

## **Sampling, measurement and single-particle analysis of coarse particulate matter (PM) from small-scale wood burning in the Black Forest**

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Biomass combustion leads to widespread emission of not only gases but also of particulate matter, including carbonaceous aerosols, which can absorb or scatter incident solar radiation, with the consequence of affecting the Earth's radiation budget. The number of installed stoves and fireplaces reached 5.8 million in Germany in 2009, with fireplaces increasing more rapidly than wood stoves. This leads to an increasing contribution of emissions from biomass combustion to the overall PM concentrations. Coarse ambient aerosols were collected according to national standards (VDI-2119, 2013) with the Sigma-2 passive sampler.

The first sampling and particle measurement campaign started in the heating season 2013/14 (Nov. 2013 - end of Feb. 2014). Automated single-particle analysis for individual particle characterization with morphometric and densitometric parameters was carried out by transmitted light microscopy (TLM) with subsequent calculation of particle mass concentrations. For three of our four sampling sites in the Black Forest, TLM revealed that the opaque particle fraction is dominated by local wood burning activities. A typical right-skewed size distribution is considered as an indicator for secondary particles ( $d_p < 2.5\mu\text{m}$ ), which are converted from the gas phase. Detailed characterization and classification of individual particle shape, type and especially chemical composition was realized by scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDS) analysis, which revealed the presence of various types of salt phases in addition to carbonaceous material.