

Zurich, November 11th 2020ETH Zürich
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PhD at ETH Zurich in Atmospheric Physics on aerosol-cloud interactions: Modelling position

The Atmospheric Physics group at the Institute for Atmospheric and Climate Sciences at ETH Zurich (IAC-ETH) invites applications for a PhD position integrated into a Binational Swiss-French project "AerOsol cloud interactions: the Role of orgANic compounds in CLOUD droplEt activation (ORACLE)", funded by the Swiss National Science Foundation (SNSF) and French Research National Agency (ANR).

Project background: Cloud droplets in the Earth's atmosphere form on ubiquitous aerosol particles. Presently, predictions of cloud droplet size and number concentration derived from aerosol properties are still poor, leading to large uncertainties in the radiation budget and climate projections. Cloud droplet activation is conventionally described by Köhler theory. Yet, classical Köhler curves do not include dynamically evolving surface tension and co-condensation of semi-volatile organic compounds during cloud condensation nuclei (CCN) activation. ORACLE aims to fundamentally improve the understanding of the role organics play in CCN activation through combined experimental and modelling work. For this project, the Atmospheric Physics group seeks two PhD students that will collaborate with each other and with the French partners. Two CCN counters with different working principles will be used to test cloud formation on aerosol sampled from a large tank with special emphasis on the role of the organic components and the dynamic equilibrium between gas phase and condensed phase during humidity variations. The CCN activity will be tested and the composition of the gas phase and the condensed phase will be measured. These experiments will be accompanied by modelling the microphysical processes involved in hygroscopic growth and CCN activation in close collaboration with the Atmospheric Chemistry group.

Job description of the modelling PhD position:

- Modelling the surface tension of aerosol particles as they activate to cloud droplets.
- Modelling gas-to-particle partitioning including diffusion processes within the aerosol particles as a function of relative humidity.
- Modelling co-condensation during CCN activation.
- Applying the microphysical models to the data acquired in the tank experiments (close collaboration with French and Swiss experimentalists).
- Applying findings from the investigated model systems to more complex systems.
- Running a box model that includes the findings from the tank experiments to simulate cloud events.

The successful candidate should hold an MSc (or equivalent) in chemistry, physics, engineering, atmospheric/environmental sciences, or a related field. Knowledge of oral and written English is required. A good background in thermodynamics and microphysics, and knowledge of programming languages such as Python or FORTRAN is expected. We are looking for a highly motivated, committed, and creative person. **The start of the project** is scheduled for February.

We look forward to receiving your online application that includes a CV, academic transcripts, work certificates (if any) and a 1-page motivation letter stating research experiences and interests. Please provide the contact information of at least two referees. Note that we exclusively accept applications submitted through our [online application portal](#). Applications via email or postal services will not be considered.

For further information please contact claudia.marcolli@env.ethz.ch and visit our [websites](#)