

Characterization of airborne particles in the Baroque Hall of the National Library in Prague

**Jiří Smolík ¹, Ludmila Andělová ^{1,2}, Lucie Ondráčková ¹,
Jakub Ondráček ¹, Susana López-Aparicio ³,
Terje Grøntoft ³, Jerzy Stankiewicz ⁴**

¹Laboratory of Aerosol Chemistry and Physics, ICPF ASCR, Prague

²Institute for Environmental Studies, Charles University in Prague

³Norwegian Institute for Air Research, Kjeller, Norway

⁴National Library of the Czech Republic

KEY QUESTIONS

What are the concentrations of aerosol particles in the indoor environment of the Baroque Library Hall?

What is the composition of indoor PM?

What sources of aerosols are there inside a building?

What effect do aerosols outside a building have on the concentrations inside?

KLEMENTINUM



KLEMENTINUM



BAROQUE LIBRARY HALL

Area **430 m²**
Volume **4500 m³**
Books **21 000**
 100 – 200 visitors
 10:00 – 19:00



MEASUREMENTS

Particle number size distributions

Mass size distributions

Ionic composition

Elemental composition

MEASUREMENTS



**Scanning Mobility Particle Sizer, TSI, U.S.A.
size range 10 – 700 nm**

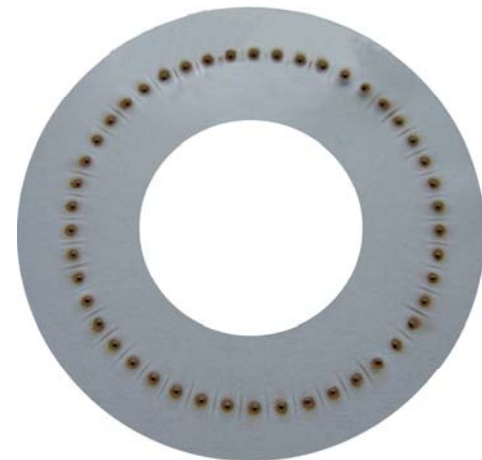
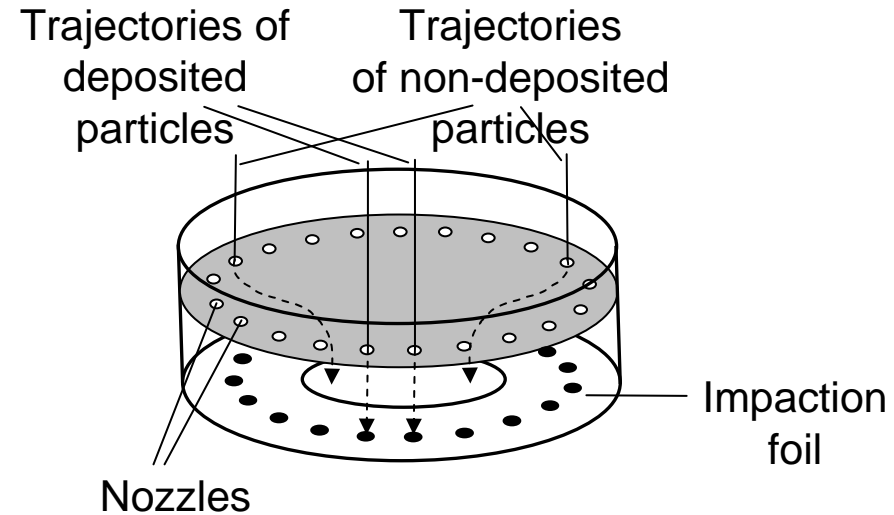
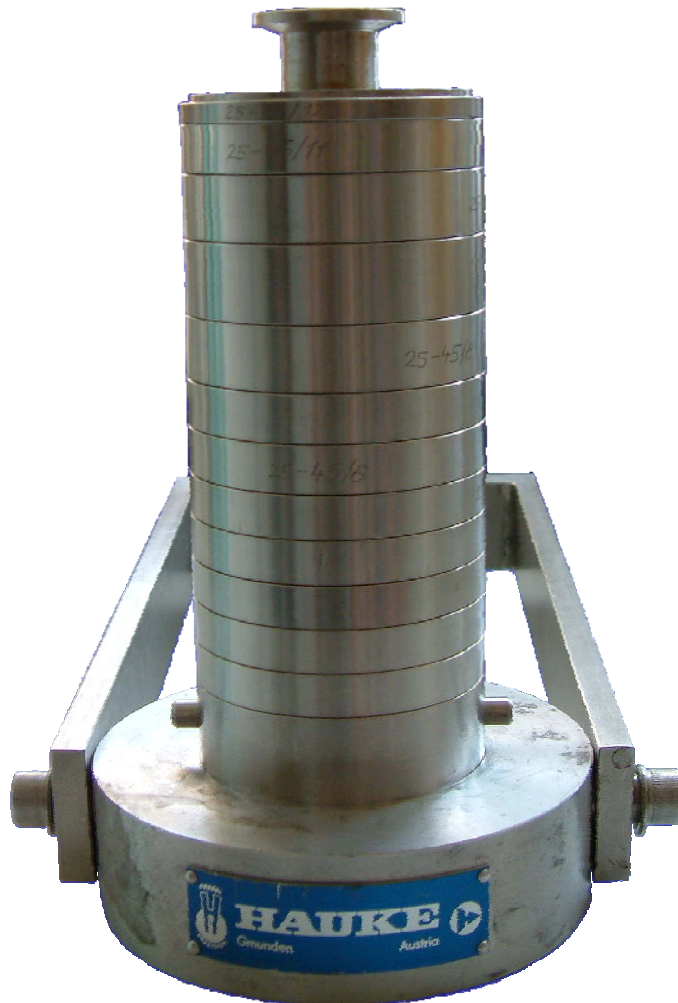
MEASUREMENTS



