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# ON INCONSISTENCY OF ESTIMATORS BASED ON SPATIAL DATA UNDER INFILL ASYMPTOTICS

by

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Let $\{Z(x) : x \epsilon R\}$ be a random field on a bounded region $R$ in $\Re^d, d \geq 1$. Suppose that the process $Z(\cdot)$ is observed at sites $x_1, \cdots, x_n$ such that $\{x_i : i \geq 1\}$ is dense in $R$. Under some fairly standard conditions, it is shown that (i) the least squares estimator of a spatial regression parameter vector, and (ii) the method of moments estimator of the variogram of $Z(\cdot)$ at a point converge in $L^2$ to nondegenerate limiting random vectors, and hence are inconsistent for the underlying parameters. Next, a general result is proved showing that any estimator sequence satisfying some smoothness and symmetry conditions (which are typically satisfied by estimators based on averages) must converge in distribution under the above sampling structure. Furthermore, finite dimensional empirical measures based on the data are shown to converge in probability to random probability measures on Euclidean spaces of appropriate dimensions. As an application of the last result, we establish convergence of a robust estimator of the variogram, proposed by Cressie and Hawkins (1980), and identify the limiting random variable.