# The Influence of Clay Fabrics on Permeability Anisotropy and Fault Behavior

By
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Elevated fluid pressure has been proposed as a mechanism for the apparent weak behavior of large faults. However in order to decrease the effective stress along such faults using fluid pressure it is necessary to confine fluids to the region of the fault in which earthquakes nucleate, and to prevent those fluids from escaping through the zone of intensely-fractured rock that bounds these areas. Permeability anisotropy in gouge resulting from a preferred orientation of clays has been proposed as a mechanism that would focus fluids, however X-ray texture goniometry has revealed that clay fabrics in fault rocks are generally weak. While these observations indicate that permeability anisotropy in fault rocks is low, it is not currently possible to directly relate X-ray fabric measurements to permeability measurements.

The Carboneras fault zone in southeastern Spain is a left-lateral crustal-scale fault composed of a broad fault zone with layers of clay gouge up to ~500m thick that has accommodated ~40 km of displacement. Detailed permeability measurements have been made for this zone by other workers. Samples collected from that fault zone provide an opportunity to develop a correlation between X-ray fabric measurements and permeability measurements. This will result in a scale that can be applied to other previously analyzed fault zones, including the Punchbowl fault in southern California, normal faults in Utah, and Sevier thrust faults in western North America, allowing the permeability anisotropy, and variations in the permeability structure of those fault zones to be calculated, greatly increasing our understanding of the permeability structure of those fault zones.