

Variograms for Natural Moisture Content in Houston Area

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Abstract: Interpreting large volumes of data can be overwhelming. Variations of moisture content along three mutually perpendicular planes were investigated using variograms. Based on the variogram models, the variation of moisture content was described as cross anisotropic.

1 Introduction

Moisture content in the soil is one of the important parameter used in foundation engineering since it is correlated to number of geotechnical properties.

2 Objectives

The objective of this study was to quantify the special variations of the natural moisture content and determine the parameters in three mutually perpendicular planes.

3 Methods

A total 417 moisture content (MC) data was used. The moisture content varied from 5 to 37. Variogram was determined in three mutually perpendicular planes. The variogram models were approximated by using spherical, fractal and power relationships.

4. Analysis and Result

Based on the analysis of the zy and zx surfaces (vertical) (Figure 1 and 2), the moisture content was represented by spherical relationship. Axis Z represented the depth direction. Spherical curve sill was 35 and the range was 105 ft for xz and 150 ft for yz. Nugget was also observed in xz and yz surface. On the yz surface, same models fitted to the empirical variogram. For the xy surface (Figure 3) the fitted power model had a power of 1.1 and slope 0.03.

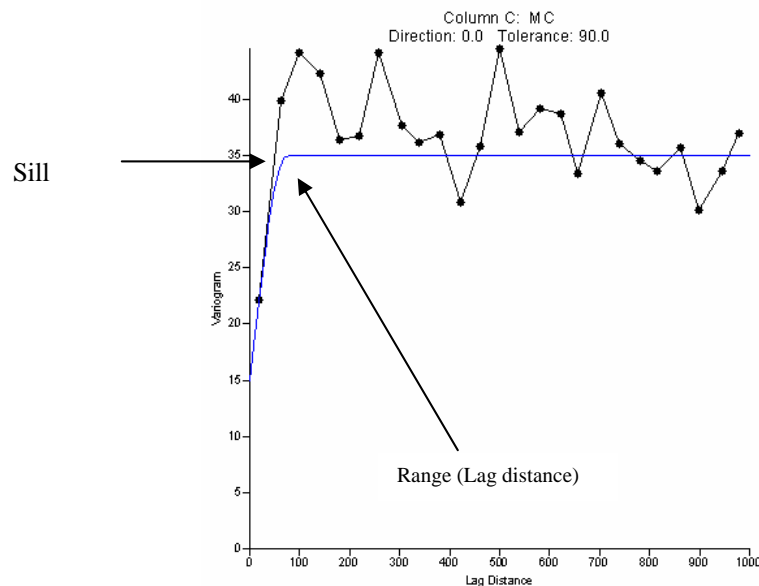


Figure 1 Moisture Content Variogram for surface yz

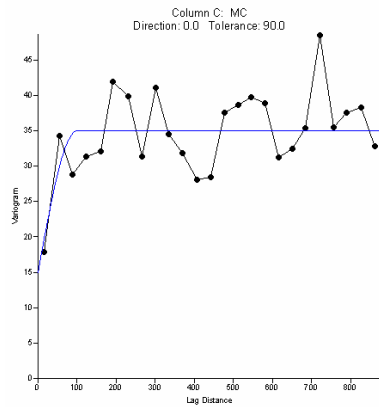


Figure 2 Moisture Content Variogram On a plane perpendicular to the ground.

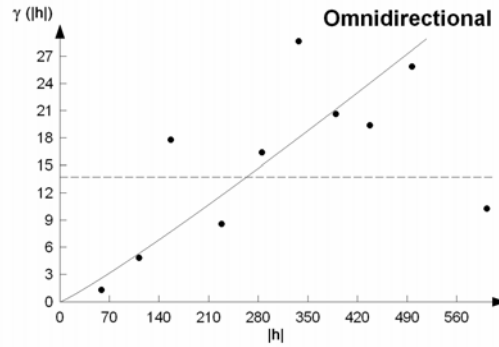


Figure 3 Moisture Content Variogram for surface xy (parallel to the ground).

5 Conclusion

From three different mutually perpendicular surfaces the spatial parameters were different. However the spherical fit of the xz and yz plane fitted same and the range (lag distance) was very close to the ground water elevation in the area. Also it was found that xy plane shows very high range.

6 Acknowledgements

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7 References

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