STABILITY OF LAND USE REGRESSION MODELS AND MEASURED SPATIAL PATTERNS FOR NO2, PM2.5 AND PM2.5 ABSORBANCE

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Background and Aims: Within the ESCAPE project outdoor air pollution concentrations are being estimated using harmonized Land Use Regression (LUR) models in 37 study areas in Europe. LUR models are being developed for concentrations measured in 2008-2011, but the cohort studies started much earlier. The aim is therefore to evaluate the stability of measured spatial patterns and LUR models using data and models from a European study conducted in 1999 (TRAPCA).
Methods: In each ESCAPE study area, 20 to 40 locations were monitored in the period October 2008 – April 2011. We also re-sampled sites used in the 1999 TRAPCA study in Munich, Stockholm and The Netherlands. For both TRAPCA and ESCAPE NO_2, $PM_{2.5}$ and $PM_{2.5}$ absorbance were measured, and LUR models were developed.
Results: The measured concentrations at the same locations in both periods correlated generally well, with Pearson correlations 0.98, 0.81 and 0.99 for the Netherlands (N=15), and 0.89, 0.46 and 0.75 for Stockholm (N=25) for NO_2, $PM_{2.5}$ and $PM_{2.5}$ absorbance, respectively. In both areas, concentrations decreased with largest decrease for $PM_{2.5}$ absorbance. In the Netherlands, the ESCAPE LUR models explained 89% (NO_2), 70% ($PM_{2.5}$) and 91% ($PM_{2.5}$ absorbance) of the spatial variance in measured concentrations in 2008-2011, and explained 94% (NO_2), 59% ($PM_{2.5}$) and 93% ($PM_{2.5}$ absorbance) of the spatial variance in concentrations measured in 1999. LUR model development is ongoing and results for other areas will also be shown.
Conclusions: The correlations between the measured spatial contrasts for $PM_{2.5}$ and especially NO_2 and $PM_{2.5}$ absorbance in 1999 and 2008-2011 were high. The ESCAPE models predicted the measured spatial contrast in 1999 well especially for NO_2 and $PM_{2.5}$ absorbance in The Netherlands. If corroborated by the analyses for the other study areas, this supports that the ESCAPE LUR models can be used to represent historical concentration contrasts.