PDF's of interest from CIS

"A Bayesian kriged Kalman model for short-term forecasting of air pollution levels" (2005)
Sujit K. Sahu and Kanti V. Mardia
http://www.blackwell-synergy.com/links/doi/10.1111/j.1467-9876.2005.00480.x/pdf?cookieSet=1
Shor t-term forecasts of air pollution levels in big cities are now repor ted in news-papers and other media outlets. Studies indicate that even shor t-term exposure to high levels of an air pollutant called atmospheric particulate matter can lead to long-term health effects. Data are typically obser ved at fixed monitoring stations throughout a study region of interest at different time points. Statistical spatiotemporal models are appropriate for modelling these data. We consider shor t-term forecasting of these spatiotemporal processes by using a Bayes-ian kriged Kalman filtering model. The spatial prediction surface of the model is built by using the well-known method of kriging for optimum spatial prediction and the temporal effects are analysed by using the models underlying the Kalman filtering method. The full Bayesian model is implemented by using Markov chain Monte Carlo techniques which enable us to obtain the optimal Bayesian forecasts in time and space. A new cross-validation method based on the Mahalanobis distance between the forecasts and obser ved data is also developed to assess the forecasting performance of the model implemented.

"Periodic Markov switching autoregressive models for Bayesian analysis and forecasting of air pollution" (2004)
Luigi Spezia, Roberta Paroli and Petros Dellaportas
http://smj.sagepub.com/cgi/content/abstract/4/1/19
Markov switching autoregressive models (MSARMs) are efficient tools to analyse nonlinear and non-Gaussian time series. A special MSARM with two harmonic components is proposed to analyse periodic time series. We present a full Bayesian analysis based on a Gibbs sampling algorithm for model choice and the estimations of the unknown parameters, missing data and predictive distributions. The implementation and modelling steps are developed by tackling the problem of the hidden states labeling by means of random permutation sampling and constrained permutation sampling. We apply MSARMs to study a data set about air pollution that presents periodicities since the hourly mean concentration of carbon monoxide varies according to the dynamics of the 24 day-hours and of the year. Hence, we introduce in the model both a hidden state-dependent daily component and a state-independent yearly component, giving rise to periodic MSARMs.

"A statistical approach to combining environmental indices with an

application to air pollution data from Bangkok, Thailand" (2004)
Spezia, Paroli, and Dellaportas
http://www.pakjs.com/journals/20(2)/20(1)6.pdf
In this paper we concentrate on the air pollution data measured as carbon monoxide, nitrogen dioxide, sulfur dioxide and ozone from ten monitoring stations in Bangkok, Thailand and apply Multiple Criteria Decision Making (MCDM) method to compute an overall air pollution index for these stations and compare them. We also study robustness of these overall indices

"Space-time variograms and a functional form for total air pollution measurements" (2002)
S. De Iaco, D.E. Myersb, D. Posa
http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6V8V-45H0BBR-1-3K&_cdi=5880&_user=4423&_orig=search&_coverDate=12%2F28%2F2002&_sk=999589997&view=c&wchp=dGLbVlb-zSkzk&md5=1ccf8e645f7118baf50650632e2a272d&ie=/sdarticle.pdf
A space–time functional form for some contaminants is obtained and used for estimating total air pollution (TAP) in the district of Milan, Italy, during selected high-risk days of 1999. This functional form is determined through a space–time product–sum variogram model for TAP measurements and the dual form of kriging, i.e., radial basis functions. Data for nitric oxide (NO), nitrogen dioxide (NO_2) and carbon monoxide (CO) collected in Milan district, Italy are used to generate a combined indicator of traffic pollution, called TAP. In a previous study the weightings were obtained by multiple principal component analyses of the daily concentration levels. It was found that the first component explains approximately 70% of the total variance for each day and this component is treated as samples defined over space and time. A systematic pattern, which follows the corridor along which survey stations, characterized by heavy traffic are located, has been observed for TAP throughout Milan district, for all days considered. Note that the pollution data set is just an illustration for the new statistical method proposed.