**Aerodynamic Particle Sizer, TSI, U.S.A.
size range 0.5 – 20 μm**

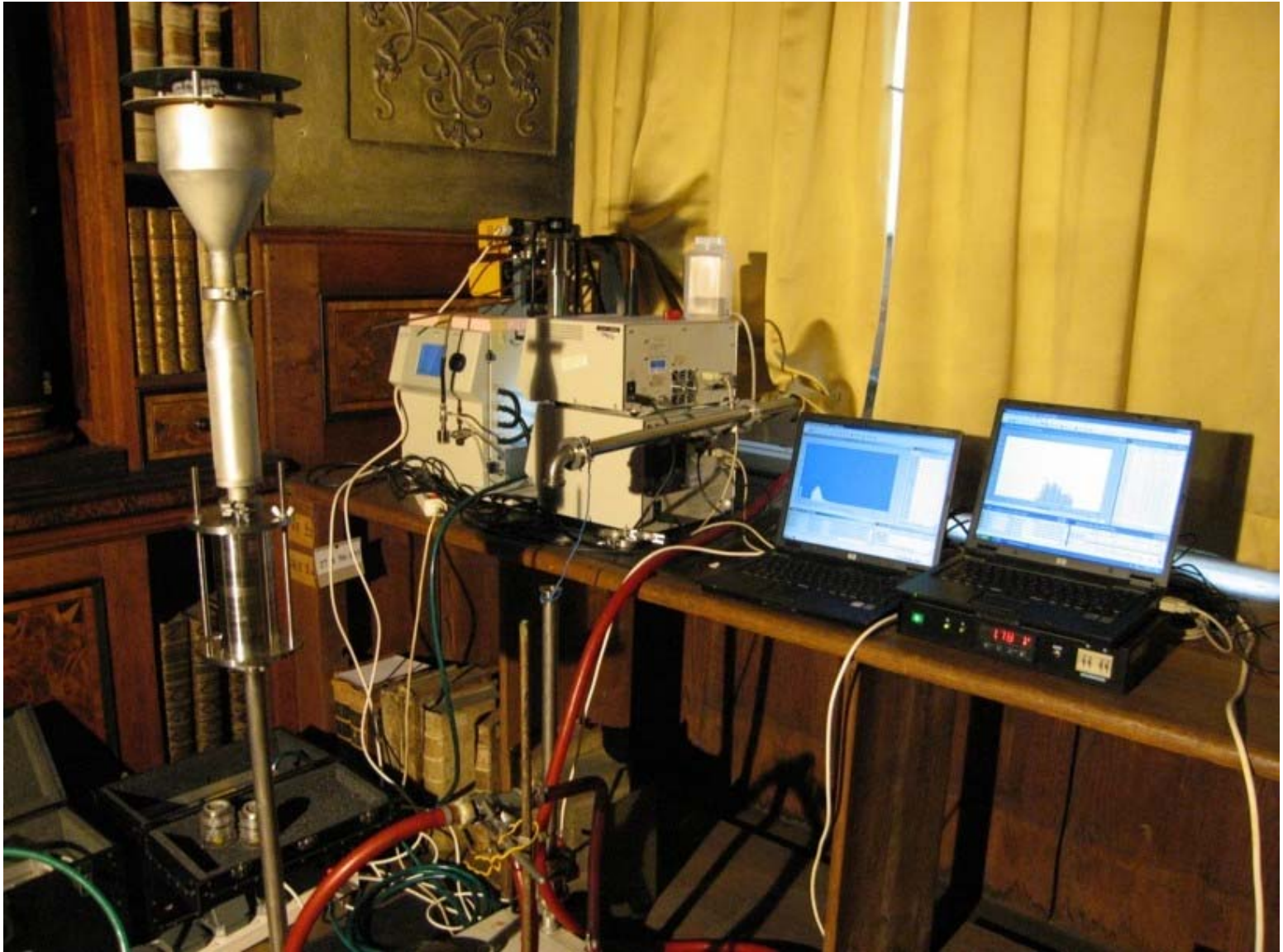
BLPI CASCADE IMPACTOR

10 stages, size range 0.025 – 10 μm











MEASUREMENTS

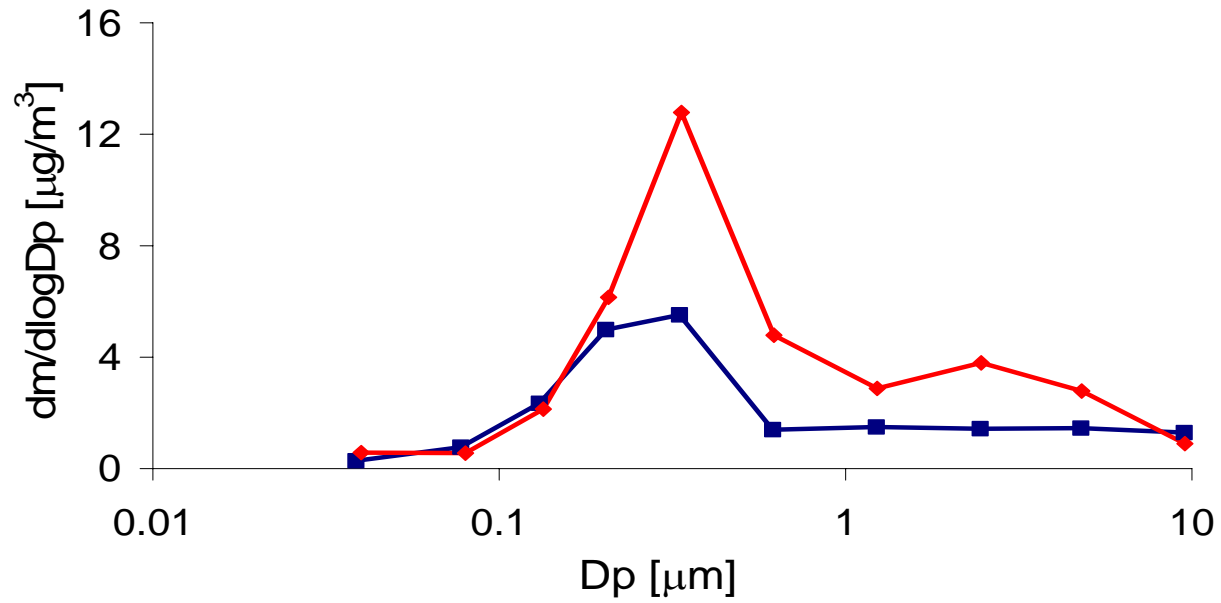
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9. 3. – 17. 3. 2009

