

# **S-C cataclasite and its significance for the seismogenic zone rheology in the upper crust**

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Foliated cataclasites found in granitic rocks along the Rokko-Awaji fault zone, southwest Japan, display features of S-C fabrics similar to those of mylonites. The S-C cataclasites involve S-surfaces defined by shape preferred orientation of biotite fragments and aggregates of quartz and feldspar fragments, and C- and C'-surfaces defined by microshears and shear bands, respectively. All quartz and feldspar fragments show a brittily dominated deformation character in texture. The biotite fragments, however, have some fabric characters like those observed in S-C mylonites, such as biotite 'fish', cleavage-step, bending, and folding. These fabric variations between the biotite, quartz and feldspar suggest that there are marked differences in their relative deformational behavior within the same regime, that the former was deformed by a combination of brittle-plastic shearing processes, and the latter two were brittily damaged. One of the most significant differences between the S-C cataclasites and S-C mylonites is the absence of dynamically recrystallized grains in the S-C cataclasites. The textural characteristics and the geological evidence suggest that the S-C cataclasites in the Rokko-Awaji fault zone formed at a temperature between 150-250 °C, corresponding to depths of 5-8 km, at a normal geothermal gradient of 30 °C/km before uplifted and exposed.

The seismic data show that earthquakes tend to occur at depths of <15 km and generally nucleate at depths of < 10 km. It is shown that the S-C cataclasites are widely present in the typical active fault zones in the world. This study of cataclastically deformed rocks indicates that the active fault zone rheology of the upper 5-10 km of the crust (the earthquake nucleation zone) is greatly influenced by deformational processes in S-C cataclasites.