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Nota di contenuto	Foreword -- Chapter 1 Introduction to Geostatistical Functional Data Analysis -- 1.1 Spatial Statistics -- 1.2 Spatial Geostatistics -- 1.2.1 Regionalized Variables -- 1.2.2 Random Functions -- 1.2.3 Stationarity and Intrinsic Hypothesis -- 1.3 Spatiotemporal Geostatistics -- 1.3.1 Relevant Spatiotemporal Concepts -- 1.3.2 Spatiotemporal Kriging -- 1.3.3 Spatiotemporal Covariance Models -- 1.4 Functional Data Analysis in Brief -- References -- Part I Mathematical and Statistical Foundations -- Chapter 2 Mathematical Foundations of Functional Kriging in Hilbert Spaces and Riemannian Manifolds -- 2.1 Introduction -- 2.2 Definitions and Assumptions -- 2.3 Kriging Prediction in Hilbert Space: A Trace Approach -- 2.3.1 Ordinary and Universal Kriging in Hilbert Spaces -- 2.3.2 Estimating the Drift -- 2.3.3 An Example: TraceVariogram in Sobolev Spaces -- 2.3.4 An Application to Nonstationary Prediction of Temperatures Profiles -- 2.4 An Operatorial Viewpoint to Kriging -- 2.5 Kriging for ManifoldValued Random Fields -- 2.5.1 Residual Kriging -- 2.5.2 An Application to Positive Definite Matrices -- 2.5.3 Validity of the Local Tangent Space Approximation --

Canada -- 15.6 Concluding Remarks -- References -- Chapter 16 From Spatiotemporal Smoothing to Functional Spatial Regression: a Penalized Approach -- 16.1 Introduction.
16.2 Smoothing Spatial Data via Penalized Regression.

Sommario/riassunto

Spatial functional data (SFD) arises when we have functional data (curves or images) at each one of the several sites or areas of a region. Statistics for SFD is concerned with the application of methods for modeling this type of data. All the fields of spatial statistics (point patterns, areal data and geostatistics) have been adapted to the study of SFD. For example, in point patterns analysis, the functional mark correlation function is proposed as a counterpart of the mark correlation function; in areal data, analysis of a functional areal dataset consisting of population pyramids for 38 neighborhoods in Barcelona (Spain) has been proposed; and in geostatistical analysis diverse approaches for kriging of functional data have been given. In the last few years, some alternatives have been adapted for considering models for SFD, where the estimation of the spatial correlation is of interest. When a functional variable is measured in sites of a region, i.e. when there is a realisation of a functional random field (spatial functional stochastic process), it is important to test for significant spatial autocorrelation and study this correlation if present. Assessing whether SFD are or are not spatially correlated allows us to properly formulate a functional model. However, searching in the literature, it is clear that amongst the several categories of spatial functional methods, functional geostatistics has been much more developed considering both new methodological approaches and analysis of a wide range of case studies covering a wealth of varied fields of applications.