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Dietrich Stoyan, Francisco Javier Rodríguez-Cortés, Jorge Mateu,  
Wilfried Gille

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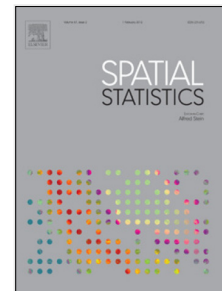
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# Mark Variograms for Spatio-Temporal Point Processes<sup>☆</sup>

Dietrich Stoyan<sup>a</sup>, Francisco Javier Rodríguez-Cortés<sup>b,\*</sup>, Jorge Mateu<sup>b</sup>,  
Wilfried Gille<sup>c</sup>

<sup>a</sup>*Institut für Stochastik, TU Bergakademie Freiberg, Freiberg, Germany*

<sup>b</sup>*Department of Mathematics, University Jaume I, Castellón, Spain*

<sup>c</sup>*Department of Physics, Martin-Luther-Universität Halle-Wittenberg, Halle, Germany*

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## Abstract

A spatio-temporal point process can be transformed into two marked point processes by taking the times or locations as marks. For these marked point processes mark variograms can be defined, opening a new way for the statistical analysis of spatio-temporal point processes. We present first the theoretical forms of the variograms for some models of spatio-temporal point processes, in order to help understanding empirical variograms. Then we study statistical problems. The used ratio-estimator for the variograms has a form that makes it possible to partially ignore inhomogeneities and edge-effects. Two data examples which were already studied with traditional methods in the point-process literature are reanalysed with the two mark variograms, showing their explorative power.

*Keywords:* Earthquakes, foot-and-mouth disease, mark variogram, marking, second-order characteristics, spatio-temporal point patterns.

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## 1. Introduction

Point process statistics for spatial structures is today a mature discipline whose development started in the 1970s. Textbooks and monographs on spatial point processes and associated statistical methods include Ripley (1988),

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\*Corresponding author.

*Email addresses:* [stoyan@math.tu-freiberg.de](mailto:stoyan@math.tu-freiberg.de) (Dietrich Stoyan),  
[cortesf@uji.es](mailto:cortesf@uji.es) (Francisco Javier Rodríguez-Cortés), [mateu@uji.es](mailto:mateu@uji.es) (Jorge Mateu),  
[gille@physik.uni-halle.de](mailto:gille@physik.uni-halle.de) (Wilfried Gille)

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