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LETTER

Evidence for residual elastic strain in deformed natural quartz

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ABSTRACT

Residual elastic strain in naturally deformed, quartz-containing rocks can be measured quantitatively in a petrographic thin section with high spatial resolution using Laue microdiffraction with white synchrotron X-rays. The measurements with a resolution of 1 μm allow the quantitative determination of the deviatoric strain tensor as a function of position within the crystal investigated. The observed equivalent strain values of 800–1200 microstrains represent a lower bound of the actual preserved residual strain in the rock, since the stress component perpendicular to the cut sample surface plane is released. The measured equivalent strain translates into an equivalent stress in the order of ~50 MPa.

Keywords: Quartz, lattice strain, residual stress, Laue microdiffraction