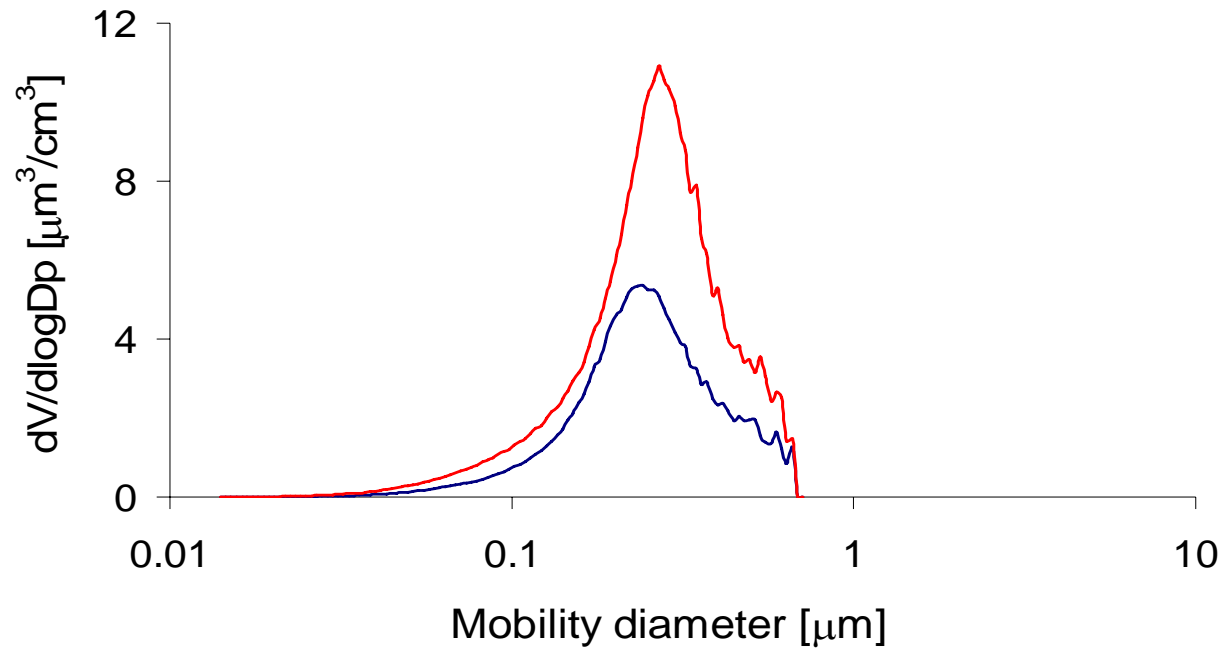
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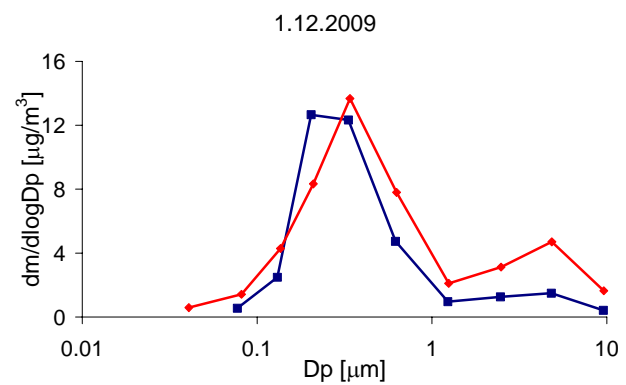
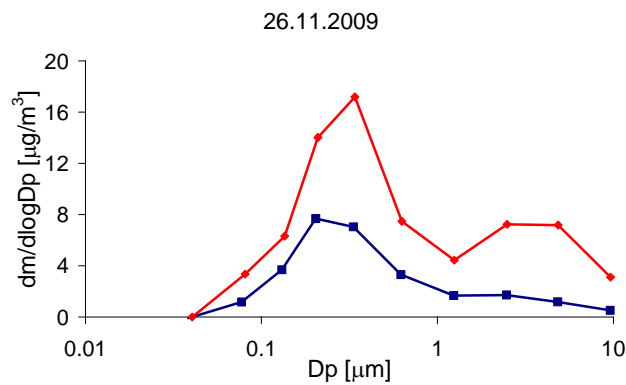
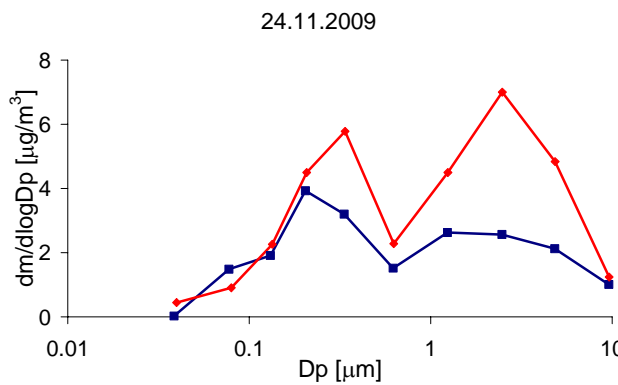
