

# Some advances in Bayesian spatial prediction and sampling design

Jürgen Pilz

Alpe–Adria–Universität Klagenfurt

In my talk, I will report on recent work with my colleagues G. Spoeck and H. Kazianka in the area of Bayesian spatial prediction and design. The Bayesian approach not only offers more flexibility in modeling but also allows us to deal with uncertain covariance parameters, and it leads to more realistic estimates for the predicted variances. We report on some experiences gained with our approach during a European project on "Automatic mapping of radioactivity in case of emergency". Moreover, I report on recent results on finding objective priors for the crucial nugget and range parameters of the widely used Matern-family of covariance functions. Finally, I will consider the problem of choosing an "optimal" spatial design, i.e. finding an optimal spatial configuration of the observation sites minimizing the mean squared error of prediction over an area of interest. Using Bessel-sine/cosine- expansions for random fields we arrive at a design problem which is equivalent to finding optimal Bayes designs for linear regression models with uncorrelated errors, for which powerful methods and algorithms from convex optimization theory are available.