UNIVERSITY of COLOGNE
INSTITUTE FOR GEOPHYSICS AND METEOROLOGY

The Institute for Geophysics and Meteorology, University of Cologne (IGMK), Germany, invites applications for several

Research Assistant positions with the opportunity for graduation

(A) Water vapor variability and trends in the Arctic
(B) Characterization of the cloud conditions at Ny-Ålesund using sensor synergy and the representativeness of the observed clouds across Arctic sites
(C) Assessing the microphysics of Arctic atmospheric models using advanced remote sensing observations
(D) Clouds and Surface Coupling

The positions are related to the Collaborative Research Center TR172 ArctiC Amplification: Climate Relevant Atmospheric and SurfaCe Processes, and Feedback Mechanisms $(AC)^3$, which was recently approved by the German Research Foundation for an initial four year period and will start 1 January 2016. Within the TR172, IGMK together with the collaboration partners (Universities of Leipzig and Bremen, TROPOS and Alfred Wegener Institute) aim to better observe, understand and model processes leading to Arctic amplification.

The positions (at least 65% TV-L E13) are awarded for at least 3 years. We offer a productive and interdisciplinary working atmosphere including comprehensive supervision and integration into the thriving Graduate School of Geosciences (http://www.geosciences.uni-koeln.de/). Details on the individual projects are given below.

Requirements
We expect strong interest in atmospheric science with specialization in cloud modeling and observations, remote sensing, or statistical modelling, depending on the topic. Applicants should have a Master-of-Science-equivalent university degree in meteorology, geophysics, physics or mathematics. Experience in scientific programming, preferably in a UNIX/LINUX environment, and knowledge in computational modelling is highly desirable. Candidates must possess excellent communication skills both in written and spoken English.

Applications
Interested candidates should send a CV; a cover letter describing background, training and research interests; certificates; and the contact information of two referees as a single PDF to meteo-jobs[at]uni-koeln.de. Please clearly indicate which position(s) you apply for. Review of applications will begin immediately and continue until the positions have been filled, January 18 latest.

Selection
The selection for the positions will be based solely on 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.

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Detailed project descriptions

(A) Water vapor variability and trends in the Arctic

How does water vapour contribute to Arctic amplification by its effects on radiation, clouds and temperature? First long-term microwave satellite observations over more than a decade will be exploited to investigate arctic wide trends and variability in water vapor. The effects of small-scale water vapour variability not captured by satellite products will be assessed using a wealth of observations from ground, ship and aircraft performed during $(AC)^3$ campaigns. The observations will serve as a basis to evaluate in cooperation with our project partner Alfred-Wegener Institute Potsdam whether regional climate simulations are able to capture water vapor dynamics and help to assess the strength of the different feedback mechanisms. For more information contact: Prof. Dr. S. Crewell crewell[at]meteo.uni-koeln.de.

(B) Characterization of the cloud conditions at Ny-Ålesund using sensor synergy and the representativeness of the observed clouds across Arctic sites

It is well known that clouds are an important factor in modulating Arctic climate. However, the corresponding processes are not well understood which is also due to the lack in long-term, highly resolved observations of cloud macro- and microphysical properties. To this end, the combination of different active and passive ground-based remote sensing techniques is crucial. Within the TR172, the existing instrumentation at the German/French research site in Ny-Ålesund/Svalbard will be extended to also include a cloud radar. The successful candidate will combine the measurements of the different instruments in order to retrieve temperature, humidity and cloud property profiles on a long-term basis. The characteristics of clouds at Ny-Ålesund will be related to the meteorological conditions at the site and also compared to observations from other Arctic cloud observatories. The retrieved data set will thus provide a valuable puzzle piece in Arctic cloud climatologies from ground–based observations. It will be used by the collaboration partners for model evaluation, as a reference for satellite and airborne retrieval algorithms, and to complement in–situ experiments. For more information contact: Dr. K. Ebell kebell[at]meteo.uni-koeln.de.

(C) Assessing the microphysics of Arctic atmospheric models using advanced remote sensing observations

Climate models have significant deficits in predicting the globally above-average temperature increase in the Arctic. A major source for these deficits is due to a lack in capturing Arctic low-level mixed-phase clouds and their related feedback mechanisms with the sea ice and the open ocean. The PhD candidate of this project will thoroughly characterize the representation of clouds in models on different scales (large-scale climate model and Large Eddy Simulation - LES). The possibility of using LES as a virtual reality for evaluating climate models will be assessed using the AC^3 observations obtained from combined active and passive remote sensing instruments during surface-based, ship-based and airborne flight campaigns. A special focus will be on using cloud radar Doppler spectra for optimally charactering mixed-phase cloud microphysics using different microphysical schemes in the LES. For more information contact: PD Dr. Ulrich Löhnert loehnert[at]meteo.uni-koeln.de or Prof. Dr. R. Neggers neggers[at]meteo.uni-koeln.de.

(D) Clouds and Surface Coupling

The development of Arctic low-level clouds are closely related to surface conditions, but the cloud and surface interactions are so far not well understood. The Arctic comprises land, water and ice/snow surfaces, and thus the surface processes are particularly difficult to model, and studies are few on quantifying the impacts of surface conditions on Arctic low-level cloud development, and the impact of clouds on surface energy balance is poorly quantified. In this project, atmosphere and land-

surface coupled large-eddy simulation model (LES-ALM) will be applied to simulating the impact of surface heterogeneity on convection and cloud patterns. The research group also developed techniques for quantification of land-surface patterns and pattern interactions. The model simulations will be analysed and compared with data. For more information contact: Prof. Dr. Y. Shao yshao[at]uni-koeln.de.