Species distribution modelling

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Many methodological approaches for modelling species patterns have been proposed during the last years. In line with Diggle et al.'s model-based geostatistics approach, we model the pattern with a hierarchical Bayesian model using the geographical and environmental characteristics of each sampling location. Maps of predicted probabilities of presence (or abundance) are then generated using Bayesian kriging. To do so, we use the integrated nested Laplace approximation jointly with the Stochastic Partial Differential Equation approach allowing us to perform fast inference and prediction in such models. After presenting the methodology, we will present some examples of application in different contexts such as fisheries, veterinary parasitology, plant pathology, etc. Moreover, our interest is also to show some extensions to the basic modelling such as different response variables, preferential sampling (commercial fishery is a clear example of this situation: fishermen go to fish in the area where they presume that can take the target species), uncertainty in the covariates and non linear relationships with covariates.