

Table DR1. Paleomagnetic polarity, inclination, and treatments from boreholes and outcrops near George Air Force Base, California.

RZ-01 (Wellhead elevation: 2806.5 feet; Location: 34°33'48" N., 117°21'04" W.)

Depth	Sample #	Polarity	Inclination	Treatment	MAD
15.8	8J099-1	N	88.7	300-558	4.93
25	8J100-1	N	53.5	379-578	2.42
31.8	8J101-1	N	50.5	475-553	2.04
45	7J070-1	N	57.9	277-579	2.14
51	8J102-1	N	53	298-525	7.19
52.5	7J062-1	R	-32.5	380-581	23.63
68	7J063-1	I	16.5	380-529	5.55
68.5	8J103-1	R	-28.8	475-553	4.51
75	7J071-1	R	-27.8	274-559	7.59
84	7J064-1	R	-43.4	200-581	7.15
88.4	8J185-1	R	-28.8	370-507	15.6
94.2	7J065-1	N	46.8	380-581	19.18
94.5	8J104-1	R	-41.8	199-475	14.7
99.3	8J105-1	N	45.2	198-520	5.35
105	7J066-1	N	41.6	478-579	18.82
118	7J067-1	R	-69.2	277-579	10.9
131.5	7J072-1	R	-26.25	375-557	4.76
141	8J106-1	R	-37	153-473	22.1
150.2	8J107-1	N	54.8	198-520	12.94
150.5	7J073-1	N	25.3	375-557	14.75
156	7J069-1	R	-59.5	277-559	18.16
157.2	8J108-1	R	-73.9	296-567	5.48
165	7J074-1	R	-59.5	196-578	0.95
175	7J075-1	R	-45	274-572	1.17
190	7J076-1	R	-44.6	274-572	2.66
196.5	7J077-1	R	-61.7	274-572	1.1
202	7J078-1	R	-46.7	274-572	1.27
213.5	7J079-1	N	61.2	270-544	5.13
224	7J080-1	N	49.7	270-565	1.34
231.8	8J109-1	N	53	373-567	0.58
240	7J081-1	N	52	270-565	1.99
242.5	8J110-1	N	66.5	361-547	0.9
256.5	7J083-1	N	68.3	270-565	0.85
261	7J084-1	R	-38.4	265-549	0.64
264	8J111-1	I	-10.4	361-547	0.45
264.3	7J085-1	I	-15.6	265-549	1.67
277.6	7J086-1	R	-50.1	265-549	1.25
281	7J087-1	N	68.9	265-549	2.88
285.2	7J088-1	N	40.4	154-342	11.58
288.5	8J113-1	I	-16.1	146-456	14.3
293.5	7J089-1	R	-50.2	342-578	1.82
301.75	8J114-1	R	-45.8	203-302	1.24
304	8J115-1	I	12.3	361-547	2.5
307	7J090-1	N	60.2	274-578	1.01

312	7J091-1	N	83.2	154-342	4.89
320.2	7J092-1	N	43.5	268-577	7.25
322	7J093-1	R	-60	268-577	2.06
326	7J094-1	R	-49.2	268-577	0.98
328.5	7J095-1	R	-48.3	337-558	4.78
335.8	7J096-1	R	-41.2	152-336	3.73
341.5	7J097-1	R	-65.5	523-578	2.96
343.4	7J098-1	R	-52.3	336-578	4.09
348.3	7J099-1	N	74.3	H200-400	5.34
356	7J100-1	I	-9	H200-400	2.05
360.5	8J116-1	N	46.6	150-360	5.61
365.5	7J101-1	R	-53.6	520-578	13.09
385.15	7J103-1	R	-56.1	H200-400	3.28
392.7	7J104-1	R	-57	268-571	0.96
405.5	7J105-1	R	-56.4	152-335	3.61
415.5	7J106-1	N	38.7	H200-400	1.98

RZ-02 (Wellhead elevation: 2842.0 feet; Location: 34°36'02" N., 117°22'28" W.)

