahedra Non-hydrostatic model (ICON) model experiments, together with ERA5 and CIMP6 data changes in MSE transport patterns together with large-scale circulation regimes will be analyzed. The study of the mechanisms for the MSE transport changes will focus on the tropospheric and stratospheric pathways for those linkages with emphasis on the effects of tropo-stratosphere coupling and low-latitude gravity wave hotspots on the polar vortex dynamics. Experience in high-level scientific programming is mandatory. For more information contact: jacobi[at]uni-leipzig.de and/or j.quaas[at]uni-leipzig.de

(C) Characterization of Arctic mixed–phase clouds by airborne in–situ remote sensing

Airborne remote sensing with passive and thermal-infrared imagers will be applied to systematically investigate seasonal and regional differences of cloud properties and their contribution to Arctic amplification. Data will be obtained during three campaigns. MOSAiC-ACA (Svalbard) in spring and summer 2020 is embedded in the framework of will focus on Arctic boundary layer clouds. HALO-(AC)³ (Kiruna) in spring 2021 will make use of the HALO aircraft to track transformations of cloud characteristics along air mass pathways from the Arctic circle into the central Arctic. The successful candidate will operate the instruments, process and publish the data and will be in charge of the statistically analysis and interpretation of the cloud data set. Furthermore, the development and application of new cloud imaging retrieval over sea ice including a new IR imager is required. As an experienced scientist, the coordination and lead of

the collaborative activities with other projects in the consortium (active remote sensing, in-situ cloud and aerosol observation, LES modelling) is required. Experience regarding airborne measurements or experimental field work in Polar regions would be advantageous. For more information contact: a.ehrlich[at]uni-leipzig.de

(D) Remote sensing of Arctic clouds and sea ice

Leads and polynyas result in substantial heat and moisture flux from the relatively warm ocean to the cold atmosphere and thus, alter the atmospheric boundary layer structure, cloud cover, and the surface energy budget and also affect atmosphere-ocean chemical exchanges. By using the extensive long-term remote sensing observations from the one-year long MOSAiC drifting observatory and the coastal station Utqiavik (Barrow) of the US-Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) program at the North Shore of Alaska the focus area of $(AC)^3$ will be extended to the Central and Western Arctic. Synergistic observations of ground-based vertically–pointing Doppler cloud radar, depolarization lidar, microwave radiometer, and radiosondes will be used to develop climatologies of cloud marco- and microphysical properties including an estimation of the thermodynamic coupling of clouds to the surface. Leads or polynyas will be identified from daily maps of satellite-derived sea ice concentration and lead fraction products at various spatial resolutions. Experience in analysis of satellite-based sea ice data and/or remote sensing of clouds is required. The analysis of long-term remote sensing data sets will be challenging due to the requirement of processing very large data sets. Furthermore, the development and application of remote-sensing retrieval algorithms is envisioned. Experience in radiative transfer modeling is an asset. For more information contact: heike.kalesse[at]uni-leipzig.de