

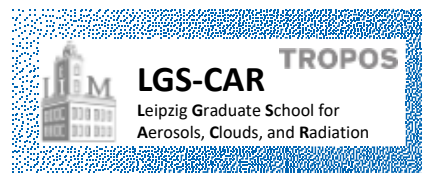


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TROPOS

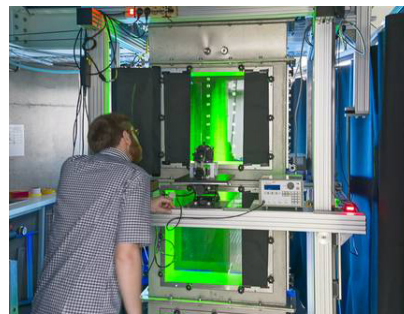
Leibniz Institute for
Tropospheric Research

Leipzig Graduate School on Clouds, Aerosols and Radiation (LGS-CAR)



Structured Doctoral Training Program

Leibniz Institute for Tropospheric Research and University Leipzig



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Research Academy Leipzig

Leibniz
Leibniz Association

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1 KEY DATA

1.1. Principal Investigators

The LGS-CAR is open to the research areas in the fields of clouds, aerosols and radiation. Academic staff and qualified senior scientists can serve as principle investigators.

The table below lists the current principle investigators of this School.

Name	Institution	Research Area
Prof. Dr. Andreas Macke	Leibniz-Institute for Tropospheric Research	polarisation of non-spherical particles, clouds and radiation
Prof. Dr. Manfred Wendisch	Leipzig Institute for Meteorology Universität Leipzig	passive remote sensing, clouds and radiation
Dr. Albert Ansmann	Leibniz-Institute for Tropospheric Research	Vis and IR remote sensing, aerosol-cloud interactions
Dr. Frank Stratmann	Leibniz-Institute for Tropospheric Research	physical chemistry, surface of aerosol particles
Prof. Dr. Hartmut Herrmann	Leibniz-Institute for Tropospheric Research	mineral dust and heterogeneous ice-nucleation
Prof. Dr. Ina Tegen	Leibniz-Institute for Tropospheric Research	regional modelling of absorbing aerosol
Prof. Dr. Johannes Quaas	Leipzig Institute for Meteorology Universität Leipzig	global modelling of absorbing aerosol
Dr. Hartwig Deneke	Leibniz-Institute for Tropospheric Research	Vis and IR remote sensing, aerosol-cloud interactions
Prof. Dr. Heike Kalesse	Leipzig Institute for Meteorology	Active remote sensing of clouds and precipitation
Dr. André Ehrlich	Leipzig Institute for Meteorology	Passive cloud remote sensing, radiative transfer
Prof. Dr. Bernd Abel	Wilhelm-Ostwald-Institute for Physical and Theoretical Chemistry	Untersuchung von Gasphasen und heterogenen Reaktionen
Prof. Dr. Knut Asmis	Wilhelm-Ostwald-Institute for Physical and Theoretical Chemistry	Untersuchung von Gasphasen und heterogenen Reaktionen
Prof. Dr. Detlev Belder	Institute of Analytical Chemistry	Analytik und Miniaturisierung analytischer Messsysteme („lab-on-a-chip“)

1.2. Involvement of young researchers

Doctoral candidates and Postdocs are involved in the Graduate School via the research activities of their working group, which include Graduate School projects. They also contribute to summer schools and other measures of the training program. In cooperation with the partners from the Universität Leipzig we seek to permanently establish the Graduate School measures to offer an attractive structured training program at the University Leipzig.

