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Automated anisotropy quantification for grain and phase boundary patterns

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Grain and phase boundary patterns of crystalline materials yield information not only about fundamental material characteristics, but also on the material's history. In the case of metamorphic rocks, this includes information about deformation and/or metamorphism events.

A growing research interest in the fabrics of geomaterials has lead to a rising demand for methods that allow for a quantitative fabric analyses. While a number of manual approaches exists, their automation promises a more time-efficient processing and the possibility to analyze the patterns at a higher resolution, which also leads to an increase in the result's quality.

We present an automated approach for quantification of anisotropy in grain boundary patterns (GBP) using the modified perimeter method along with results of analyses of (1) artificial and natural GBP of (2) quartz and (3) calcite samples. To illustrate the attractiveness of available pattern acquisition concepts, we compare the results of GBP that were manually digitized from the polarizing microscope to GBP that were obtained using the rotating polarizer stage together with the artificial neural network (ANN) component of GeoVision.