



## **Quantitative microstructural analysis: fabric parameters as a tool for the provenance determination of marbles**

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The quantitative microscopy of carbonate rocks accompanied by various geochemical methods is commonly used to solve problems with sourcing of marbles from historical monuments. Former provenance studies were focused mainly on the grain size detection. Present study focused on marbles (crystalline limestones) coming from abandoned quarries in the Bohemian Massif (Czech Republic) (29 quarries) and marble artefacts (2). From 2 to 10 samples were taken at each locality from which ordinary thin sections have been prepared. These were investigated by conventional and quantitative microscopy (petrographic image analysis).

Petrographic image analysis (PIA) represents useful and simple method allowing quantification of rock microstructures like grain size, shape or modal composition. PIA consists of the capturing of rock microstructure (conventional or digital photography), digitizing of individual grain boundaries, identification of present mineral phases, and analysis of selected items. In this study, the following rock fabric parameters were measured and computed: grain size (equivalent diameter), grain shapes (compactness, shape factor, aspect ratio), index of grain size homogeneity, area, perimeter, length and slope of principal axes of carbonate grains.

Based on the results, the average and maximum grain size (expressed as the equivalent diameter) is the most distinguishing feature of the tested parameters. The slope of principal axes presents another useful parameter allowing distinguish rocks show-

ing considerable shape-preferred orientation of carbonate grains. The examined parameters describing grain shapes showed mostly small difference among individual localities which excludes them in the determination of the source locality.