

Chemical and Physical Characteristics of Pulverized Tejon Lookout Granite Adjacent to the San Andreas and Garlock Faults: Implications for Earthquake Physics

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Abstract

We present new detailed analysis of pulverized Tejon Lookout granite from sections adjacent to the San Andreas and Garlock faults in southern California. The granite is pulverized in all exposures within about 100 m from both faults. Chemical analyses indicate essentially no or little weathering in the bulk of the rock, although XRD analysis shows the presence of smectite, Illite, and minor kaolinite in the clay-size fraction. Weathering products may dominate in the less than 1 micron fraction. The average grain size in all samples of pulverized granite range between about 26 and 208 microns (silt to fine sand), with the size distribution in part a function of proximity to the primary slip zone. The San Andreas fault samples are generally finer than those collected from adjacent to the Garlock fault. The particle size distribution for each sample follows a pseudo power law with a continuously changing exponent, which suggests that pulverization is not simply a consequence of direct shear. This average particle size is quite coarser than previous reports, which we attribute to possible measurement errors in prior work. Our data and observations suggest that dynamic fracturing in the wall rock of these two major faults only accounts for about 1% or less of the earthquake energy budget.