



Standard Guide for Selection of Kriging Methods in Geostatistical Site Investigations¹

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^{ε1} NOTE—Paragraph 1.7 was added editorially October 1998.

INTRODUCTION

Geostatistics is a framework for data analysis, estimation, and simulation in media whose measurable attributes show erratic spatial variability yet also possess a degree of spatial continuity imparted by the natural and anthropogenic processes operating therein. The soil, rock, and contained fluids encountered in environmental or geotechnical site investigations present such features, and their sampled attributes are therefore amenable to geostatistical treatment. Kriging methods are geostatistical techniques for spatial estimation belonging to the class of least-squares estimators. This guide reviews criteria for selecting a kriging method, offering direction based on a consensus of views without recommending a standard practice to follow in all cases.

1. Scope

1.1 This guide covers recommendations for selecting appropriate kriging methods based on study objectives, exploratory data analysis, and analysis of spatial variation.

1.2 This guide considers commonly used forms of kriging including ordinary kriging, simple kriging, lognormal kriging, universal kriging, and indicator kriging. Multivariate, space-time and other less-frequently used kriging methods are not discussed; however, this is not intended to reflect any judgment as to the validity of these methods.

1.3 This guide describes conditions for which kriging methods are not appropriate and for which geostatistical simulations approaches should be used.

1.4 This guide does not discuss non-geostatistical alternatives to kriging such as splines or inverse-distance techniques.

1.5 This guide does not discuss the basic principles of kriging. Introductions to geostatistics and kriging may be found in numerous texts including Refs (1), (2), and (3).² A review of kriging methods is given in (4).

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 ASTM Standards:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids³

D 5549 Guide for Report Geostatistical Site Investigations³

D 5922 Guide for Analysis of Spatial Variation in Geostatistical Site Investigations⁴

D 5924 Guide for the Selection of Simulation Approaches in Geostatistical Site Investigations⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *additivity, n*—a mathematical property of a regionalized variable stating that it can be combined linearly in order to define a similar variable on a larger support.

¹ This guide is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

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² The boldface numbers in parentheses refer to a list of references at the end of the text.

³ *Annual Book of ASTM Standards*, Vol 04.08.

⁴ *Annual Book of ASTM Standards*, Vol 04.09.