



Frictional silica gel and cataclasite microstructures from shallow earthquakes on El Hierro, Canary Islands

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Silica gel lubrication has been recognized as one of the mechanisms causing coseismic weakening in faults at shallow crustal conditions, but natural examples are scarce (Kirkpatrick et al. 2013, Faber et al. 2014). We present the occurrence of a natural silica gel coating a fault surface of the San Andres fault on El Hierro, Canary Islands. The shallow San Andres fault is referred to as an aborted mega-landslide along the flank of the youngest volcano of Canary Islands (Day et al. 1997). Recently unearthed fault rocks exhibit a complex history of deformation, with two distinct layers: a cataclasite, and a silica gel. While cataclasite has been recognized in previous studies, and attributed to coseismic slip during a massive landslide, the newly found layer of frictional silica gel adds to the complexity. Fresh slickenlines along the fault scarp are covered by a thin, white layer of silica, 10-100 microns thick. Microstructures within the silica layer show flow banding, armored clasts, and extreme comminution compared to both the wall rock and adjacent cataclasites. The contact with the wall rock and the adjacent cataclasite is very sharp, and includes cut-off clasts. We argue that both relict layers, cataclasite and silica gel, were formed during separate, fast-slip events. These past massive landslides, as lateral collapse structures, shaped the island of El Hierro. Therefore, understanding the geometry and physical properties of these faults is of great importance.

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