Depth	Sample #	Polarity	Inclination	Treatment	MAD
15.3	8J020-1	N	33.5	483-581	5.12
20.4	8J021-1	N	54.7	483-581	2.97
36.6	8J022-1	N	47.8	483-587	3.22
66.4	8J023-1	N	51.6	383-581	2.92
67.2	8J024-1	N	60.4	379-597	1.72
71.9	8J025-1	N	51.1	379-597	3.36
80.3	8J026-1	N	55.3	379-597	1.42
82.9	8J027-1	N	38.4	379-597	4.39
87.2	8J028-1	N	28.4	378-596	2.48
89.3	8J029-1	N	49	378-596	2.33
93.3	8J030-1	N	75.3	558-596	4.97
97.5	8J031-1	N	62.2	378-578	2.4
101.3	8J032-1	N	54.7	375-591	1
107	8J053-1	N	61.7	H100	-
116.3	8J054-1	I	-13.4	301-573	8.97
120.2	8J033-1	R	-43.1	573-591	6.53
122	8J034-1	R	-29.9	475-591	4.15
133.3	8J035-1	R	-27.2	475-591	8.63
142	8J036-1	N	26.7	H300-500	27.47
148.2	8J037-1	I	-9	H400-600	18.97
161.8	8J038-1	N	45.5	H200-500	3.41
173	8J039-1	R	-39.7	372-585	3.11
174.3	8J040-1	R	-31.4	372-585	3.11
185	8J136-1	R	-21.8	300-581	3.27
192.2	8J041-1	R	-86.1	372-567	7.33
193.2	8J042-1	R	-26.7	567-585	26.28
197.2	8J043-1	R	-66.5	456-566	0.78
198.3	8J044-1	R	-44	456-566	0.88
207.3	8J045-1	R	-54.7	456-566	1
209	8J046-1	R	-43.9	456-566	1.85

215.5	8J137-1	N	62.3	300-581	3.02
222	8J138-1	I	7.9	380-559	9.16
235.1	8J047-1	R	-54.4	H100	-
238.3	8J048-1	R	-40.5	377-573	7.69
246.6	8J049-1	R	-63.1	377-555	4.85
247.3	8J050-1	R	-48.5	377-573	1.37
256.5	8J051-1	R	-74.3	H100	-
260.3	8J052-1				

RZ-03 (Wellhead elevation: 2839.7 feet; Location: 34°36'03" N., 117°23'57" W.)

Depth	Sample#	Polarity	Inclination	Treatment	MAD
30.3	8J055-1	N	57.58	302-578	2.67
36	8J056-1	N	60.1	H100	-
46.9	8J057-1	N	52.9	H100	-
52.2	8J058-1	N	73.9	H100	-
61.8	8J059-1	N	45.5	H100	-
72.5	8J060-1	N	45.9	302-578	0.94
75.8	8J061-1	N	54.3	302-578	2.18
85.5	8J062-1	N	53	302-578	0.85
86.8	8J063-1	N	53.2	300-578	0.89
93.3	8J064-1	N	49	300-578	3.09
105	8J139-1	N	48.9	300-581	1.7
110.3	8J065-1	N	58.4	300-578	1.37
113.5	8J066-1	I	13.1	300-578	0.92
114.5	8J067-1	R	-35.2	300-578	1.01
122.3	8J068-1	R	-44.5	H100	-
125.5	8J069-1	I	-6.9	H100-400	10.1
130.5	8J070-1	N	35.6	H100	-
135	8J140-1	R	-50.9	300-578	2.71
141	8J071-1	R	-61.1	300-578	0.64
143.7	8J072-1	R	-56.7	300-578	1.52
144.7	8J073-1				
145.8	8J074-1	R	-54.9	300-578	0.56
147	8J075-1	R	-57.1	301-575	0.7
148.8	8J076-1	R	-33.5	301-575	0.46
151	8J077-1	R	-44	301-575	0.59
152.5	8J078-1	R	-33.4	H100	-
156	8J141-1	N	30.1	300-578	8.44
162.25	8J142-1	I	-3.1	478-557	8.74
169.2	8J143-1	N	50.24	378-557	9.8
175.8	8J079-1	N	45.8	H100	-
183	8J080-1	R	-52.3	301-575	0.59
186.7	8J081-1				
187.3	8J082-1	R	-22.5	302-570	8.55
191.3	8J083-1	R	-36.3	379-570	4.3
193	8J084-1	R	-27.2	302-570	9.64
197	8J085-1	R	-41.2	377-573	5.48
198.8	8J086-1	R	-38.9	377-573	11.12
200.8	8J087-1	R	-52.5	377-573	2.09

