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# The effect of muscovite on the recrystallization of experimentally deformed quartz under general shear

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We conducted general shear experiments to investigate the role of mica content on the microstructural evolution and rheological properties of quartz aggregates. In previous studies, axial compression experiments were conducted on quartz aggregates to develop a better understanding of the relationship between flow strength and lattice preferred orientation with varying percentages of muscovite. Other analyses have shown a relationship between the topology of second phases (i.e. micas in a quartzite) and the strength of the material. Based on this previous work, we have begun an investigation to constrain the role of mica content on dynamic recrystallization of quartz. General shear experiments were performed using synthetic quartz aggregates with varying percentages of muscovite at 800°C, 1100 to 1500 MPa, and at axial strain rates ranging from 10-6/s to 10-7/s (resulting in shear strain rates approximately an order of magnitude greater). At a strain rate of 10-6/s the quartz deforms by bulging recrystallization and subgrain rotation while at a strain rate of 10-7/s the quartz deforms dominantly by subgrain rotation. Muscovite deforms by kinking and slip along the basal plane and accommodates most of the strain because it is mechanically weaker. Experiments have demonstrated that quartz does not recrystallize at quartz – muscovite boundaries, leading to unstrained quartz grains and a variety of quartz grain sizes. White mica in experiments performed at 10-7/s displays a finer grain size and dispersed distribution than the starting material, indicating diffusive mass transfer processes. These results have implications for recrystallized quartz piezometers. The grain size of both recrystallized and nonrecrystallized quartz grains is measured on orientation images generated by the CIP method. Microstructures and CPO of the recrystallized and nonrecrystallized grains of the aggregates are compared by quantitative fabric analysis at various scales.