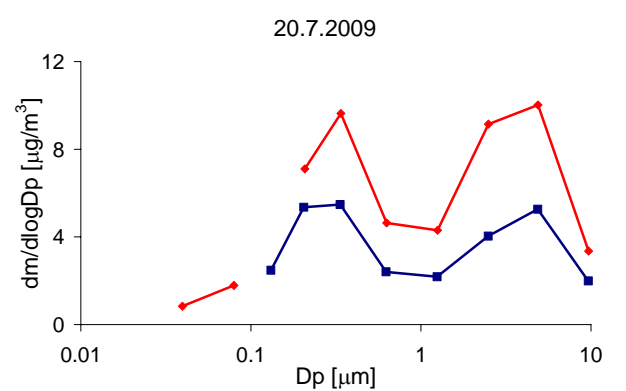
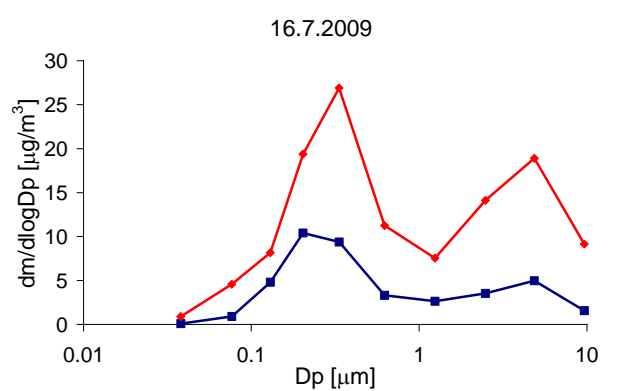
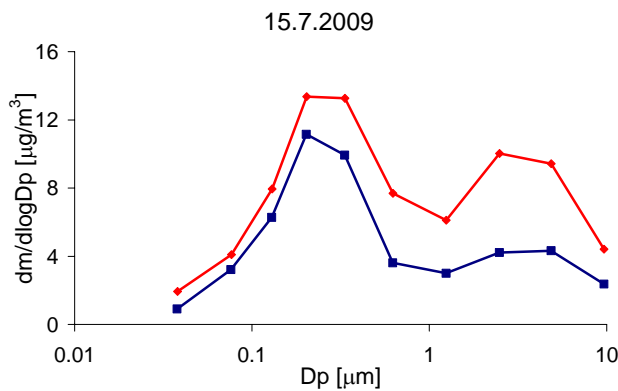
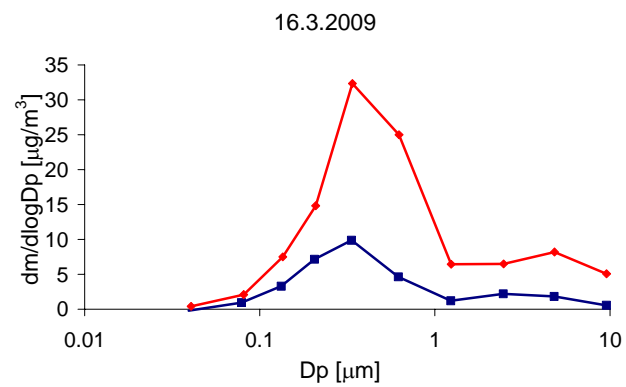
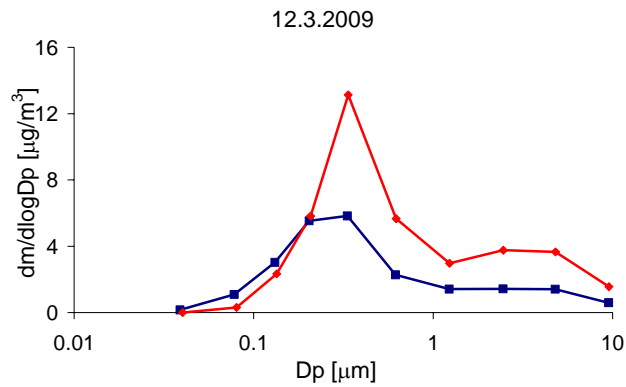
