Comparison between direct measurements and indirect estimations of hydraulic conductivity for slope deposits of the North-Western Tuscany, Italy

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INTRODUCTION

Hydraulic conductivity (K) is a relevant engineering property of the ground (Huggins 1948). It shows the hydraulic behavior of the soil and can be determined using different techniques. In vadose zone studies, different techniques are applied to evaluate different parameters of the vadose zone, especially for parameter K in vadose zone: along SD depth and in the geographic neighbourhood of the study areas. The objective of this work is to assess the parameter K, which is useful for many applications fields such as: simulations of both water and solute transport in the vadose zone and modelling of contaminant transport in the vadose zone. Moreover, K is one of the most important parameters in developing geoenvironmental models for hydrologically complex regions, which have been widely used in the vadose zone and in the vadose zone studies. K is defined as the ratio of the total flux to the gradient of the intensity of the flux.

RESULTS

1) K-means clustering of grain size data and related hydraulic conductivity

For different bedrock lithological units (BLU), 47 samples (Gsamples) allowed us to obtain grain size information (Fig. 4). K was estimated for different BLUs (Fig. 1). Classification of the selected samples was performed by using gravel, sand, silt and clay fractions of each cluster. K was estimated for different BLUs (Fig. 1). In this study, we used the K back-calculated data to evaluate the accuracy of the K estimates. Figure 5. Figure 5 shows median of gravel, sand, silt and clay fractions of each cluster. K was estimated for different BLUs (Fig. 1). In this study, we used the K back-calculated data to evaluate the accuracy of the K estimates.

2) Constant vs. Falling Head Permeameter

For different bedrock lithological units (BLU), 67 samples (Gsamples) were classified into 8 clusters by using gravel, sand, silt and clay fractions of each cluster. K was estimated for different BLUs (Fig. 1). In this study, we used the K back-calculated data to evaluate the accuracy of the K estimates.

3) Neighborhood variability of K

For each test site, K has been performed on different field sites to evaluate the variability of K. The Modified Interquartile Ranges (Q1 and Q3) have been used to evaluate the variability of K. Figure 6 shows the Modified Interquartile Ranges (Q1 and Q3) for different BLUs (Fig. 1). In this study, we used the K back-calculated data to evaluate the accuracy of the K estimates.

4) Comparison between literature and calibrated PTFs

From pedological functions (Boadu 2000, Tietje and Hennings 1996), different PTFs have been calibrated using different techniques. Figure 7 shows the comparison between different techniques to evaluate the variability of K. In this study, we used the K back-calculated data to evaluate the accuracy of the K estimates.

REFERENCES