Atmospheric Hydrometeors in the Wind Tunnel Laboratory

Particle Chemistry Department

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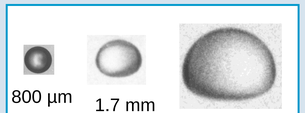
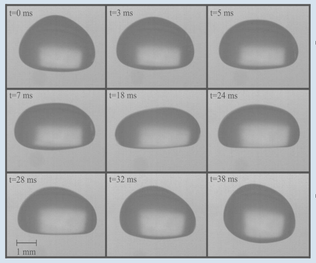
Mainz Vertical Wind Tunnel

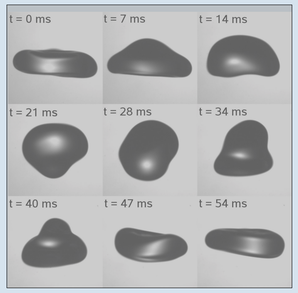
- freely floating of hydrometeors (drops, ice particles, snow flakes)
- sizes from 10 µm to 5 cm
- wind speed up to 40 m/s
- temperatures from +30°C to -30°C
- no wall or substrate effects
- observation of single objects
- control of parameters (temperature, humidity)



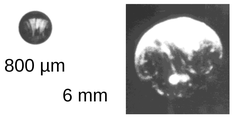
Shapes of raindrops



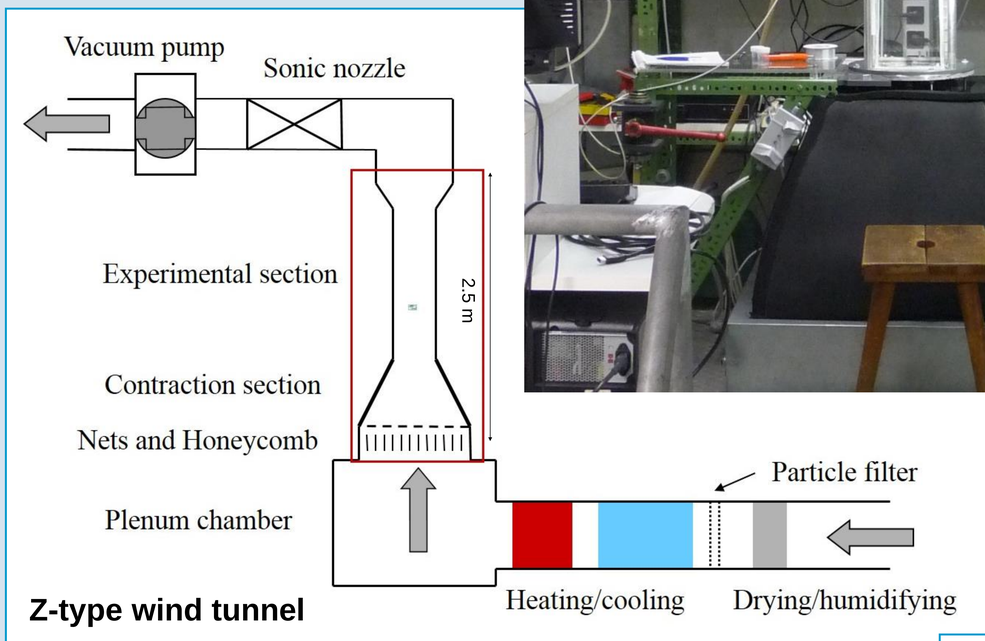
Oscillation of pure raindrops



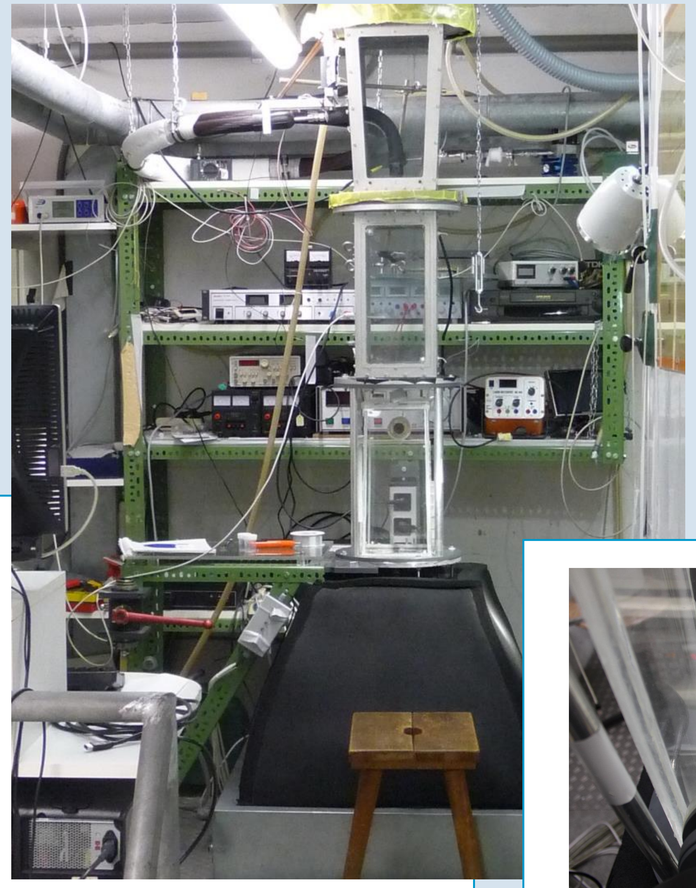
Oscillation of solution raindrops

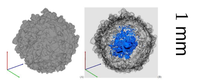


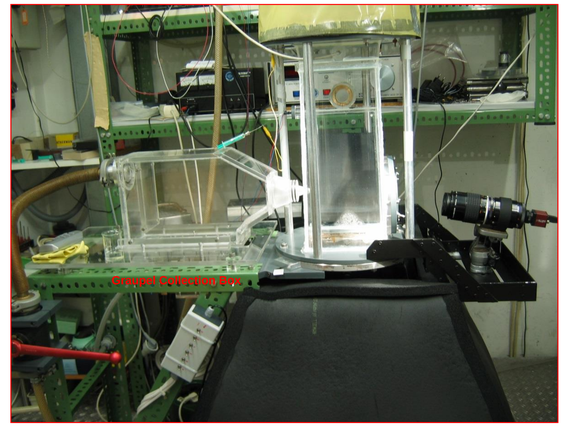
Internal circulation in raindrops



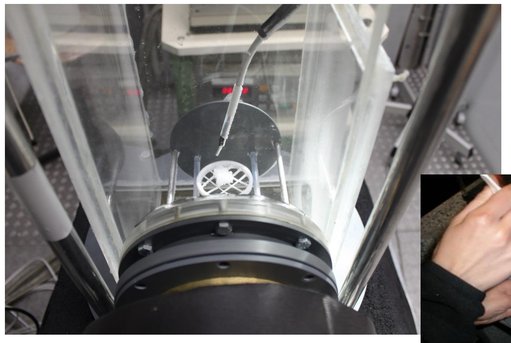
Z-type wind tunnel

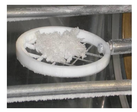




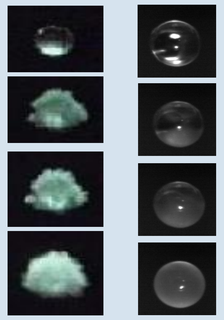


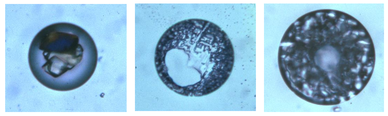
Riming of graupel





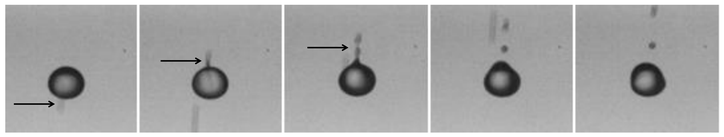
Riming of snow flakes





Drop size 100 to 170 µm

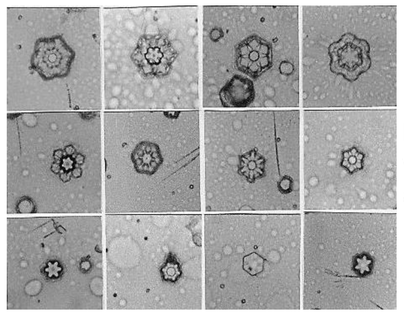
Frozen drops with pollen as ice nucleating particles



Filament break-up after collision of 2.5 mm raindrop with 500 µm droplet

Research fields

- raindrop shapes and oscillations
- internal circulation of raindrops
