

A COMPILATION OF OSL GEOCHRONOLOGY COLLECTED BY THE U.S. GEOLOGICAL SURVEY FROM SOUTHERN CALIFORNIA: WHAT THE AGES TELL US AND HOW THEY WILL BE USED

Shannon A. Mahan¹, Jonathan Matti², Christopher M. Menges³, and Robert E. Powell⁴

¹U.S. Geological Survey, Box 25046 Federal Center, Denver, CO 80225, smahan@usgs.gov

²Environ & Nat Resources Bldg, US Geological Survey, Tucson, AZ 85719-5035

³Geologic Division, U.S. Geological Survey, 520 N. Park Avenue, Tucson, AZ 85719

⁴U.S. Geological Survey, Geology and Geophysics Science Center, 520 N Park Ave, Tucson, AZ 85719

Over the last several years, the U.S. Geological Survey has investigated the geochronology of surficial deposits associated with the San Andreas Fault (SAF) and the Eastern California Shear Zone (ECSZ) in southern California using optically stimulated luminescence (OSL) dating. These OSL ages elucidate ongoing landscape evolution and active tectonics, especially near intersections between the fault systems, and span multiple physiographic provinces, including the Peninsular Ranges, the Transverse Ranges, the Mojave Desert, and the Salton Trough. More than sixty five OSL ages were generated from this study.

Within the Transverse Ranges, study areas included the Cottonwood Mountains, the Cottonwood Pass-Cottonwood Springs area, and strands of the Chiriaco Fault where it crosses the north piedmont of the Orocochia Mountains west of Chiriaco Summit. Within the Mojave Desert Province we focused on the Twentynine Palms area, at the intersection between the ECSZ and the Pinto Mountain Fault. At the boundary between the Transverse Ranges and Peninsular Ranges Provinces, we focused on complexities within the SAF zone associated with San Gorgonio Pass. Sample targets included terraces in the canyons of San Gorgonio River and Little San Gorgonio River, the Banning Bench, the alluviated Beaumont Plain at the west end of the San Gorgonio Pass Fault zone, the intersection of the Yucaipa horst-and-graben complex and the San Bernardino strand of the SAF (Wilson Creek area), and a nested alluvial-fan complex astride strands of the SAF at the mouth of Mission Creek at the northwestern head of Coachella Valley. Coachella Valley and basins within the sinistral fault complex of the Eastern Transverse Ranges were also dated. Samples were selected to help constrain the age of last movement on the Chiriaco fault, a major sinistral fault zone in the eastern Transverse Ranges province, and to begin to document the ages of major alluvial events in that province.

While most of the OSL ages are destined for maps or investigative reports, individual local sites where intensive systematic sampling was possible can provide new and useful age control for the latest Pleistocene to Holocene deposits and future investigations will be able to use the database that has accumulated from this study.