Modeling zero-inflated spatio-temporal processes

Alexandra M. Schmidt
Associate Professor
Instituto de Matemática UFRJ, Brazil

We consider models for spatio-temporal processes which assume either non-negative values and often are observed as zero, or assume discrete values and are also inflated by zeros. We assume that each observation is a realization from a mixture of distributions, which includes probability mass at zero. Our main idea is based on those of zero-inflated models, and one of our main contributions lies in the fact that in the continuous case the observations are modeled in their original scale without the need of considering any transformation to attain normality of the data. For spatially referenced data there are two types of data. In the first, the spatial observations are obtained at fixed locations (point-referenced data) over a region D; whereas in the second, the region D is divided into a finite number of regular or irregular subregions (areal level) resulting on observations for each subregion. We consider both types of spatially-referenced data. Inference procedure is performed under the Bayesian paradigm. Markov Chain Monte Carlo methods are used to obtain samples from the target distribution and efficient sampling schemes are proposed. Our proposed model is applied for two different examples. In the context of point-referenced data we model the amount of rainfall over the city of Rio de Janeiro during 75 weeks; whereas in the areal data level case, we consider weekly cases of dengue fever in the city of Rio de Janeiro during the years of 2001-2002. This is joint work with Marcus Vinicius Morais Fernandes (IBGE, Brazil) and Helio S. Migon (IM- UFRJ, Brazil).