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concentrations on a 1x1km grid), Met office (modelled daily air pollution concentrations on a 12x12km grid) and King's College London (monitoring daily air pollution concentrations and meteorological confounders). Through a Bayesian hierarchical framework we specify a model to link the data sources, accounting for the change of support problem as well as for the measurement error, in order to predict the concentration at grid level (1x1km). In addition, we evaluate the role of spatial and temporal covariates (e.g. site-type, meteorology). The analysis for model adjustment considers a single pollutant (NO2) in the area of Greater London for the years 2007-2011. This analysis will build the basis for a multi-pollutant model, which takes into account the correlation between the major pollutants (PM10, PM2.5, O3, NO2, NOX) through a temporal effect varying across these; further developments may include the implementation of an epidemiological model to evaluate the link between exposure to air pollution and cardio-respiratory conditions at the small area level, propagating the uncertainty from the exposure estimates.

Penalized Complexity Priors for Varying Coefficient Models

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Varying coefficient models (VCMs) can be seen as a general class of models that includes as special cases the generalized linear model, generalized additive models, dynamic generalized linear models or even the more recent functional linear model. In practice, a VCM is useful in the presence of an effect modifier, a variable that changes the effect of a covariate of interest on the response. In a Bayesian hierarchical framework, the varying coefficient can be described by a vector of random effects distributed at prior as a Gaussian Markov Random Field. In this work, we present the use of penalized complexity priors for VCMs, introducing a natural base model for different (temporally and spatially) structured priors. We illustrate the application of these priors on an epidemiological case study.

Predicting Missing Values in Spatio-temporal Satellite Data

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Time series of remotely sensed optical data often contain data points of low product quality, related to atmospheric contamination or angular configuration for example. After detecting and removing such data points, the resulting data product is sparse and contains missing values. This is problematic for applications and signal processing methods that require temporally continuous data sets. To address this sparsity, we present a new gap filling method, which is designed to scale with the computational resources via parallel computing. We predict each missing value separately