204.5	8J088-1	R	-46.2	377-573	2.18
205.7	8J089-1	R	-43.7	380-578	4.64
208.3	8J090-1	R	-38.5	380-578	3.91
210.5	8J091-1	R	-45.3	380-578	4.61
211.3	8J092-1	R	-47.7	380-578	4.37
215.8	8J093-1	R	-52.5	379-578	0.68
216.8	8J094-1	R	-50.8	379-578	1.55
218.3	8J095-1	R	-45.2	379-578	1.71
250.7	8J096-1	N	74.8	479-578	1.39
260.8	8J097-1	N	49.9	379-578	6.02
261.5	8J098-1	N	70.4	300-578	8.44

RZ-04 (Wellhead elevation: 2895.2 feet; Location: 34°34' 21" N., 117°23'48" W.)

Depth	Sample #	Polarity	Inclination	Treatment	MAD
142	7J111-1	N	76.2	H150-400	2.48
157.5	7J112-1	N	56.5	420-571	3.82
170.25	7J113-1	R	-49.1	420-571	4.19
179	7J114-1	N	51.9	268-566	0.63
197.15	7J115-1	N	63.8	H150-400	2.82
212	7J116-1	N	55.7	268-566	1.61
222	7J117-1	R	-23.9	515-566	6.29
225.5	7J118-1	N	46.5	201-335	1.51
240	7J119-1	N	73.4	H150-400	3.39
252.5	7J120-1	N	79.5	H150-400	11.37
264	7J121-1	N	72.4	264-553	0.51
271	7J122-1	N	73.7	264-406	4.01
286	7J123-1	N	63.1	H150-400	3.7
291.5	7J124-1	N	79.5	H150-300	9.05
302	7J125-1	R	-51.8	H150-400	0.81
311.5	7J126-1	N	26.6	198-406	11.58
331	7J127-1	N	36.5	H150-400	5.65

Outcrops

- 8J181-1 (Elevation: 2870 feet, Location: 34°33'33" N., 117°20'16" W.)
Inclination: 57.0; Declination: 359.5; Polarity: N; Treatment: 153-522; MAD: 0.8
- 8J182-1 (Elevation: 2815 feet, Location: 34°33'37" N., 117°20'29" W.)
Inclination: 33.3; Declination: 292.8; Polarity: N; Treatment: 153-522; MAD: 7.1
- 8J183-1 (Elevation: 2810 feet, Location: 34°33'52" N., 117°20'54" W.)
Inclination: 53.5; Declination: 5.2; Polarity: N; Treatment: 150-507; MAD: 4.7
- 8J184-1 (Elevation: 2843 feet, Location: 34°33'52" N., 117°21'10" W.)
Inclination: 54.9; Declination: 6.1; Polarity: N; Treatment: 150-507; MAD: 2.1
- 7J145-2 Volcanic ash near Helendale Fault
(Elevation: 2515 feet, Location: 34°45'58" N., 117°17'42" W.)
Inclination: -30.3; Declination: 272.4; Polarity: R; Treatment: 286-639; MAD: 1.8

Notes: Depth, distance in feet below wellhead; Sample #, USGS sample identifier; Polarity, N = normal magnetic polarity, R = reversed magnetic polarity, I = intermediate, polarity not determined; Inclination, magnetic inclination in degrees; Treatment, range of heating steps used in inclination determination, H indicates alternating field treatments in oersteds, other values are thermal demagnetization temperatures in degrees C; MAD, maximum angle of deviation from Kirschvink (1980). If no values are given, specimen was not recovered or was not suitable for measurement.