1.3. Participating Institutions

Institution	Affiliation
Leibniz-Institute for Tropospheric Research	Leibniz Association
Leipzig Institute for Meteorology	Faculty of Physics and Earth Sciences, Leipzig University
Wilhelm-Ostwald-Institute for Physical and Theoretical Chemistry	Faculty for Chemistry and Mineralogy, Leipzig University
Institute of Analytical Chemistry	Faculty for Chemistry and Mineralogy, Leipzig University
Research Academy Leipzig, Universität Leipzig	Central service institution responsible for promoting early career researchers at Leipzig University

1.4. Motivation

Tropospheric particles play an important role in many scientific fields from air quality to chemical processing of atmospheric gases and aerosols to formation of clouds and precipitation to climate change.

The corresponding processes are highly complex and require expertise in several fields such as aerosol and cloud physics, precipitation, remote sensing, fluid dynamics, meteorology in general, and atmospheric chemistry.

The aim of this Graduate School is to combine these expertise from partners at the University Leipzig and the Leibniz Institute for Tropospheric Research to provide the PhD students an interdisciplinary teaching and research environment, which is focused on a joint scientific problem, i.e. an improved understanding of physical and chemical processes in the field of clouds, aerosols and their radiative properties and impacts.

2 ACADEMIC PROFILE

2.1. Academic Aims

The Leibniz Institute for Tropospheric Research together with the Leipzig Institute for Meteorology, the Wilhelm-Ostwald-Institute for Physical and Theoretical Chemistry and the Institute of Analytical Chemistry offer a unique research and teaching environment covering all aspects of observation and modelling physical and chemical processes of aerosol and cloud particles in the Earth's atmosphere.

A wide range of chemical and physical laboratories and field-based research infrastructures and campaign activities exist where nearly all scientific questions concerning the development, processing, transport, cloud interaction of tropospheric aerosol particles as well as their effect on weather and climate can be addressed.

The contributing institutions have a world-leading reputation for carrying out large national and international field campaigns on land, air and sea. Modelling capabilities cover all scales from molecular reaction paths to regional aerosol-cloud interaction to global assessments of the role of aerosols on climate and climate change. Ground-based remote sensing resolves the vertical structure of aerosols and aerosol-cloud interaction at a variety of world-wide distributed stations. Satellite remote sensing provides spatio-temporal variability of aerosols, clouds, aerosol-cloud interaction as well as their radiative effects.

Currently, eight professorships ensure a unique academic supervision in the fields of atmospheric chemistry, physics, and modelling.

2.2. Main Research Topics in the LGS-CAR (LIM and TROPOS)

Aerosols

- Particle formation and growth
- Emission and deposition
- Chemical processing
- Air quality/health and technology

Clouds

- Ice Nucleation
- Dynamics / Turbulence
- Mixed-phase cloud processes
- Chemical multiphase processes

Radiation

- Interaction of clouds, aerosols, and radiation
- Cloud radiative forcing
- Surface reflection properties
- Synergetic use of ground-based and satellite observations

Focus Areas

- Northern hemisphere dust belt (Cape Verde to Central Asia)
- Urban areas
- Polar atmospheres
- Trade wind region and ITCZ
- Marine atmospheres

2.3. Methods, Infrastructures and Networks

Methods in the three research areas

- Laboratory observations
- Modeling of atmospheric processes
- Remote sensing of atmospheric processes
- Field campaigns with aircraft, ships, and satellite observations, and ground-based long-term measurements

Infrastructures and Networks

- LACIS (Leipzig Aerosol Cloud Interaction Simulator)
- LACIS-T (Turbulent Leipzig Aerosol Cloud Interaction Simulator)
- Melpitz-Observatorium (TROPOS Forschungsstation Melpitz, Torgau bei Leipzig)
- ACD-C (Atmospheric Chemistry Department Chamber)
- LACROS (Leipzig Aerosol and Cloud Remote Observations System)
- ACTRIS (Aerosol, Clouds and Trace Gases Research Infrastructure)
- Pollynet (worldwide observations with the portable Raman lidar systems Polly)
- Polarstern (deutscher Forschungseisbrecher des AWI Bremerhaven)
- HALO (High Altitude and Long-Range Research Aircraft)
- Polar Aircraft (Forschungsflugzeuge Polar 5 und Polar 6)
- Radiation Laboratories at LIM

3. STRUCTURED DOCTORAL TRAINING PROGRAM AND SUPERVISION

The independent research work carried out by doctoral candidates, under thorough supervision, represents a major part of the graduate training. In addition, individual scientific training in key research areas and soft skills contributes to a highly valuable and lasting education. Objectives are the promotion of the doctoral project through interdisciplinary and international additional qualifications in the specific scientific field, as well as the acquisition of professionally and practically relevant social skills.