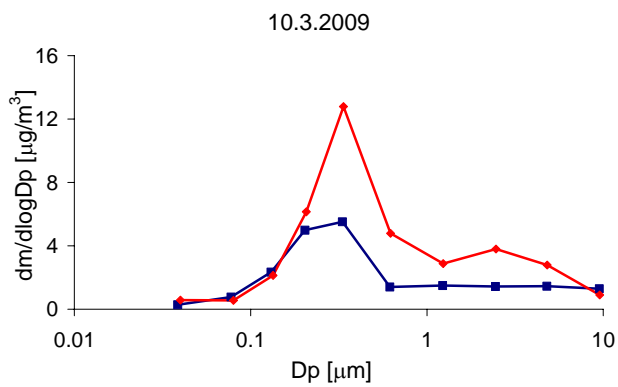
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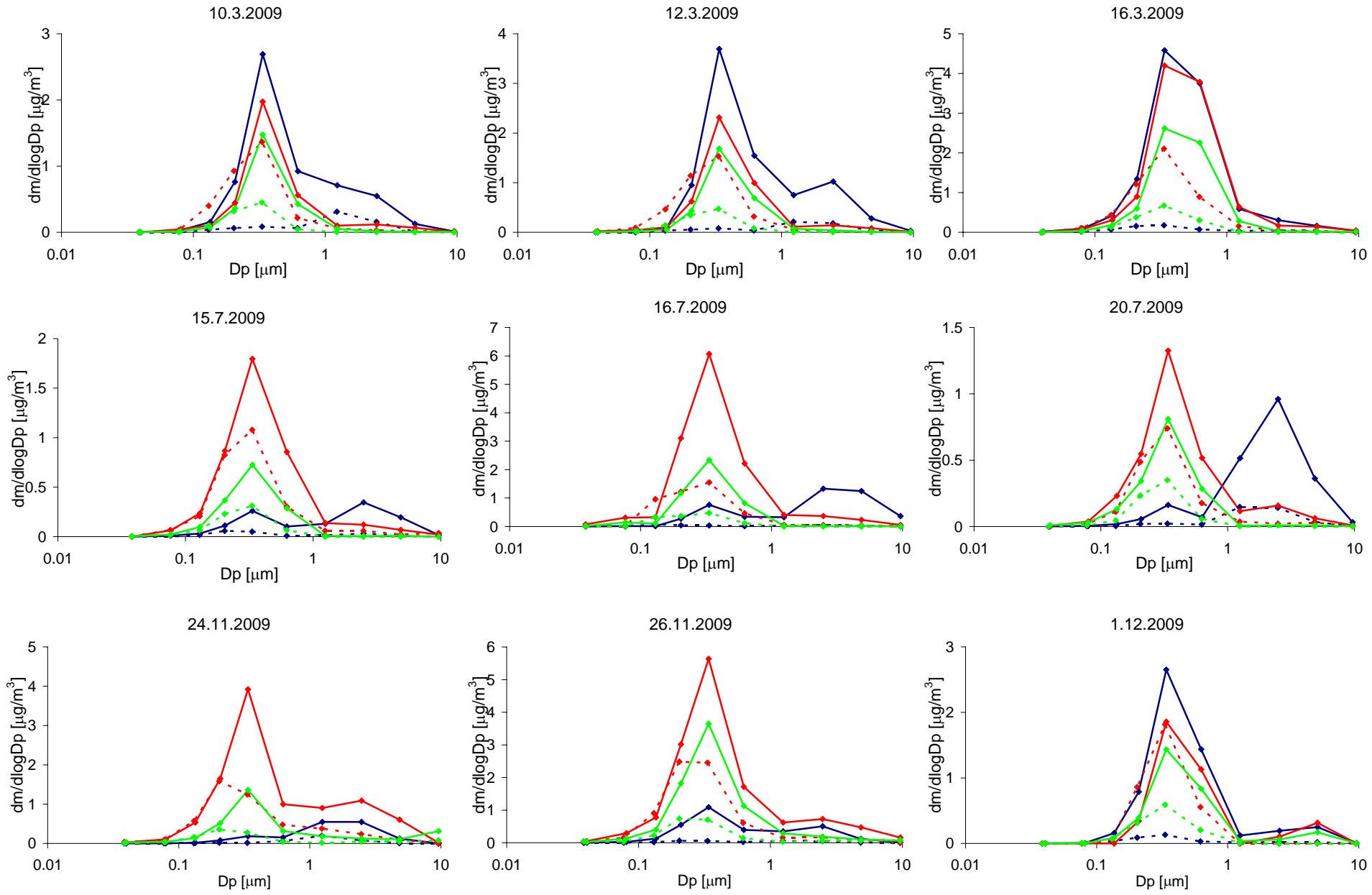
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■ Indoor ◆ Outdoor



