Modelling the effect of vehicular–traffic and meteorology on fine particle concentration using Additive Mixed Models: the case of the town of Perugia

Simone Del Sarto[1,*], M. Giovanna Ranalli[2], Elena Stanghellini[1], David Cappelletti[3], Beatrice Moroni[3], Stefano Crocchianti[3] and Silvia Castellini[3]

[1] *Department of Economics, University of Perugia; delsarto@stat.unipg.it, elena.stanghellini@stat.unipg.it*

[2] *Department of Political Sciences, University of Perugia; giovanna.ranalli@stat.unipg.it*

[3] *Department of Chemistry, Biology and Biotechnologies, University of Perugia; david.cappelletti@unipg.it, croc@impact.dyn.unipg.it*

[*] *Corresponding author*

Abstract

The purpose of this work consists in understanding how fine particles concentration in the town of Perugia is affected by vehicular traffic and meteorological variables. In particular we analyse data from the PMetro project (`http://www.pmetro.it`), which studies urban pollution dynamics in the town of Perugia. The particles concentration data are collected by an instrument located on a cabin of Minimetro, a public conveyance that moves on a monorail throughout the town. We merge these data with vehicular traffic and several meteorological variables (temperature, wind speed, etc.). We analyse this dataset using Additive Mixed Models, which use a smooth function (such as penalized splines) to model the effect of each covariate, instead of a polynomial pre–specified function.