UNIVERSITÄT LEIPZIG

Faculty for Physics and Earth Sciences
Leipzig Institute for Meteorology

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

PhD Position on

Airborne Remote Sensing and Radiative Forcing of Inhomogeneous Trade-Wind Cumuli

The position is related to the international research project EUREC^{4}A (ElUcidating the Role of Cloud-Circulation Coupling in ClimAte, see http://eurec4a.eu) and is part of the Scientific Priority Program SPP 1294 (www.halo-spp.de) funded by the German Research Foundation (DFG, Deutsche Forschungsgemeinschaft). Within the EUREC^{4}A project, a one-month multi-platform research campaign including the German High Altitude and Long Range Research Aircraft (HALO) is planned for February 2020. During this mission, a suite of cloud, aerosol, and surface remote sensing instruments will be operated aboard of HALO to investigate the radiative, macrophysical, and microphysical properties of trade-wind cumuli and their relevance for the global climate.

The position (65% TV-L E13) is awarded for three years, starting as soon as possible. We offer a productive and interdisciplinary working group (http://home.uni-leipzig.de/strahlen/web/en_index.php) including comprehensive supervision and integration into the Leipzig Graduate School on Clouds, Aerosol and Radiation (www.lgs-car.tropos.de).

Detailed project descriptions

The core objective of the project is to **quantify the large-scale radiative forcing of shallow trade-wind cumuli as a function of the cloud macrophysical and microphysical properties, the cloud spatial organization, and the mesoscale vertical motion**. The successful applicant will combine macrophysical, microphysical, and radiative properties of trade-wind cumuli obtained from airborne remote sensing cloud observations and in situ irradiance measurements aboard the HALO during the EUREC^{4}A campaign east of Barbados in February 2020. To retrieve the relevant cloud and radiation data, the instrumentation of HALO will be extended by (i) a multi-wavelength thermal infrared (IR) imager, and (ii) pairs of upward and downward looking, hemispheric broadband pyranometers and pyrgeometers. These broadband radiometers will provide solar and terrestrial irradiance measurements to quantify the atmospheric radiation budget at flight level. The thermal IR imager will map the cloud top brightness temperatures at different thermal IR spectral bands with high spatial (5 m) and temporal (20 Hz) resolution. The instruments were not operated on HALO yet. Therefore, a crucial part of the proposed work plan is related to extensive tests and calibrations of the new instruments and developing tools for handling and post processing the data.

The thermal IR imager will be used to develop an IR-based cloud product, providing maps of cloud top temperature, cloud liquid water path and cloud effective droplet size. The maps will be analysed statistically to obtain the cloud fraction, degree of clustering, and cloud size distributions. The data will be correlated with atmospheric parameters (temperature/humidity profiles, background aerosol, large-scale divergences). The observations of the broadband radiometers will be analysed in combination with the maps of cloud properties derived from the thermal IR imager. Quantifying the cloud radiative forcing for scenes of trade-wind cumuli

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with different cloud fraction, degree of clustering, and cloud top temperatures will indicate how sensitive the cloud radiative forcing is with respect to the macroscopic properties and organization of trade-wind cumuli. Parameterizing this sensitivity provides a tool to evaluate the representation of trade-wind cumuli in numerical weather prediction models and global climate models.
For more information contact: m.wendisch[at]uni-leipzig.de

Requirements

We expect enthusiasm and interest in atmospheric science, in particular in cloud observations, remote sensing, and radiative transfer modelling. Applicants should have a Master-of-Science-equivalent university degree in meteorology, geophysics, physics or mathematics. Knowledge of high-level scientific programming for data analysis is desirable. Experience regarding experimental field work and the operation of scientific instruments would be advantageous. The successful applicant will strongly interact with other research groups (experimental, modelling, and satellite groups). Communication, collaboration and team play is essential. 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 at least two academic referees as a single PDF to

anja.schwarz[at]uni-leipzig.de.

Submissions will be accepted until **15 May 2019**.

Selection

The selection for the candidates 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.