

## Nanometer-scale faulting in quartz

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In this study, we use nanometer-scale fault data to test competing models of displacement-length scaling relationships in faults. To obtain the data, we performed a nano-indentation test of quartz under a load of 294 mN at room temperature and ambient pressure. Using an atomic force microscope, we created topographic maps of the quartz surface immediately after the indentation test and again two days later. Analysis of the maps reveals that a new fault developed in the quartz, without direct artificial force, during the time between the two observations. Maximum displacement on the fault plane is ca. 20 nm, and the fault length is ca. 2000 nm. Our results, when combined with existing displacement-length data from larger-scale faults, support a linear, rather than non-linear model of displacement-length scaling relationship for faults.