Spacetime models using the SPDE approach

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Abstract

A solution to a linear Stochastic Partial Differential Equation (SPDE) is a Markov Random Field (MRF) and by considering Gaussian driving noise it allows for a Gaussian MRF (GMRF) representation. This is an appealing result as one can consider efficient computations on GMRFs. We will introduce a few of such SPDEs including some non-separable spacetime models bearing in mind some well known auto-regressive models in time series and spatial statistics. In order to work with real data it is usually required to account for covariate effects, multiple random effect and non-Gaussian outcomes. The Integrated Nested Laplace Approximations (INLA) algorithm was proposed to solve some problems of this kind when GMRFs are considered for fixed and random effects. We will show partial results of an application of this method to climate data.