

## SUMMARY

This work presents new method for determination of geological provenance based on the statistical analysis of cathodoluminescence spectra of marbles and carbonate rocks from various localities in the Bohemian Massif. Analysis is based on the combination of data from seven different measures of spectral similarity and provides results that are more robust than those obtained by approach based only on a single measure of similarity. These results may be further improved by employing meta-analysis that evaluates behaviour of spectra during the individual steps of analysis.

Analysis was performed on the original cathodoluminescence spectra, as well as on the residual spectra in which relative variability was amplified by the subtraction of Gaussian trend present in all spectra of carbonates. By combining results from analysis and meta-analysis of both original and residual spectra it was possible to almost unambiguously determine provenance of samples from all studied localities.

Agglomerative hierarchical clustering was employed as a supplementary method for classification of spectra. Out of 72 different methods for clustering, one was selected for both original and residual data based on the number of correctly classified spectra.

Second part of this work presents analysis of cathodoluminescence spectra obtained from apatites in various rock types including granite, gabbro, durbachite, rhyolite, paragneiss, quartzite, and granulite. Additional analysed samples of apatites were represented by biogenic apatites from fossil bones and teeth of animals.

Two types of cathodoluminescence spectra were defined - those dominated by the luminescence of Mn (characteristic for all samples of granite, paragneiss, and some samples of gabbro) and those dominated by the luminescence of lanthanides (characteristic for all the other rock types, as well as biogenic apatites). Analysis of Mn-dominated samples revealed high variability of their residual spectra with observed trend of this variability that is ascribed to effects induced by the variable crystallographic orientation of analysed apatites. Emission bands of lanthanides observed in the second group of spectra were assigned to corresponding activators and trends of variability in these spectra were discussed in relation to geology and chemism of studied localities.