

PHD SEMINAR ANNOUNCEMENT  
Department of Statistics

## "The Nature of Spatial Variation in Crop Yields"

TUESDAY, July 6, 2004, 3:00 pm  
Eckhart Hall, Room 110, 5734 S. University Avenue

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### ABSTRACT

The goal of this research is to understand natural spatial variation in crop yields. Group theoretic arguments by McCullagh lead to the consideration of models that are closed under invertible conformal transformation of the plane. The loi du terroir (LdT) says that spatial variation in crop yields is a convex combination of white noise and the de Wijs process, which is conformally invariant. I carry out an empirical study of spatial variation in crop yields in light of this model and compare it with more general models using likelihood ratio tests. The LdT model is a submodel of the power model and also lies on the boundary of the Matérn class of spatial models. I exploit the layout of agricultural trials on rectangular plots and derive theoretical results to evaluate the covariance matrices using one-dimensional numerical integration for any isotropic covariance function. Furthermore, I derive analytic results in the case of the de Wijs and power covariance functions. Results from multivariate and space-time models of crop yields will also be discussed.

I find that the LdT model performs very well in most examples. Geometric anisotropy in the direction of rows and columns is present for some data but most of the yields are isotropic. The fitted models hold up under aggregation and division of the experiments. The computational tools developed are efficient and stable and these tools are a significant contribution to this area of research.