

# Study on evaluations of some geophysical explorations by self-organizing maps

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## Abstract

*We usually carry out geophysical explorations for slope conditions. However, there is no technique to compound and interpret the result of each geophysical exploration now. Therefore, we classified the ground property by self-organizing maps (SOM). The classification result by SOM is relatively conformal with boring data. Therefore, it is recognized that it can be used to improve the interpretative accuracy of compound geophysical explorations.*

## 1. INTRODUCTION

In Japan, in the high economic growth period in 1960's, a great number of slopes were formed to construct many roads. Now, the slopes have been aging, it is important to estimate the health of the aging slope and maintain slopes effectually. So we tried evaluating of three geophysical explorations (a seismic tomography method, a surface wave method, resistivity tomography method) by SOM widely used in the field of information processing engineering.

## 2. EXPERIMENTAL PROCEDURE

The geophysical value of different dimension (the P wave velocity, the S wave velocity and the resistivity) had been obtained from three kinds of geophysical explorations. SOM made maps of two dimensions in proportion to the degree of similarity from the value. And the maps were clustered by k-means method. Then, the slope was classified 4 classes every properties from the clustering result.

## 3. RESULTS AND DISCUSSION

It was able to estimate the weakening area and water-retaining condition by the result of classification by SOM. The result is related to RQD (Rock Quality Designation), the rock kind and the rock class division that became clear in the boring investigation. In addition, we could catch a change of the state in the ground such as the weathering and the water-retaining condition by measuring regularly.

## 4. CONCLUSIONS

In this study, the geophysical data was characterized and classified to four classes by SOM and k-means method to interpret the result of two or more geophysical explorations comprehensively. We got the result that is roughly corresponding to RQD, the rock class division and the stratum structure by the boring investigation. Therefore, it is recognized that it can be used to improve the interpretative accuracy of compound geophysical explorations.