Optically stimulated luminescence dating

Figure DR1 shows the sites within the trench where samples MO1 to MO4 were collected. Optically stimulated luminescence (OSL) dating was undertaken at the Luminescence Dating Laboratory in the Department of Earth Sciences, University of California at Riverside. Coarse-grained (90–125 μm) quartz and feldspar samples were prepared using the methods of Rhodes (1988) and Aitken (1985 and 1998). Optically stimulated luminescence measurements were made using Daybreak Luminescence equipment using the methods of Duller (1994) and Murray et al. (1997). Tables DR2–DR4 show the data and calculations used in determining the OSL ages. We favor the quartz OSL ages because no assumption has to be made for anomalous fading and internal dose rates within the grains.

Table DR2. Sample locations and types

Sample ID	Laboratory ID	Location (latitude/longitude)	Altitude (m)	Sediment type	Depth below surface (m)	Moisture content (%)
MO1	UCR37	34°37'80.2"N/117°22'49.6"W	890	pebbly silty sand	1.0	1.1
MO2	UCR38	34°37'80.2"N/117°22'49.6"W	890	pebbly silty sand	1.0	0.7
MO3	UCR39	34°37'80.2"N/117°22'49.6"W	890	pebbly silty sand	1.0	1.4
MO4	UCR40	34°37'80.2"N/117°22'49.6"W	890	pebbly silty sand	1.0	0.9

Table DR3. Dose rate data

Sample ID	Cosmogenic dose rate (Gy/ka)*	K (%)†	Rb (ppm)†	Th (ppm)†	U (ppm)†	Radioisotope dose rate for quartz (Gy/ka)§	Radioisotope dose rate for feldspar (Gy/ka)''	Total dose rate for quartz (Gy/ka)**	Total dose rate for feldspar (Gy/ka)††
MO1	0.220	2.76	109	7.67	0.94	3.39 ± 0.19	3.79 ± 0.19	3.61 ± 0.26	4.10 ± 0.30
MO2	0.220	2.42	109	7.50	0.98	3.08 ± 0.16	3.30 ± 0.16	3.30 ± 0.23	3.71 ± 0.37
MO3	0.197	3.08	129	9.14	1.11	3.83 ± 0.19	4.23 ± 0.21	4.02 ± 0.29	4.43 ± 0.44
MO4	0.195	4.07	160	6.10	1.03	4.55 ± 0.23	4.96 ± 0.25	4.75 ± 0.37	5.15 ± 0.40

* Determined using the methods of Prescott and Hutton (1994)

† Determined by neutron activation analysis at Becquerel Laboratories in Australia

§ Calculated following the methods of Nambi and Aitken (1986) and Aitken (1985 and 1998)

'' Calculated following the methods of Nambi and Aitken (1986) and Aitken (1985 and 1998) and corrected for internal K and Rb within feldspar

** Sum of cosmogenic dose rate and radioisotope dose rate for quartz

†† Sum of cosmogenic dose rate and radioisotope dose rate for feldspar

Table DR4. Paleodose measures and OSL ages

Sample ID	Feldspar paleodose, luminescence correction (Gy)*	Feldspar paleodose dose correction (Gy)†	Quartz paleodose (Gy)§	Feldspar OSL age luminescence correction (ka)	Feldspar OSL age dose correction (ka)	Quartz OSL age (ka)
MO1	15.23 ± 2.31	13.63 ± 2.86	22.28 ± 2.8	3.7 ± 0.8	3.4 ± 0.9	6.2 ± 1.0
MO2	10.03 ± 2.21	9.62 ± 2.59	14.16 ± 4.56	2.7 ± 0.7	2.6 ± 0.8	4.3 ± 1.5
MO3	207.2 ± 10.1	219.6 ± 10.9	244.7 ± 20.2	46.8 ± 2.9	49.6 ± 3.1	60.8 ± 5.4
MO4	214.3 ± 13.1	232.5 ± 16.6	340.3 ± 61.9	41.6 ± 3.2	45.1 ± 3.7	71.7 ± 13.3