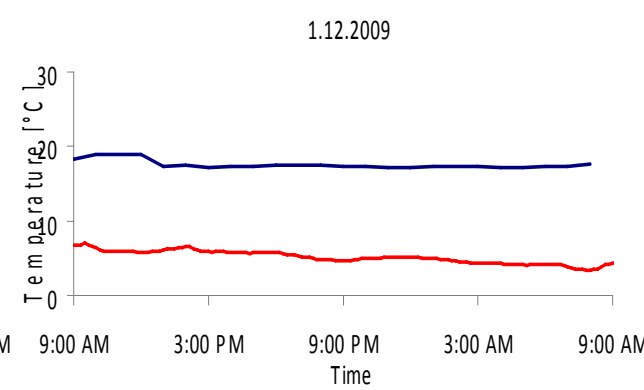
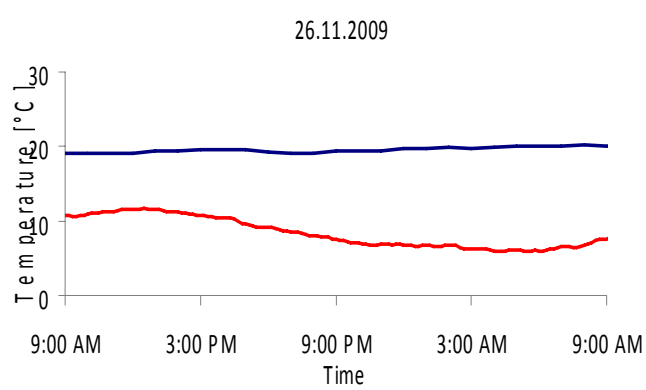
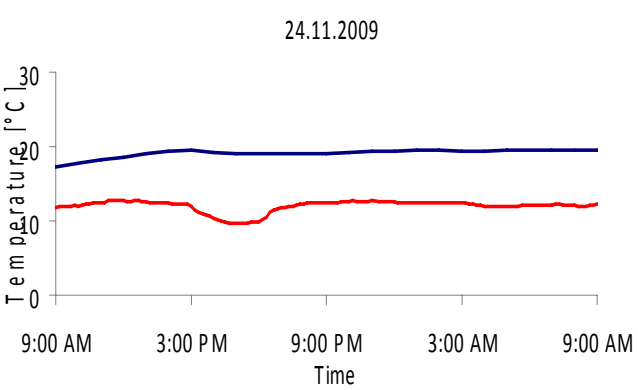
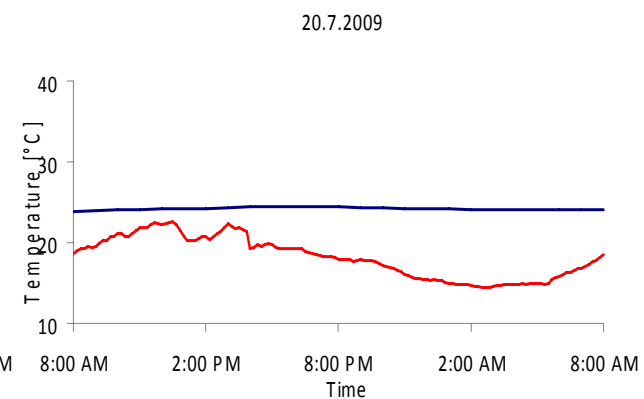
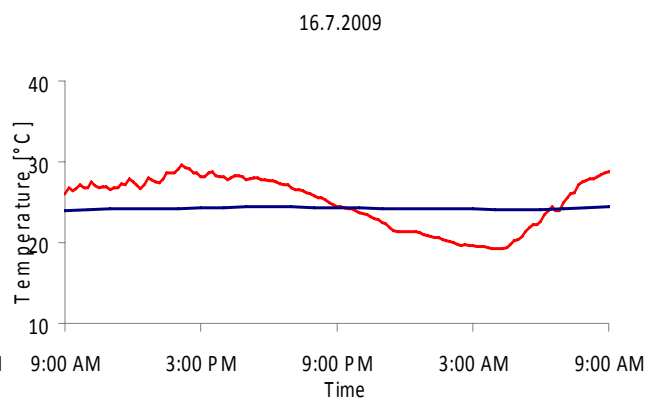
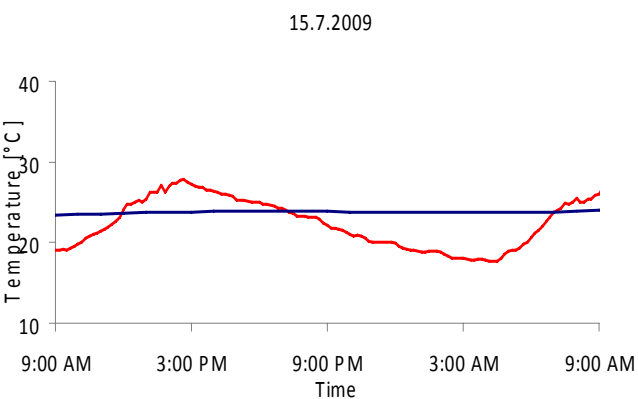
