

Nucleation mode particles in the Karlsruhe city plume, the COPS / TRACKS - Lagrange experiment

FZK

IMK

W. Junkermann¹, R. Hagemann² and B. Vogel²

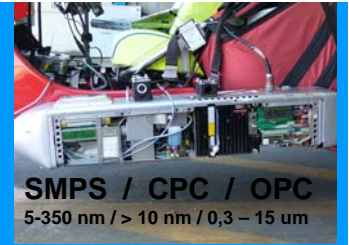
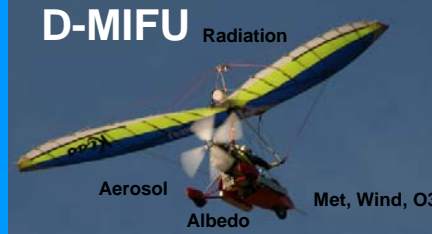


¹Forschungszentrum Karlsruhe, IMK-IFU, 82467 Garmisch-Partenkirchen, Germany

²Forschungszentrum Karlsruhe, IMK-TRO, 76021 Karlsruhe, Germany

➤ Observation of nanometer size particles in a city plume
 > Timing not in agreement with typical nucleation observations

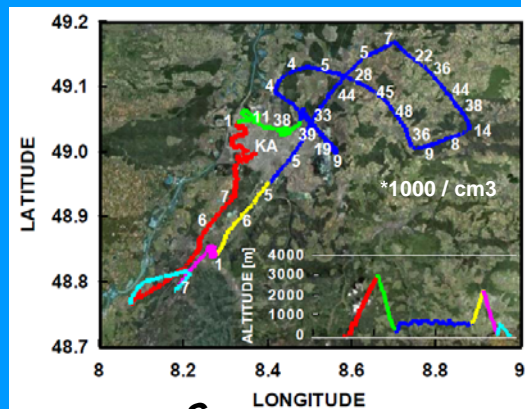
➤ Model calculations were performed to solve this discrepancy



THE MEASUREMENTS: AEROSOL/MET INSTRUMENTATION ON D-MIFU

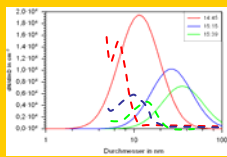
FLIGHT TRACK
 ALTITUDE
 NUMBER CONCENTRATION [1/cm³]
 > 10 nm AEROSOL

Wind (avg)~ 6 m/sec

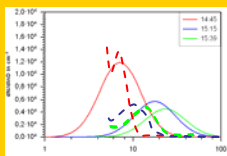


COSMO-ART

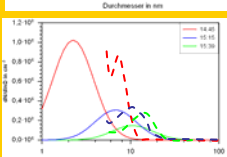
fully coupled model system for aerosols on the regional scale based on the operational forecast model of the German Wetterdienst



aerosols from urban emissions with increased source strength



addition of SO₂ at the surface

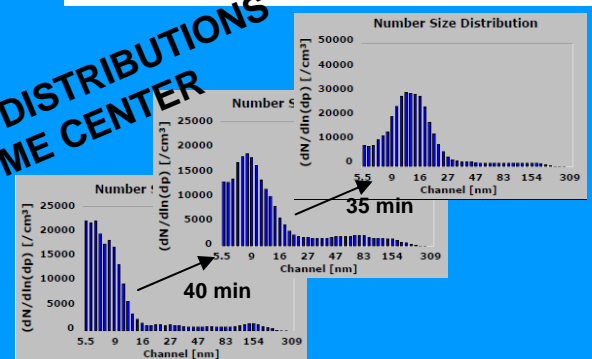


addition of SO₂ in 500 m

Best match -> continuous SO₂ emission between 250 and 500 m, further small sources downwind

KA power plant chimney 233 m

SIZE DISTRIBUTIONS PLUME CENTER



SUMMARY

Nucleation observed in the city plume in the early afternoon

Model requires SO₂ emissions in agreement with regional emission inventory

Power plant SO₂ emissions main source for regional ultrafine aerosol