Quantitative image analysis of natural and experimental graphic textures

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Fractal and two-point radial autocorrelation analysis has been performed on 16 images of experimental run products and 43 images of natural graphic textures. The box-counting fractal dimension, D_B, and the lacunarity, Λ, of experimental and many natural images overlap, although natural samples extend to lower values of the fractal dimension and higher values of lacunarity than seen in experiments. Measurements of natural textures on faces cut in 3 orthogonal directions indicate that the spread in the measured parameters is influenced by the orientation of the image relative to the crystallographic axes of the host K-feldspar.

The normalized distance between quartz measured by autocorrelation analysis in experimental (11 samples) and natural (26 samples) graphic textures is similar, although experiments display greater variation. The similarity of the results on experimental and natural samples demonstrate that the conditions of graphic texture formation in laboratory experiments at length scales on the order of microns can be extrapolated to natural length scales on the order of centimeters to meters. The three measures used in this study can be applied to other graphic granite textures and may provide a quantitative classification system leading to a better understanding of their formation.