NON STATIONARY GEOSTATISTICS

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NON STATIONARY GEOSTATISTICS

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ABSTRACT

In geostatistics, variables are often classified as "stationary" or "non stationary". The latter refers to variables which show a definite trend in space, such as the direction of the hydraulic gradient, for hydraulic heads in an aquifer. In (10), the method of simple kriging for stationary hydrologic variables is presented. In this chapter, universal kriging and the use of generalized covariances of order k are summarized, for the estimation of non stationary hydrologic variables, with one example of application.

1. INTRODUCTION

In a previous NATO Advanced Study Institute, we have tried to summarize the application of simple geostatistics (simple kriging) to hydrological problems (10). Only stationary or intrinsic phenomena were considered, i.e., those where the variable of interest does not show a systematic "trend" or "drift" in space. This is most often acceptable for transmissivities, or thickness of a formation, however it only rarely can be applied to hydraulic head, or else rainfall data, which most often have a definite trend in space, that of the general hydraulic gradient, for heads, or of the orographic effects, for rainfall.

Non stationary geostatistics must therefore be used and will be summarized below, illustrated with an example. All of this comes from the work of G. Matheron and co-workers in Fontainebleau, e.g. Matheron (15), Delfiner (12), Delhomme (3,4,5,6), Chiles (1), and also from Kitanidis (8). A more elaborate presentation is also given