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PM Monitoring and Modelling on Microscale in Urban Area

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Strong gradients of particulate matters (PM) exist on micro scale or urban area due to the complex building arrangement and multiple sources in the city. This complicate micro environment brings us challenges for the air pollution research and exposure assessment especially in urban residential community. Field monitoring combined with dispersion modelling is a promising approach. In the project "Scale model outdoor measurement of urban climate and health (SOMUCH)", field monitoring is being performing both with scale model and in real city. In the scale model field, we built ideal urban area with street canyons of different aspect ratios. Meteorological parameters and pollutants concentrations are being monitored. Also, observation campaign in real city was implemented within a typical Asian residential community with dense high- and- low rise buildings. Meteorological parameters and spatial gradients of PM concentrations in the community were monitored by both in-situ and mobile observations. For modelling work, in SOMUCH project a Lagrangian particle dispersion model (GRAL) is used for PM simulation. The validation shows pretty good agreements between the results of simulation and observation. The modelling results are used to access PM exposure increments related to the vehicle exhaust within the community. Furthermore, the horizontal profile of road-traffic PM exposure concentration within deep street canyons were accessed on different floor levels. Perfect exponential decay curves of traffic related PM2.5 were found on all floor levels within canyons. This monitoring and modelling approach is highly helpful for PM dispersion research and residents' exposure assessment in complex urban communities. Promising good results can be expected by combining the on-going work with scale model and observation campaigns in real city.