COREGIONALIZATION ANALYSIS WITH A DRIFT: THEORETICAL AND SIMULATION RESULTS, AND ILLUSTRATION BY A FOREST ECOLOGY EXAMPLE

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Coregionalization analysis with a drift (CRAD) is a method in which the total variation of a multivariate spatial data set is decomposed into components associated with processes operating at different scales. Each of the variables is spatially modeled as the sum of a deterministic drift representing the pattern at large scale and a random component representing patterns at smaller scales. Random components are further decomposed into purely random and spatially structured components with a small or intermediate range of autocorrelation under a linear model of coregionalization to be fitted to all direct and cross experimental variograms after the removal of estimated drifts. Parametric global model-based procedures and nonparametric local windowbased procedures can be used for joint estimation of the drift and the random component. Since the decomposition into the sum of a drift and a random component is not unique, the choice of models needs to be both empirically derived from the observed patterns and based on coherent conceptualization of the underlying processes and relevant scales of variation. Theoretical results of bias analyses, for a given type and size of drifts and for each procedure of drift estimation, will be presented together with simulation results for correlations and coefficients of determination estimated per scale under various scenarios. An example with forest ecology data, using CRAD for regionalized redundancy analysis, will also be discussed.