PROCESSES OF MICROCRACKING AND FAULTING IN GRANITE

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Microscopic observations using a fluorescent technique were made on thin sections obtained from stressed granite at 5MPa confining pressure at room temperature. The results of microscopic observations show details of microcracking and faulting in granite.New long and conspicuous transgranular cracks parallel to maximum compression direction are significantly recognized just prior to peak stress. These microcracks extend from biotite grain boundaries into adjoining minerals, principally in quartz grains. Stress-related microcracks are observed throughout the thin sections, but localization of microcracks is not recognized in the region close to peak stress, even in post-failure. However, abrupt stress drop in the post-failure region coincides with the appearance of an intense cracking zone, which is expected to develop into a fault. The fault inclined to maximum compression direction is formed to link up biotite grains by the stage of plateau in a complete stress-strain curve. Kinking and folding are observed in the biotite, principally in grains close to the intense cracking zone and the fault.It is clear that the biotite behavior is closely associated with fault formation as well as with development of microcracks. Plastic deformation in biotite, which is a minor constituent of granite, dominates the brittle microcracking and faulting. Elastic moduli of biotite are considerably lower than of other granite constituent minerals such as quartz and feldspar. Grain scale elastic inhomogeneity can influence the processes of fracture propagation and faulting in granite that is regarded as homogeneous on a larger scale.