

The Factor Analysis and Microstructure of the Loess Soils

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The multistatistical data analysis is traditionally used for classification of geological objects. We have selected a factor analysis as a more universal method for classification of the loess soils microstructure.

Experimental investigations of the loess microstructure have been done by means of direct visual observations, scanning electron microscope and personal computer. Studies have been conducted according to a new original quantitative image analysis method. Numerous samples of loess soils have been analyzed. These samples have been taken from different regions of Northern Eurasia. They have various genesis, composition and properties. In addition, many parameters of these soils have been determined, such as: humidity, density, geotechnical properties, mineral composition and etc. About 42 parameters have been received. R-modification of factor analysis has been applied in order to estimate the relationship between all these parameters.

The factor model describes more completely the loess soils microstructure in coordinates of 1st and 2nd factors. The analysis of factor model has shown that the parameters, which describe the dispersion of the loess soils, have high loading on 1st factor; the parameters, which illustrate soils porosity, have high loading on 2nd factor. Fulfilled investigations gave us an opportunity to divide all the patterns into three groups according to their dispersion and three groups according to their porosity.

Application of factor and correlation analyses between loess microstructure and its properties allowed us to work out a new classification of the loess microstructure due to selected general signs. This classification has been made with the help of statistical data analysis. It permits us to made prognosis about loess soils collapsibility according to quantitative image analysis.