3.1. Research Training

The structured doctoral training program of the LGS-Car is divided into the part “Research Training” and “the External Training Program (ETP)”.

The Research Training accompanies the doctoral candidate in providing supervision and mentoring support during the dissertation project.

The ETP represents a program of courses and modules, which offers additional work-specific qualifications as an aim of the structured and cross-compartmental education of the LGS-CAR. In this, discipline-specific/scientific and interdisciplinary/soft-skill topics are implemented and credit points are awarded.

In order to meet the requirements of the LGS-CAR and the requirements of the Research Academy Leipzig, the candidate has to acquire 10 ungraded CPs in the Research Training and 10 ungraded CPs in discipline-specific/scientific and interdisciplinary/soft-skill topics, respectively (External Training Program). The result will be certificated by the Research Academy Leipzig.

Composition of the “Research Training”

1) Thesis work:

The doctoral candidate writes a scientific concept and a preliminary work plan after 4 months of enrolment in the dissertation project. The written concept shall be provided to the personal qualification plan.

2) Supervision meeting

The doctoral candidate six-monthly meets with the supervisor to discuss the progress of the research project. The actual/planned comparison of his work shall be reported in written form in the personal qualification plan.

3) Open doctoral student seminar (obligatory)

The doctoral candidate gives three presentations within a joint seminar. All doctoral candidates and all PIs – especially the supervisor and the mentor - of the Graduate School

are invited to attend the public presentation. Interested colleagues from the participating institutes are welcome as well. The presentation is followed by an open discussion with respect to the progress of the work. For both presentation and discussion doctoral candidates will obtain 1CP graded.

4) Advanced Training Modules (obligatory)

This Advanced Training Modules deepen the doctoral candidate's knowledge of the different research topics of the LGS-CAR. Two-day block seminars are held using two different forms of studying:

Method-oriented seminars held by the principal investigators provide general and advanced knowledge about the research-topics of the LGS-CAR. The seminar content includes lectures, practical training or lab demonstration. After a learning period the student qualification is grades by an online exam.

The seminars and workshops include a general introduction into the research field and discuss possible cross sections to other research fields in the graduate school in order to enable an interdisciplinary learning that is suitable for all PhD candidates.

Doctoral candidates will obtain 2 CP.

Each ATM is evaluated by a questionnaire afterwards to ensure the quality and gain feedbacks.

3.2. External Training Program

3.2.1. LGS-CAR Discussion Workshops (obligatory)

From the second year of the dissertation program the doctoral candidate participates in the yearly workshops on the different research topics that are investigated in the Graduate School. Doctoral candidates will obtain 2 CP ungraded for active participation and oral presentation.

Besides scientific topics this workshop provides the opportunity to exchange experiences with the other PhD candidates: challenges/problems, recommendation for others (e.g. programs, techniques, devices). Also feedbacks on the program of the LGS-CAR are part of the workshop content. Ideas for suitable soft-skill courses or topics for future Advanced Training Modules are collected.

3.2.2. Participation in conferences (optional)

The doctoral candidate has the possibility to participate in national and international conferences relating to her or his field. The active Participation includes poster or oral presentation, which is awarded with 2 credit points.

3.2.3. Participation in summer/winter schools (optional)

The doctoral candidate is encouraged to participate in national and international summer schools relating to her or his field. Active participation is required and awarded with 2 CP.

