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## The applicability of automated static image analysis to identify sedimentary environments

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The granulometric (particle size and shape) data of sediments provide insights into the processes of grain formation, transport, deposition, and post-depositional alteration mechanisms. Therefore, granulometric proxies are widely used in paleogeographical research.

A statistically robust, objective, and representative description of the particle size and shape characteristic of a sample can only be achieved with a large number ( $n > 10^4$ ) of observed mineral grains. Automated image analysis techniques meet the above requirements. Not only the size distributions of the scanned particle populations are determined, but also the distributions of different shape (e.g., circularity, convexity, solidity) and other shape-dependent size parameters (e.g., circular equivalent diameter, length, width, circumference, area) of each grain.

The presented granulometric analyses were based on sediments from the Carpathian Basin (Central Europe): filling material from Pleistocene periglacial sand wedges (Kemeneshát, Mogyoród gravel pit –Danubian Plain), recent wind-blown sand (Nyírség, Danube-Tisza Midland Ridge), fluvial sand from floodplain and transport media (Lower-Tisza Plain and Dráva Plain). The grains were analysed primarily for their circularity, solidity, and convexity properties. Our aim was to identify fingerprints related to the environment and the transport processes (e.g., type, time).

According to our granulometric results, the Kemeneshát and the Mogyoród site sand wedges can be distinguished. Most samples from Kemeneshát contained fresh, less rounded grains while the other source contained mature, rounded grains. Although, it was also possible to differentiate between the Kemeneshát samples based on the grain shape parameters. Granulometric differences can be detected between the fluvial and eolian sand samples, especially in the case of roundness parameters. Using granulometric proxies, it can be concluded that the filling material of the wedges in the Mogyoród gravel pit is mainly eolian. Therefore, the origin of Kemeneshát samples cannot be clearly identified due to the less mature nature of the grains. Examination of more samples is required to reveal granulometric fingerprints that characterise certain sedimentary environments.

The application of granulometric proxies on relict and recent sand materials can be used to reconstruct the paleoenvironmental conditions. The method can be a new tool for investigating the origin of different sediments and can extend the interpretation of granulometric data. Support of the National Research, Development and Innovation Office (Hungary) under contract NKFIH FK138692 is gratefully acknowledged.