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Fault slip rates in time and space along the eastern margin of the Eastern California shear zone: Stateline fault system, California-Nevada, USA

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The Stateline fault system (SFS), a northwest striking zone of distributed dextral faulting, defines the active eastern margin of the Eastern California shear zone (ECSZ), and extends 180 km along the California-Nevada border from Ivanpah to northern Amargosa valley, terminating within 20 km of Yucca Mountain. Major nearby cities include Las Vegas ($\sim$40 km east of the SLF), and Pahrump (2 km east of the SLF). A 30 $\pm$ 3 km offset of $\sim$13 Ma volcanics indicates a minimum long-term geologic slip rate of 2.3 $\pm$ 0.35 mm/yr along the southern SFS. This is two to three times higher than the modeled geodetic displacement rate across the SFS of only 0.7-1.2mm/yr. This discrepancy suggests that the fault is either in a transient period of low activity or that it is deactivating as strain migrates to the western part of the ECSZ. In an effort to understand the slip-history and along-strike geometry of the SLF, and to document a proposed late Holocene rupture we are mapping the fault zone in detail with a current emphasis on Stewart Valley (2 km west of Pahrump), on the northern Pahrump segment of the SLF. Using LiDAR data we have mapped offsets of late Quaternary deposits and geomorphic features along the eastern margin of Stewart Valley. These include dextrally offset drainages, uplifted alluvial fan and playa deposits, disrupted alluvial fan surfaces, sag ponds and push-up ridges. Limited age data and a geomorphic chronosequence suggest a approximate Holocene slip rate of 3.0 $\pm$ 0,9 mm/yr based on a set of small drainages with an offset of 12-23m that cut into an uplifted

5570 $\pm$ 40 ybp surface (DePolo et al. 1999). This suggests that the SFS may be in a transient slow phase and that over longer time scales (1-10 ka) the geodetic displacement rate may be significantly higher. The implication for seismic hazard is that fault slip events on the SFS are probably large but infrequent. The tectonic implication is that strain from the well studied 4 to 5 mm/yr Death Valley-Furnace Creek fault is probably transferred southeast onto the SFS via a transpressional left step and that the geologically fastest portion of the ECSZ lies at the margin of the shear zone rather than within it.