Results of a one-year ambient aerosol study with coarse particle characterization at highly frequented motorways in Germany

Z. TIAN[125]*, V. DIETZE[2], A. BAUM[3], U. KAMINSKI[2], J. SAUER[3], P. STILLE[4], C. MASCHOWSKI[5], K. CEN[1] AND R. GIERÉ[6]

[1]School of the Earth Sciences and Resources, China University of Geosciences (Beijing), 100083, Beijing, China (*correspondence: xuedu325@gmail.com)

[2]Deutscher Wetterdienst (DWD), Zentrum für Medizin-Meteorologische Forschung, 79104 Freiburg, Germany

[3]Bundesanstalt für Straßenwesen (BASt), Referat V3 – Umweltschutz, 51427 Bergisch Gladbach, Germany

[4]Laboratoire d'Hydrologie et de Géochimie de Strasbourg, Université de Strasbourg, UMR 7517 CNRS, 67084 Strasbourg, France

[5]Institut für Geo- und Umweltnaturwissenschaften, Albert-Ludwigs-Universität, 79104 Freiburg, Germany

[6]Department of Earth and Environmental Science, University of Pennsylvania, Philadelphia, PA 19104-6316, USA

Monitoring and characterizing airborne particulate matter (PM) has been an important research area due to PM's impact on health, visibility reduction, material damage and ground water pollution. In regard to road dust, suspension and re-suspension with the contribution of non-exhaust PM to total traffic emissions are expected to increase as a result of predicted climate scenarios.

The passive sampling method Sigma-2 collects coarse particles on an acceptor surface, which is suitable for single-particle analysis via optical microscopy (TLM=transmitted-light microscopy) and scanning electron microscopy (SEM). The TLM analysis allows for the determination of a number settling rate of the "total" atmospheric particle load (d_p 2.5-80 μm, geometric equivalent diameter), used for the calculation of the total ambient aerosol mass concentration (VDI 2119, 2013). Furthermore it allows for the differentiation by particle type (e.g., opaque *vs*. transparent) and particle size (d_p 2.5-10 μm, d_p 10-80 μm), used for the calculation of the size-fractionated mass concentration of these particles. Results from this method provide information on the distribution ratio of different particle sizes over a given period and sampling site and permit distinction between, and first estimation of, anthropogenic and natural particles in the study area. The anthropogenic (opaque) particle fraction shows for our sampling sites the maximum concentration of PM in the 10 to 20 μm size interval. This is typical for sampling locations under the direct influence of road traffic.