The Institute for Energy and Climate Research, Troposphere (IEK-8), investigates the chemical and physical processes in the troposphere that impact the chemical composition of the atmosphere.

The German Federal Ministry of Transport and Digital Infrastructure (BMVI) supports the air quality related project ‘MesSBAR’, which develops and validates atmospheric pollutant measurements installed on highly automated unmanned aerial vehicles (UAV). The measured 4D-data of meteorological parameters and atmospheric aerosols, soot, nitrogen oxides (NOx) and ozone (O3) in polluted areas will be coupled to transport models for air quality monitoring and assessment.

The application of UAV for atmospheric measurements requires the use of small and lightweight sensors. In flight measurements impose additional challenges on the sensor performance as the operation environment may change quickly. This requires a comprehensive characterization of the used sensors to obtain air quality data. UAVs provide a novel, flexible, ad hoc applicable and individually controllable possibility to obtain detailed information on air pollution characteristics and their dispersion.

We are offering a

2020D-025 - PhD position - Regional air quality assessment monitored by unmanned aerial vehicles

Your Job:
This PhD-project comprises the characterization and application of small air-quality sensors for the vertical profile dependent measurement of the trace gases NOx and O3 on-board of a newly developed ultra-lightweight serial drone. The simultaneous use of several UAV up- and down-wind of emission sources will allow an impact assessment of selected areas on air quality and will extend ground based measurements significantly. The data will be compared to regional model calculations to identify local emission.
sources and their strengths.

Your tasks:
- Adaption of UAV-applicable sensors for O3 and NOx
- Integration of the sensors on the UAV in collaboration with the UAV producer
- Characterization of the sensors under flight conditions
- Establish calibration procedures for quality assurance
- Establish automated data evaluation routines for measured pollutant concentrations
- Preparation and conduction of at least two intensive measurement campaigns in metropolitan areas
- Comparison of the in-situ measurements to data retrieved from remote sensing instrumentation, ground based measurements and regional model calculations
- Impact assessment of emission sources on local air quality based on the drone based measurements

Your Profile:
- M. Sc. degree in physics, chemistry, meteorology or a related field field with good final grade (German system equivalent 2.0 or better)
- Experimental skills
- Knowledge in atmospheric physics and chemistry
- Excellent knowledge of written and oral German and English
- Outstanding organizational skills and the ability to work independently
- Very good cooperation and communication skills and ability to work as part of a team in an international and interdisciplinary environment

Of great advantage are:
- Experience in data processing and visualization with a programming language
- Metrological knowledge

Our Offer:
- Cooperation between IEK-8 and other partners outside the research centre provides an ideal fundament to combine competences across different disciplines (meteorology, environmental science, high performance computing, software development and data science
- An exciting, inter-disciplinary team at one of Europe’s largest research establishments
- Excellent scientific environment and technical facilitie – ideal conditions for successfully completing a doctoral degree
- Continuous scientific mentoring by your scientific advisor
- Further development of your personal strengths, e.g. via a comprehensive further training programme
- A 3 year contract with pay in line with 67,5 % of pay group 13 of the Collective Agreement for the Public Service (TVöD-Bund).
- Information on employment as a PhD student at Forschungszentrum Jülich can be found here http://www.fz-juelich.de/gp/Careers_Docs

For project specific questions please contact Dr. Ralf Tillmann (IEK-8)

Forschungszentrum Jülich promotes equal opportunities and diversity in its employment relations.

We also welcome applications from disabled persons.