

Leibniz Institute for Tropospheric Research Leipzig (IfT)

Expertise and Experience

The Leibniz-Institute for Tropospheric Research (IfT) was founded in 1991 for the investigation of physical and chemical processes in the polluted troposphere. The institute comprises three departments, i.e., Physics, Chemistry, and Modelling.

In the chemistry department chemical processes in the troposphere are investigated by field experiments, laboratory investigations, and multiphase modelling. Field experiments serve the chemical characterisation of the anthropogenically formed aerosol, the investigation of chemical multiphase processes in the troposphere and of atmospheric trace gases regarding their formation and deposition. In the lab experiments investigations of heterogeneous and gas phase reactions, homogeneous aqueous phase processes, the particle modification in an aerosol chamber, and the particle generation in a laminar flow tube are realised. The multiphase modelling group formulates and models chemical mechanism. Based on laboratory and field experiments different applications (clouds or aerosol chemistry) modules are developed for the further improvement of higher scale models.

The physics department investigates meteorological and physical processes of tropospheric aerosols and clouds in the field and in the laboratory. The scientific results emerging from individual experimental studies are used to develop and validate tropospheric process models. The experimental methods include ground-based and airborne in-situ aerosol and cloud characterizations, and remote sensing of meteorological, microphysical aerosol and cloud parameters. Intense laboratory investigations are carried out concerning aerosol cloud interactions and their effects on microphysical and turbulent cloud properties. The instrumentation is largely based on in-house developments. The models used in the physics department simulate fluid mechanical, thermodynamic, and aerosol/cloud droplet dynamical processes.

Professional Experience

Prof. Hartmut Herrmann is the head of the IfT chemistry department and professor of atmospheric chemistry at the University of Leipzig. He is active in the field since 1986. This department of the IfT has special experience in field measurements (analytics and process studies), multi-phase modeling (modeling of chemical processes in cloud droplets), and laboratory experiments, with the main focus on gas phase and aerosol studies and reactions in the aqueous phase including phase transfer.

Aerosol experiments have been performed in a flow tube aimed to study the formation of new particles as well as in an aerosol chamber. The main goal of the chamber experiments was to study of SOA formation from the ozonolysis of biogenic hydrocarbons especially the influence of the particle acidity on particulate products and yields. In 2004/2005 the new aerosol chamber LEAK (Leipziger Aerosolkammer) was built.

Dr. F. Stratmann, is the head of the cloud group, department of physics, at the Institute for Tropospheric Research. Since 1986 he deals with the theoretical and experimental investigation of aerosol dynamics in flowing systems. His major research fields are: (a) the investigation of aerosol and cloud interactions and here especially the activation, the growth and the freezing of multicomponent aerosol particles, (b) the modeling of aerosol microphysical processes in flow reactors.

He is one of the developers of the Fine Particle Model, a commercially available add-on module to the Computational Fluid Dynamics Code FLUENT.

He and his group have been responsible for the layout, the design and the realization of the Leipzig Aerosol and Cloud Interaction Simulator (LACIS) and for the successful organization of the first international measurement campaign at the new IfT cloud laboratory.

His and his co-workers' scientific activities have been documented in more than 60 peer-reviewed publications.

Recent/Current EC Projects

ACCENT	Atmospheric Composition Change: the European network (GOCE-CT-2004-505337)
EUSAAR	European Super-sites for Atmospheric Aerosol Research (RII3-CT-2006-026140)
TENATSO	Tropical Eastern North Atlantic Time-Series Observatory (FP6-018458)
EUCAARI	European Integrated Project on Aerosol Cloud Climate and Air Quality Interactions (036833-2)

Recent Publications

Iinuma, Y., Müller, C., Berndt, T., Böge, O., Claeys, M., Herrmann, H. (2007) Evidence for organosulfates in secondary organic aerosol from β -pinene ozonolysis and ambient aerosol, *Environ. Sci. Technol.*, **41**, 6678-6683

Iinuma, Y., Müller, C., Böge, O., Gnauk, T., Herrmann, H. (2007) The formation of organic sulfate esters in the limonene ozonolysis secondary organic aerosol (SOA) under acidic conditions, *Atmos. Environ.* **41**, 5571-5583

Böge, O., Miao, Y., Plewka A., Herrmann H. (2006) Formation of secondary organic particle phase compounds from isoprene gas-phase oxidation products: An aerosol chamber and field study, *Atmos. Environ.* **40**, 2501-2509

Voigtlaender, J., F. Stratmann, et al. (2007) Mass accommodation coefficient of water: a combined computational fluid dynamics and experimental data analysis, *J. Geophys. Res.* 112, Art. No. D20208.

Wex, H., T. Hennig, et al. (2007) Hygroscopic growth and measured and modelled supersaturations of an atmospheric HULIS sample, *Geophys. Res. Lett.* 34, Art. No. L02818: doi:10.1029/2006GL027320.

Ziese, M., H. Wex, et al. (2007) Hygroscopic growth and activation of HULIS particles: Experimental data and a new iterative parameterization scheme for complex aerosol particles, *Atmos. Chem. Phys. Discuss.* 7, 13773-13803.