BISP8

Eighth Workshop on
BAYESIAN INFERENCE IN STOCHASTIC PROCESSES

Spatial modeling of fish abundance in a stream network

João B. M. Pereira[1], Marco A. Rodríguez[2], Alexandra M. Schmidt[1]

[1] Universidade Federal do Rio de Janeiro, Brazil

[2] Université du Québec à Trois-Rivières, Canada

Spatial autocorrelation in species abundances can be induced by ecological processes operating at multiple spatial scales. In stream and river networks, autocorrelation in fish counts can arise from (1) directional processes constrained by waterflow, such as upstream and downstream fish movements and downstream transport of waterborne nutrients and pollutants; (2) geological processes that influence watershed soil structure, local topography, and water chemistry at various spatial scales. We used a moving-average (convolution) construction to model fish counts in a stream network by means of a Poisson log-normal mixture incorporating random effects for time and space. The spatial component incorporated both hydrological ("as the fish swims") distance, to capture directional effects, and Euclidean ("as the crow flies") distance, to capture geological effects. Additionally, covariates were used to account for known or suspected environmental effects. We used a Bayesian approach to fit a set of models representing different combinations of temporal and spatial effects, including complete independence. We compared models by means of information criteria, examined the variance accounted for by each of the covariance components, and used prior-posterior differences to clarify the relative contribution of different processes to variation in fish counts.

Keywords:
Bayesian inference; count data; ecological processes; hydrological distance;
mixed model; moving average

ABSTRACT	BISP8.41
TYPE	**C**ontributed poster