Karlsruhe Institute of Technology (KIT)
Institute of Meteorology and Climate Research (IMK)
Atmospheric Aerosol Research Department (AAF)

IMK-AAF invites applications for a PhD Position (f/m) within the DFG-funded research project "Quantification of the secondary ice production mechanisms in mixed-phase clouds"

Reliable modeling of cloud processes for weather predictions and climate change projections requires a sound understanding of the ice formation in mixed-phase clouds. However, ice crystal concentrations measured in-situ are often found to exceed the concentration of ice nucleating particles by many orders of magnitude. This discrepancy motivates a search for Secondary Ice Production (SIP) mechanisms, i.e., processes producing additional ice particles by e.g. fragmentation of existing ice particles or during droplet freezing events.

In a DFG-funded collaborative project between the Leibniz-Institute for Tropospheric Research (TROPOS) in Leipzig and the Institute of Meteorology and Climate Research (IMK) of Karlsruhe Institute of Technology (KIT), we plan to investigate two potential SIP mechanisms: production of secondary ice particles caused by (A) droplet-ice collisions (rime-splintering) and (B) splintering of freezing droplets (see Figure 1). These two SIP mechanisms have been suggested to be of particular relevance in mixed-phase clouds.

The Department of Atmospheric Aerosol Research at IMK seeks a highly motivated PhD student (f/m) to work on the experimental investigation of droplets splintering on freezing. The successful candidate will take part in the development of a new experimental set-up, the Ice Droplet splintEring and Fragmentation eXperiment (IDEFIX); together with the leading scientists at TROPOS will conduct experiments on identification of the physical mechanisms via high-speed video observations of the SIP events; and will contribute to parameterization development for both SIP mechanisms. These parameterizations will be applied by external collaborators for SIP representation in cloud microphysics resolving models.

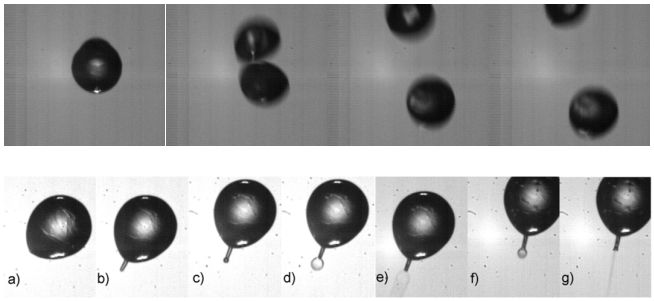

Figure 1. High-speed video records (30k frames per second) of secondary ice production events. Upper panel: splintering of a freezing droplet. Lower panel: ejection of a secondary ice particle via bubble bursting.

Required qualifications are:

- A M.Sc. degree or equivalent in physics, environmental physics, geophysics or meteorology
- Good technical and laboratory skills
- A strong interest to work in the field of cloud microphysics
- Good communication skills, fluent English language in writing and speaking

If you are interested in joining our highly motivated team to perform cutting-edge research in a stimulating international working environment, please send a cover letter including a short statement about your research interests; a full CV including publication list; names and contact information for 2 references; copies of relevant certificates to Dr. Alexei Kiselev. Applications will be considered until the position is filled; the estimated project duration is 36 months. The position will be funded according to TV-L E13 at 75% full time equivalent.

KIT is an equal opportunity employer. Women are especially encouraged to apply. Applicants with disabilities will be preferentially considered if equally qualified.

Contact person:
Dr. Alexei Kiselev, Tel: 0721/ 608-26662, E-Mail: alexei.kiselev@kit.edu
Web: http:\\www.imk-aaf.kit.edu

Related references:

1. Field, P. R. et al., 2017: Secondary Ice Production: Current State of the Science and Recommendations for the Future. Meteorological Monographs, 58, 7.1-7.20, DOI: 10.1175/amsmonographs-d-16-0014.1.
2. Sullivan, S. C., C. Hoose, A. Kiselev, T. Leisner, and A. Nenes, 2018: Initiation of secondary ice production in clouds. Atmos. Chem. Phys., 18, 1593-1610, DOI: 10.5194/acp-18-1593-2018.
3. Lawson, R. P., S. Woods, and H. Morrison, 2015: The Microphysics of Ice and Precipitation Development in Tropical Cumulus Clouds. Journal of the Atmospheric Sciences, 72, 2429-2445, DOI: 10.1175/jas-d-14-0274.1.