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Towards innovative roadside monitoring

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Soil contamination along roadsides is an important factor of anthropogenic point source pollution. Climatic and traffic-specific factors influence the amount and characteristics of pollution emitted and deposited in the roadside soil. In our present study we focus on monitoring typical traffic pollutants (heavy metals HM, platinum group elements, polycyclic hydrocarbons PAH), and investigate the use of magnetic parameters, especially magnetic susceptibility (MS) as proxy. Monitoring plots were installed along roadside in areas with different climatic conditions and different traffic-specific activities (traffic density and speed, vehicle types, abrasion of tires, brake linings, petrol/diesel compounds and road maintenance). For monitoring we removed 10-15 cm of top soil at 1 m distance from the roadside edge and placed 30 plastic boxes there filled with clean quartz sand, to be sampled after regular intervals within two years. Preliminary data from the first year of monitoring are presented. Magnetic results revealed that a coarse grained magnetite-like phase is responsible for the enhancement of magnetic concentration. The mass-specific MS and concentration of pollutants (HM, PAH) all show a significant increase with time, however, there are obviously also seasonal and site-dependent effects which lead to more stable values over several months or even some decrease in the upper few cm due to migration into depth. Source identification indicates that the accumulated PAHs are primarily emissions from traffic. In order to be able to discriminate in between different kinds of transport and deposition (surface run off from the road and neighbouring soil material, splash water, air transport), we additionally established pillars at the roadside with clean quartz sampling boxes at different heights (surface, 0.5 m, 2 m). As a first surprising result we observed that the increase in the boxes at surface is not necessarily higher than at 0.5 m height. The results from our monitoring studies will be utilized to understand site-specific characteristics and to develop new innovative roadside pollution monitoring concepts.