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Evolution of mylonitic microfabrics

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Abstract: Microfabrics contain important information about the physical conditions, the kinematics and the processes of deformation. The kinematics of deformation (i.e., the shear sense), for example, are often inferred from the asymmetry of microstructural and textural features in deformed rocks. In order to gain a better understanding of kinematic indicators and the deformational behavior of minerals at different physical conditions, researchers have studied the mechanical properties and microfabrics of most common rock-forming minerals (e.g., quartz, calcite, feldspar, olivine). The study of naturally deformed rocks, experimental rock deformation, and computer modeling have all played complementary roles in improving our knowledge of mineral physics.

We chose an experimental approach involving the deformation of polycrystalline norcamphor in a see-through, Means-Urai deformation apparatus under simple shear conditions. The main advantage of this method is that it allows continuous observation of the microfabric evolution during progressive deformation. We monitored this evolution with photographs, video tapes and computer integrated polarization microscopy (CIP, see Panozzo Heilbronner, R. and Pauli, C. 1993. Integrated spatial and orientation analysis of quartz c-axes by computer-aided microscopy. J. Struct. Geol. 15, 369-383). With CIP, the c-axis orientations are visualized directly with specific reference colors. Strain was calculated with help of passive marker particles and the computer program Marker Analysis (Bons, P., Jessell, M.W. and Passchier, C.W. 1993. The analysis of progressive deformation in rock analogues. J. Struct. Geol. 15, 403-412.) This allowed us to relate the microstructure, the texture and the localization of strain in each experiment.

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