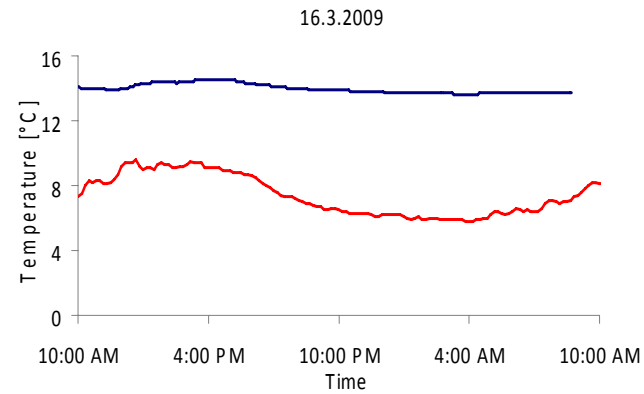
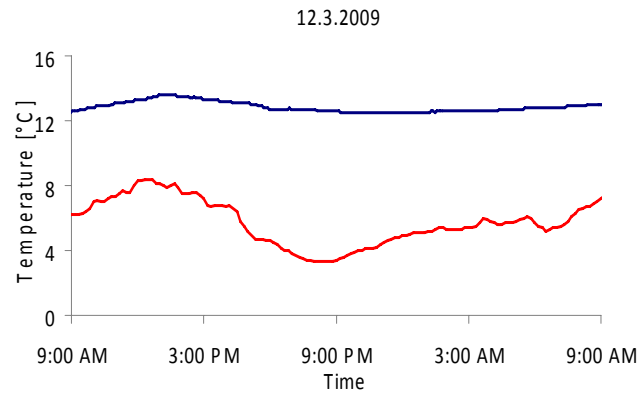
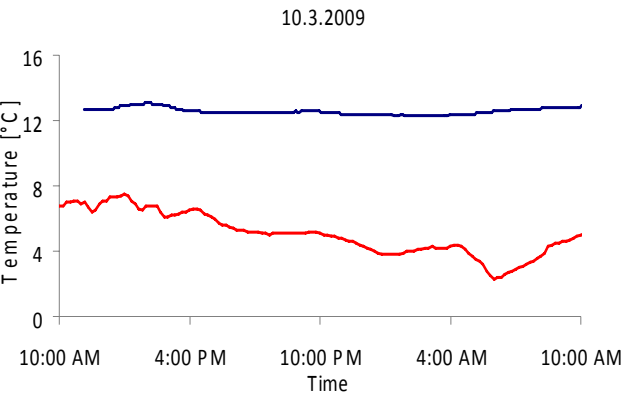
-◆- NO3 Indoor -◆- NO3 Outdoor
 -◆- SO4 Indoor -◆- SO4 Outdoor
 -◆- NH4 Indoor -◆- NH4 Outdoor