3.2.4. External research experience (optional)

This program provides scientific experiences and contacts abroad and enables graduate students to conduct dissertation research that is necessary or beneficial to their work.

Moreover, such research stays can greatly help to assimilate young researchers into the international community and provide possibilities for their subsequent scientific careers (such as postdoctoral positions).

To plan an international research stay, doctoral candidates of the LGS-CAR consult their supervisors for an appropriate period (ca. 1 months) and aim of stay. The research experience is structured according to the research topics of the LGS-CAR. International partners in the research areas of the Leibniz Graduate School can be mediated by PIs..

1 CP will be awarded for a written report on the research activities during a research stay.

3.2.5. Additional exams (optional)

Upon request the PIs can (but are not obliged to) offer oral exams on a specific scientific topic in her/his field of expertise that requires roughly one week of preparation and that is awarded with 2 credit points.

3.2.6. Soft skill courses (obligatory)

Thanks to the cooperation of the LGS CAR with the Research Academy Leipzig (RAL), the doctoral candidate attends various soft skill courses. The courses can be chosen according to the individual demands and interests and are awarded with 0,5 to 2 credit points. Two courses are mandatory.

According to the status of the dissertation project the Research Academy provides suitable courses. For the first year for example “Good scientific practise” or “Time and self management” is recommended. For the second year “Scientific writing” or “Advanced presentation skills” is suitable. For the third year the courses “Finish it!” or “Career planning” are offered.

3.2.7. Method related courses (optional)

Courses on specific methods or software can be supported, when required.

3.2.8. Transfer activities and social engagement (optional)

The dialogue between science and the society is an integral part of scientific work. Phenomena such as skepticism about science, polemicizing against scientific discourse, or the misleading presentation of scientific results in public show that a better relationship between science, politics and society is needed. The LGS-CAR promotes transfer activities, such as participation in scientific public events or educational events and collaboration or

exchange with the media. Time spent is recognized with 1 or 2 credit points, depending on the effort. Also, the social engagement during the doctoral period in the task of "doctoral student representation" is recognized with 2 credits points.

3.3. Overview of the External Training Program and awarding of credit points:

Research training

Module	Required number	CP* per module
Advanced Training Module (ATM), 2 day block seminar, literature workshop one or two per semester	obligatory, 5	2 CP
Open doctoral student seminar	obligatory, 3 presentations	1 CP
To be acquired in total / within 3 years		10

External Training programme

Module	Participation	CP number/module
Workshops on intersection points of the research-topics, yearly, starting from the second year	obligatory	2 CP
International conferences	optional	2 CP
Summer/winterschools	optional	2 CP
International research experience	optional	1 CP for report
Soft skill courses (RAL)	obligatory, min 2	1 or 2 CP
Transfer activities (participation in scientific public events or media activities)	optional	1 or 2 CP
Representative for doctoral candidates	optional	2 CP
To be acquired in total / within 3 years		10

*For the necessary workload, involved in the structured doctoral training program, Credit Points are awarded. According to the European Credit Transfer System (ECTS), the Graduate School gives Credit Points for successfully completed modules. Here one ECTS credit corresponds to a workload of 25 to 30 hours. This includes both preparation time and actual session time.

3.4. Supervision and mentoring

The supervision committee consists of an Academic Supervisor, a Scientific Advisor and a Mentor. **The Academic Supervisor** is a faculty member and member of the Doctoral Committee delegated by the faculty to evaluate the dissertation.

The Scientific Advisor is mainly responsible for advising the student with respect to the dissertation project and the Personal Qualification Plan, ascertains that the student is provided with a concise description of the project and is thoroughly introduced into the subject area (practise and theory), regularly discusses the progress of the research project with the student. He or she discusses the work and makes recommendations; writes (together with the mentor) a brief statement on the progress of the student to the LGS-CAR office and discusses career perspectives with the student.

He or she helps the candidate to obtain support for the coordination of family life and research, if necessary.