- collision processes
- riming and retention of trace gases
- heterogeneous freezing



Ice crystals with soot as ice nucleating particles

Publications

Diehl, K., et al., 2014: Particle-area dependence of mineral dust in the immersion mode: investigations with freely suspended drops in an acoustic levitator. Atmos. Chem. Phys., 14, 12343-12355.

v. Blohn, N., et al., 2013: The retention of ammonia and sulfur dioxide during riming of ice particles and snow flakes: Laboratory experiments in the Mainz vertical wind tunnel. J. Atm. Chem., 70, 131-150.

Müller, S., et al., 2013: Shapes and oscillations of raindrops with reduced surface tensions: Measurements at the Mainz vertical wind tunnel. Atmos. Res., 119, 38-45.

Szakáll, M., et al., 2013: A wind tunnel study of the effects of collision processes on the shape and oscillation for moderate-size raindrops. Atmos. Res., 142, 67-78.

v. Blohn, N., et al., 2011: Wind tunnel experiments on the retention of trace gases during riming: Nitric acid, hydrochloric acid, and hydrogen peroxide. Atm. Chem. Phys., 11, 11569-11579.

Diehl, K., et al., 2011: The Mainz vertical wind tunnel facility: A review of 25 years of laboratory experiments on cloud physics and chemistry. In: J.D. Pereira (Ed.), *Wind tunnels: Aerodynamics, models, and experiments.* Nova Science Publishers, Inc.

Szakáll, M., et al., 2010: Shapes and oscillations of falling raindrops – A review. Atmos. Res., 97, 416-425.