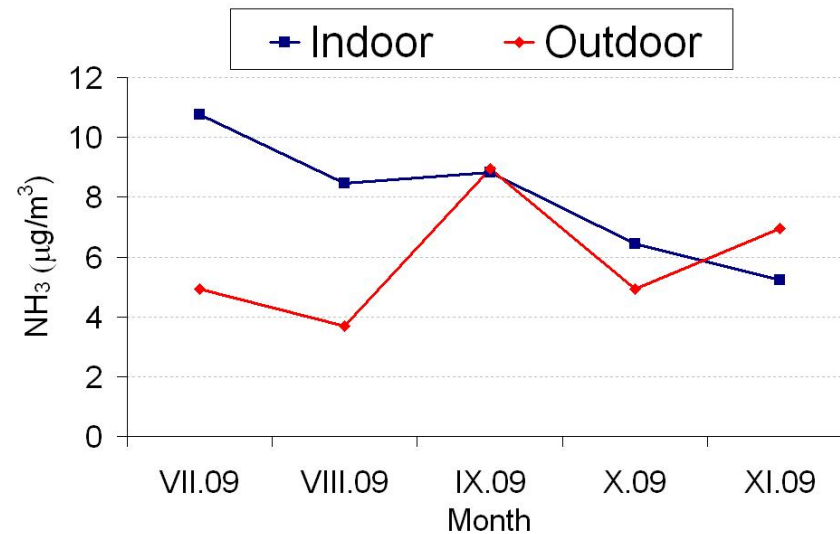
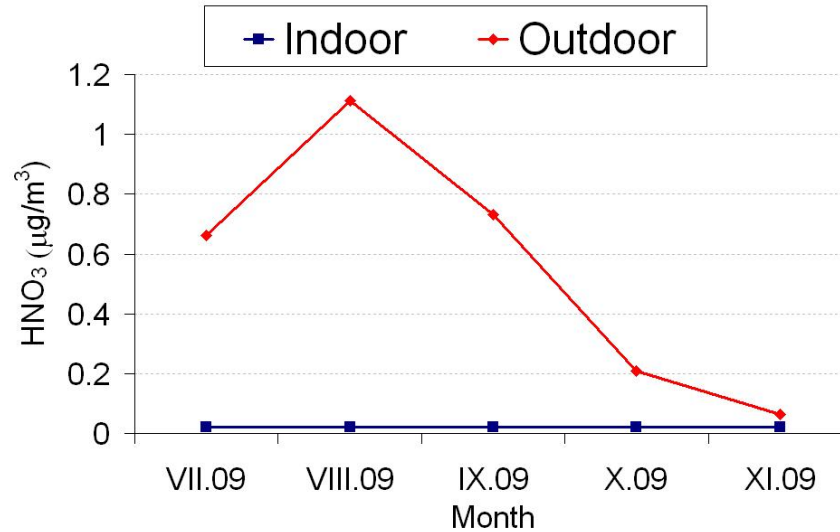
AMMONIUM NITRATE



— Outdoor — Indoor



PASSIVE DIFFUSION SAMPLERS



CONCLUSIONS

- ammonium sulphate and nitrate in outdoor PM contribute significantly to the indoor air pollution
- ammonium nitrate can evaporate indoors producing gaseous ammonia and nitric acid
- the process is enhanced by nitric acid deposition on indoor surfaces
- the process increases concentrations of gaseous ammonia indoors
- remaining ammonium sulphate is hygroscopic

ACKNOWLEDGMENTS

National Training Fund A/CZ0046/2/0001

Environmental Monitoring and Evaluation of Tolerability of Indoor Environment in the Baroque Library Hall of the National Library



COST D42

Chemical Interactions between Cultural Artefacts and Indoor Environment

MEYS OC09049

Detailed Characterization of Particulate Matter in the Indoor Environment of the National Library in Prague

THANK YOU