The Mentor is co-responsible for the dissertation project and advises the student, together with the supervisor, regarding the Personal Qualification Plan. They participate in the seminars in which the initial work plan and yearly progress reports are presented, discuss the work and make recommendations, meets with the student at least every six months, and is available for additional discussions of the thesis project upon request. They help solving problems of the doctoral candidate with the supervisor and discuss career perspectives with the student.

4 STRUCTURE

4.1. Organisation

The bodies of the LGS-CAR are the steering committee of the LGS-CAR consisting of the scientific coordinator of the LGS-CAR, the principal investigators and the doctoral student representation, made up of 2 doctoral students and the spokesperson for the LGS-CAR, appointed by the steering committee. The structure and organization of the bodies is described in the corresponding bylaws.

4.2. Gender equality

The LGS-CAR offers the doctoral candidates family- and dual-career friendly work conditions. One applied gender equality measure for the Graduate School is the so-called cascade model that is designed by the Leibniz Association and adopted by all Leibniz institutes. According to the establishment plan TROPOS intends to increase the proportion of women especially in leading positions. Similar measures exist at the Universität Leipzig. Gender equality is existing among the doctoral candidates of both institutions.

A catalogue of measures is given by the “career and family audit” at TROPOS.

The improvement of a family friendly general framework shall extend the international competitiveness to create a positive working environment and attract high-qualified personnel. Another goal is the improvement of compatibility of work and family for young scientists, which enables better conditions for career development. These measures for the improvement of working conditions are for example family friendly work planning, pregnancy-related support and regulations for parental leave, family-friendly flexibility of working place and time.

Involvement of women in the Graduate School training program

Female researchers are generally involved in the Graduate School via the research activities of their working group, which include Graduate School projects. They also contribute to summer schools and other measures of the training program.

We evaluate additional female partners abroad to provide supervision for international research experience.

4.3. Tendering and selection procedure

The LGS-CAR graduate school offers a structured PhD education to all PhD students at TROPOS and LIM. Funding comes from various sources. The school itself does not provide funding for personal costs. PhD students are selected according to the hiring protocols at the partner institutes.

The University partners and TROPOS encourages all doctoral candidates in the fields of clouds, aerosols and radiation to take part in the structured program of the Graduate School. This thematic focus and a closed agreement and working contract to perform the dissertation either at the University or at TROPOS are prerequisites for enrolment in the LGS-CAR.

5. QUALITY MANAGEMENT OF THE LGS-CAR

Quality management by the TROPOS Scientific Advisory Board

The TROPOS Scientific Advisory Board) was informed about the implementation of the Graduate School. Constantly the report about the activities of the Graduate School is a part of the annual board meeting. The Advisory Board is hereby asked to give a statement regarding the operation and progress of the Graduate School. The University partners proceed the same way.

Measures on quality management

In addition to the supervision practise, described in point 3.1. – Research Training, the quality of the LGS-CAR program and success monitoring is regulated through the following comprehensive measures:

- A yearly planning workshop of the Principal Investigators on the current work status and future activities
- A planning workshop with the doctoral candidates, the LGS-CAR secretariat and the speaker of the Graduate School at the beginning of every year with the following content:
 - o Information on the planned activities, which were discussed in the PI planning meeting
 - o Information and joint scheduling of the coming semester programme
- Quality management of the advanced training modules via questionnaire
- Components of training modules and the improvement of interdisciplinary activities are discussed between the LGS-CAR speaker and the doctoral candidates

Transparency of the credit point system and grades

- The speaker of the LGS-CAR takes insight in the qualification status of all Graduate School members
- The LGS-CAR secretariat provides a program overview and an individual overview on the acquired credit points and grades during the structured training program
- The members of the Graduate School are asked to directly or anonymously give feedbacks to the LGS-CAR secretariat regarding supervising or program issues
- During the regular supervision meetings structural improvements of the training program can also be addressed