Graphite lubricates fault zones

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Graphite is known to be a low-friction material, and rocks rich in graphite are often found in fault zones. Oohashi et al. conducted laboratory studies to determine how much graphite is needed to reduce the frictional strength of a fault.

Their experiments included samples with various mixtures of graphite and quartz, as well as pure quartz and pure graphite, and they covered large displacements (up to 100 meters (328 feet)), a range of slip rates (from 200 micrometers (0.0079 inches) per second to 1.3 meters (4.27 feet) per second), and shear strains (up to several tens of thousands.)

The authors find that the coefficient of friction decreases nonlinearly with increasing graphite fraction for any given shear strain and slip rate. Friction decreases quickly as graphite fraction increases between 5 percent and 20 percent by volume; at concentrations of 30 to 50 percent graphite, frictional levels were similar to that with pure graphite. They suggest that graphite in natural fault zones can effectively reduce the fault strength.

More information: Graphite as a lubricating agent in fault zones: an insight from low- to high- velocity friction experiments on a mixed graphite-quartz gouge, *Journal of Geophysical Research-Solid Earth*, doi: 10.1002/jgrb.50175
http://onlinelibrary.wiley.com/doi/10.1002/jgrb.50175/abstract

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