

**Project 07142: Determination of Paleoseismic Chronologies and Slip Rates Using AMS 14C, 10Be and OSL Measurements**

*Lewis Owen, University of Cincinnati*

12 OSL samples were dated from a paleoseismic trench across the Calico Fault in eastern California shear zone with Palmen Ganev, James Dolan, Kimberly Blisniuk and Mike Oskin. These ages helped define four surface ruptures during the past ~9,000 years. Together the geometry of growth strata, fissure fills, and upward fault terminations, they date to 0.6-2.0 ka, 5.0-5.6 ka, 5.6-6.1 (or possibly 7.3) ka, and 6.1 (or 7.3)-8.4 ka. The ages of the paleoearthquakes coincide with periods of clustered moment release identified previously on other faults in the eastern California shear zone at 0 – 1.5 ka, 5 – 6 ka, and ~9 – 10 ka, with two Calico fault surface ruptures occurring during the 5-6 ka ECSZ cluster. These data strongly reinforce earlier suggestions that earthquake recurrence in ECSZ is highly clustered in time and space. Such seismic clustering suggests that at least some regional fault networks undergo distinct periods of system-wide accelerated seismic moment release that may be driven by feedbacks between fault-loading rate and earthquake activity. Table 1 shows the determined ages.

TABLE 1: SUMMARY OF OSL DATING RESULTS EXTRACTED FROM SEDIMENT, SAMPLE LOCATIONS, RADIOISOTOPES CONCENTRATIONS, MOISTURE CONTENTS, TOTAL DOSE-RATES,  $D_E$  ESTIMATES AND OPTICAL AGES

Sample number	Laboratory number	Location		Altitude (m asl)	Depth (cm)	Particle size (μm)	U* (ppm)	Th* (ppm)	K* (%)	Rb* (ppm)	Cosmic <sup>§§</sup> (G/ka)	Dose-rate <sup>¶¶</sup> (G/ka)	n <sup>**</sup>	Mean equivalent dose <sup>††</sup> (Gy)	OSL age <sup>§§</sup> (ka)
		Lat (°N)	Long (°W)												
051707B	DOLAN5	34.820	116.66	565	40	90-125	4.07	10.30	2.50	120.00	0.22±0.02	3.92±0.24	14	19.1±0.8	1.1±0.1
051707I	DOLAN12	34.820	116.66	565	80	75-150	4.81	8.25	2.88	114.00	0.21±0.02	4.26±0.26	35	14.3±0.1	3.4±0.2
051707J	DOLAN11	34.820	116.66	565	40	90-125	4.48	10.70	2.58	108.00	0.22±0.02	4.10±0.25	19	2.5±22.5	0.6±0.1
081407A	DOLAN7	34.820	116.66	565	300	90-125	1.38	7.03	3.62	138.00	0.16±0.02	4.01±0.29	8	33.8±1.3	8.4±0.7
081507A	DOLAN4	34.820	116.66	565	80	125-180	3.65	9.02	2.87	116.00	0.21±0.02	4.05±0.26	70	8.2±0.2	2.0±0.1
081507B	DOLAN1	34.820	116.66	565	170	90-125	4.10	13.00	2.46	135.00	0.19±0.02	4.04±0.24	40	22.7±0.6	5.6±0.4
081507C	DOLAN8	34.820	116.66	565	130	125-180	5.01	9.86	1.84	105.00	0.20±0.01	3.51±0.20	14	19.1±0.8	5.4±0.4
081507D	DOLAN3	34.820	116.66	565	240	90-125	3.05	8.07	1.71	89.30	0.17±0.01	2.83±0.17	44	20.6±0.4	7.3±0.5
081507E	DOLAN9	34.820	116.66	565	180	125-180	3.27	8.74	1.79	98.10	0.19±0.01	3.00±0.18	34	18.3±0.7	6.1±0.4
081507F	DOLAN10	34.820	116.66	565	170	125-180	1.14	3.86	3.21	111.00	0.19±0.02	3.43±0.25	35	19.2±0.6	5.6±0.4
081507G	DOLAN6	34.820	116.66	565	170	125-180	2.05	4.38	2.83	99.50	0.19±0.02	3.34±0.23	32	16.6±0.5	5.0±0.4
081507H	DOLAN2	34.820	116.66	565	70	125-180	2.64	5.93	3.12	112.00	0.21±0.02	3.84±0.26	40	19.0±0.4	5.0±0.4

Note 1: OSL- Optically Stimulated Luminescence.

Note 2: The location of the samples is 34.820°N, 116.662°E.

\*Elemental concentrations from NAA of whole sediment measured at USGS Nuclear Reactor Facility in Denver. Uncertainty taken as ±10%.

†Estimated fractional water content was taken as 10±5%.

‡Estimated contribution to dose-rate from cosmic rays calculated according to Prescott and Hutton (1994). Uncertainty taken as ±10%.

§Total dose-rate from beta, gamma and cosmic components. Beta attenuation factors for U, Th and K compositions incorporating grain size factors from Mejdahl (1979). Beta attenuation factor for Rb arbitrarily taken as 0.75 (cf. Adamiec and Aitken, 1998). Factors utilized to convert elemental concentrations to beta and gamma dose-rates from Adamiec and Aitken (1998) and beta and gamma components attenuated for moisture content.

\*\*Number of replicated equivalent dose ( $D_E$ ) estimates used to calculate mean  $D_E$ . These are based on recuperation error of < 10%.

††Weighted mean equivalent dose ( $D_E$ ) determined from replicated single-aliquot regenerative-dose (SAR; Murray and Wintle, 2000) runs. Errors include an error from beta source estimated at about ±5%.

§§Errors incorporate dose rates errors and weighted errors or  $D_E$ .

520

521