"A simple spatio-temporal procedure for the prediction of air pollution levels" (2002)
Jorge M. Mendes1 and Kamil F. Turkman
http://www3.interscience.wiley.com/cgi-bin/fulltext/101520329/PDFSTART
In this paper we study the spatio-temporal behaviour of air pollutants measured daily over the city of Lisbon, Portugal. Our specific aim is to predict air pollutant levels in time and space over a fine grid of locations based on observations from a small number of monitoring sites. Our suggested prediction procedure is based on the simple and intuitive idea of first making predictions in time at the monitoring sites and then extending these predictions in space to locations other

than the monitoring sites using kriging methods. Copyright © 2002 John Wiley & Sons, Ltd.

"Interpolation of nonstationary air pollution processes: A spatial spectral approach" (2002)

Montserrat Fuentes

http://biomet.oxfordjournals.org/cgi/reprint/89/1/197

We propose a nonstationary periodogram and various parametric approaches for estimating the spectral density of a nonstationary spatial process.We also study the asymptotic properties of the proposed estimators via shrinking asymptotics, assuming the distance between neighbouring observations tends to zero as the size of the observation region grows without bound. With this type of asymptotic model we can uniquely determine the spectral density, avoiding the aliasing problem. We also present a new class of nonstationary processes, based on a convolution of local stationary processes. This model has the advantage that the model is simultaneously defined everywhere, unlike 'moving window' approaches, but it retains the attractive property that, locally in small regions, it behaves like a stationary spatial process. Applications include the spatial analysis and modelling of air pollution data provided by the US Environmental Protection Agency.

"Assessment of regional air pollution variability in Istanbul" (2001)

Sen and Otzopal

http://www3.interscience.wiley.com/cgi-bin/fulltext/85006997/PDFSTART

Air pollution concentrations have temporal and spatial variations depending on the prevailing weather conditions, topographic features, city building heights and locations. When the measurements of air pollutants are available at set measurement sites, the regional variability degree of air pollutants is quantified using the point cumulative semi-variogram (PCSV). This technique provides a systematic method for calculating the changes in the concentrations of air pollutants with distance from a specific site. Regional variations of sulphur dioxide (SO_2) and total suspended particulate (TSP) matter concentrations in Istanbul city were evaluated using the PCSV concept. The data were available from 16 different air pollution measurement stations scattered all over the city for a period from 1988 to 1994. Monthly regional variation maps were drawn in and around the city at different radii of influence. These maps provide a reference for measuring future changes of air pollution in the city. Copyright © 2001 John Wiley & Sons, Ltd.

"Bayesian uncertainty estimation methodology applied to air pollution modeling" (2000)

Renata Romanowicz , Helen Higson , Ian Teasdale
http://www3.interscience.wiley.com/cgi-bin/fulltext/72502843/PDFSTART
The aim of the study is an uncertainty analysis of an air dispersion model. The model used is described in NRPB-R91 (Clarke, 1979), a model for short and medium range dispersion of radionuclides released into the atmosphere. Uncertainties in the model predictions arise both from the uncertainty of the input variables and the model simplifications, resulting in parameter uncertainty. The uncertainty of the predictions is well described by the credibility intervals of the predictions (prediction limits), which in turn are derived from the distribution of the predictions. The methodology for estimating this distribution consists of running multiple simulations of the model for discrete values of input parameters following some assumed random distributions. The value of the prediction limits lies in their objectivity. However, they depend on the assumed input distributions and their ranges (as do the model results). Hence the choice of distributions is very important for the reliability of the uncertainty analysis. In this work, the choice of input distributions is analysed from the point of view of the reliability of the predictive uncertainty of the model. An analysis of the influence of different assumptions regarding model input parameters is performed. Of the parameters investigated (i.e. roughness length, release height, wind fluctuation coefficient and wind speed), the model showed the greatest sensitivity to wind speed values. A major influence on the results of the stability condition specification is also demonstrated. Copyright © 2000 John Wiley & Sons, Ltd.