* Determined using the method of Duller (1994) with a luminescence correction

† Determined using the method of Duller (1994) with a dose correction

§ Determined using the method of Murray et al. (1997)

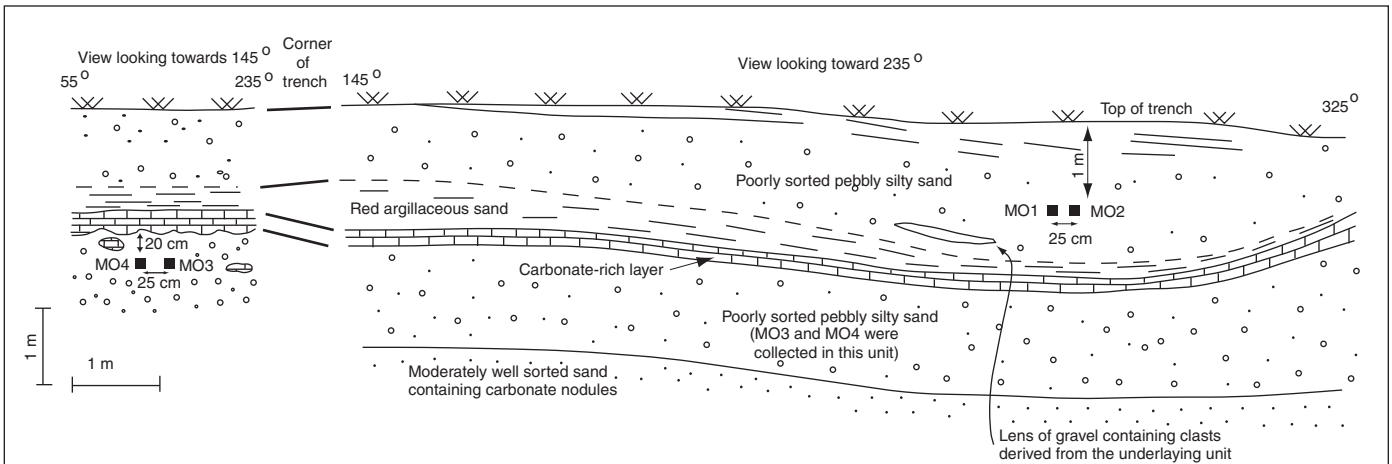


Figure DR1. Sedimentary log in trench near George Air Force Base (34° 37.802'N/117° 22.496'W) showing the sampling site for MO1 to MO4.

REFERENCES CITED

- Aitken, M.J., 1985, Thermoluminescence dating: London, Academic Press.
- Aitken, M.J., 1998, An introduction to optical dating: Oxford, Oxford University Press, 267 p.
- Duller, G.A.T., 1994, Recent developments in luminescence dating of Quaternary sediments: *Progress in Physical Geography*, v. 20, p. 133–151.
- Kirschvink, J.L., 1980, The least-squares line and plane and the analysis of paleomagnetic data: *Geophysical Journal of the Royal Astronomical Society*, v. 62, p. 699–718.
- Murray, A.S., Roberts, R.G., and Wintle, A.G., 1997, Equivalent dose measurements using a single aliquot of quartz: *Radiation Measurements*, v. 27, p. 171–183.
- Nambi, K.S.V., and Aitken, M.J., 1986, Annual dose conversion factors for TL and ESR dating: *Archaeometry*, v. 28, p. 202–205.
- Prescott, J.R., and Hutton, J.T., 1994, Cosmic ray contributions to dose rates for luminescence and ESR dating: large depths and long-term time variations: *Radiation Measurements*, v. 23, p. 497–500.
- Rhodes, E.J., 1988, Methodological considerations in the optical dating of quartz: *Quaternary Science Reviews*, v. 7 p. 395–400.