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Different Styles of Faulting Deformation along the Dead Sea Transform

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The left-lateral Dead Sea Transform (DST) is one of the largest continental strike-slip faults in the world. It forms the plate boundary between the Arabian and African plates and accommodates their convergence relative to Eurasia as a system of left-lateral fault-branches. Structural and geochemical data from three fault branches of the DST (Arava, Serghaya and Yammouneh/Missyaf fault) document considerable differences of faulting deformation and fluid-rock interactions between the selected segments.

Within the area of the Arava fault, the typical fault zone architecture composed of fault core/gouge zone, damage zone and undeformed host rock could not be recognized neither at macroscopic scale nor by microstructural analysis in thin sections. A main gouge zone or cataclasites, which in general build up brittle fault cores, are not exposed and the damage zone is rather narrow. The structural analysis suggests a relative simple kinematic pattern with a NW-SE direction of σ_1 and a NE-SW direction of the σ_3 axis. Our geochemical data suggest reduced fluid rock interactions and limited fluid flow. The fault did likely not act as an important fluid conduit. There are no indications that hydrothermal reactions (cementation, dissolution) changed the strength and of the fault zone.

Along the Serghaya and Yammouneh segments fault-related deformation patterns are more extensively developed. Brecciated damage zones up to 100m wide are frequent (e.g., at branches of the Serghaya fault where clay-gouges are documented in altered limestones). The kinematic patterns are more complex than in the Arava fault area. Striation along the main fault planes as well as second order faults suggest dominant strike-slip and normal faulting. The derived northwest-southeast-ward oriented short-

ening axes fit well into the system of published DST activities. Contrary to the Arava fault, fluid-assisted fault zone “strengthening” processes (i.e. veining and cementation) were active.