

# ESTIMATING THE POPULATION EXPOSURE TO AIRBORNE POLLUTANTS IN EUROPE BASED ON A SPACE-TIME MODELLING

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**Abstract.** In this talk we consider the distribution of population by exposure to multiple airborne pollutants taking into account spatial and temporal variability of air quality and spatial spread of human population over Europe. To do this we use high resolution semi-parametric estimates of daily average concentrations for five pollutants, namely carbon monoxide, nitrogen dioxide, ozone, fine and coarse particulate matters. In order to optimize the spatial information content and allow the computation of daily multi-pollutant exposure distribution, we introduce a trans-Gaussian multivariate spatio-temporal model which is estimated using the EM algorithm. Daily spatial prediction of multi-pollutants is then performed using a robust semi-parametric estimate of the link function. As a by-product of this approach we have a semi-parametric bootstrap technique which is used to assess the exposure distribution uncertainty. In this way we compare the daily population exposure of 33 European countries as well as three important metropolitan areas given by Berlin, Greater London and Milan province in years 2009-2011. Extensive tabulations and graphs are reported in supplementary material.