

Granulometry of Core CL-73-4 Clear Lake, California

by

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ABSTRACT

Published preliminary grain size analyses of samples from from Clear Lake core CL-73-4 are in error. New analyses here presented correct and replace the data published by Sims and others (1981); and show that the range in mean grain size for samples from core CL-73-4 is between 7.73 and 9.21 ϕ (4.8 to 1.7 μm).

Clear Lake is located about 120 km north of San Francisco and lies in a fault bounded, seismically active intermontane valley north of The Geysers geothermal field (fig. 1). In 1973 eight cores ranging in length from 13.9 to 115.2 m were taken in Clear Lake (fig. 1). Analyses of these cores yields a continuous lithostratigraphic and biostratigraphic record from which a history of volcanic activity, sedimentation, tectonism, and paleoclimate is reconstructed (Sims, 1976; Casteel and others, 1977; Sims and others, 1981; Adam and others, 1981). The longest of the eight cores, core CL-73-4, allows the determination of a major part of this history and paleoclimatic interpretation for the past 130,000 years (Sims and others, 1981; Adam and others, 1981).

Grain size analysis was recently done on 109 samples from core CL-73-4 using a Particle Data computerized electro-resistance particle size analyzer. The samples for analysis were first dispersed in four percent sodium pyrophosphate ($\text{NaHPO}_4 \cdot 10\text{H}_2\text{O}$) (Particle Data Inc., 1979; Berg, 1958; Muerdter and others, 1981). The dynamic range of the particle size analyzer as calibrated is from about 2.7 to 10.7ϕ (150 to $0.6 \mu\text{m}$). Moment statistical parameters are calculated for each analysis (table 1). The range in mean grain size for samples from core CL-73-4 is between 7.73 and 9.21ϕ (4.8 to $1.7 \mu\text{m}$). There is no apparent systematic variation in mean grain size with depth in the core. As a further means of characterizing the grain size data, the delta variate of Craig (1936) is calculated for each analysis and plotted against skewness (LeRoy, 1981). All but two of the analyses plot in the bell-shaped curve area of the modified Craig diagram (fig. 2) and illustrate the close relationship of all the analyses and the samples extreme similarity.

This set of data contrasts with preliminary grain size analysis for core CL-73-4 in Sims and others (1981, p. 221). The preliminary analyses on 11 samples at about 10 m intervals suggested that the mean grain size for the core is about 6ϕ ($15.6 \mu\text{m}$) (Sims and others, 1981). However, the complete analysis of samples from the core are at variance with the conclusions in Sims and others (1981). The apparent discrepancy is due to a previously undetected malfunction of the grain size analyzer at a time of changeover to a new software system for the computer and a simultaneous modification of the analytical procedure to accomodate the new software system, which were corrected for these new analyses. Thus the data presented here replaces and corrects the preliminary data in Sims and others (1981).

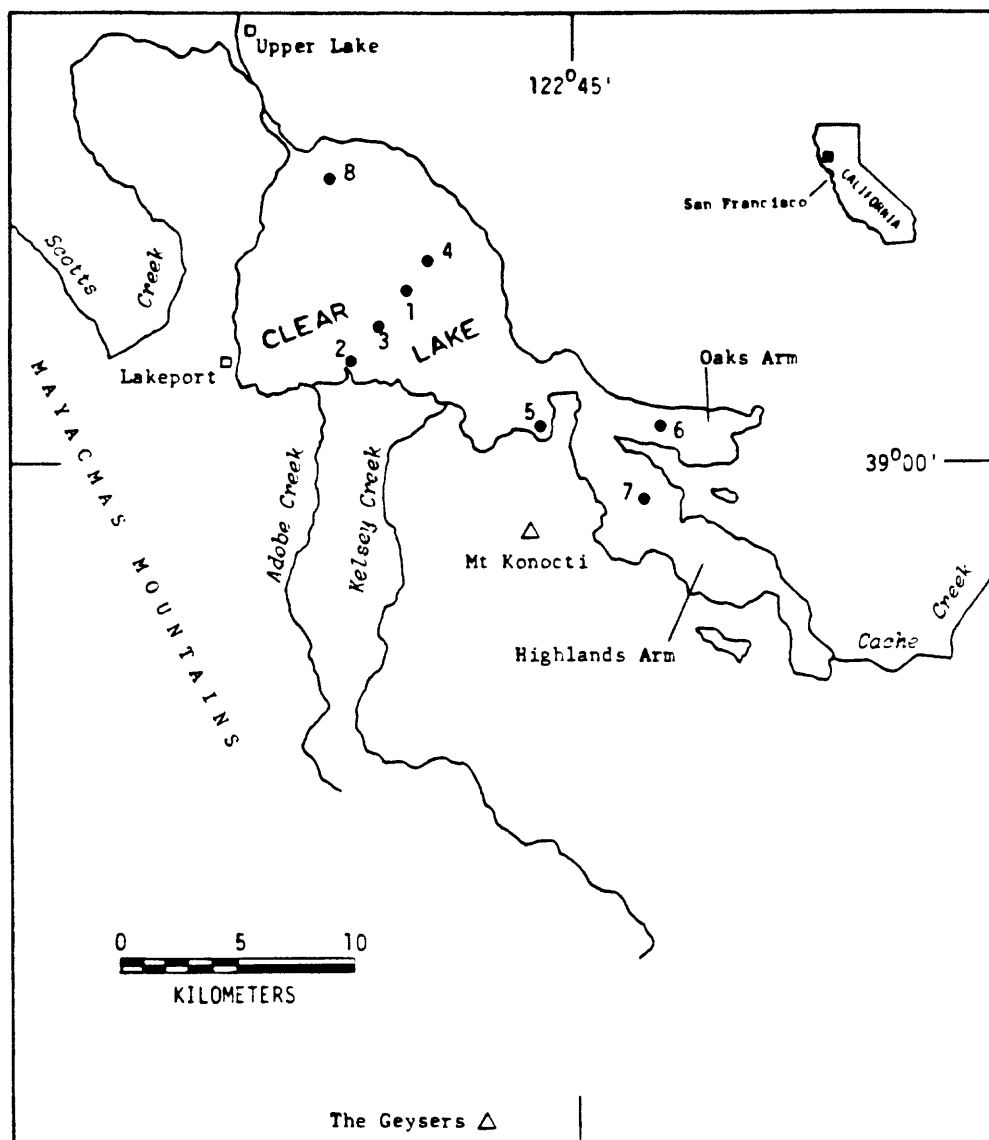


Figure 1. Location map of Clear Lake, California and eight cores taken from the lake in 1973. Core numbers are all identified by the prefix CL-73.

Table 1. Grain Size Analysis for Core CL-73-4, Clear Lake, California

Depth (cm)	X _φ	S _φ	Sk _φ	K _φ	ε value
100	8.15	1.07	- 0.80	4.70	0.19
220	8.75	0.84	- 0.45	3.73	0.13
310	8.16	1.38	- 1.06	3.88	- 0.23
409	8.61	0.75	+ 0.05	3.57	0.17
595	8.62	0.96	- 0.70	4.27	0.15
596	8.74	0.84	- 0.65	4.14	0.14
710	8.72	0.81	- 0.47	4.13	0.22
792	8.78	0.77	- 0.22	3.12	0.02
890	8.74	0.87	- 0.65	4.13	0.14
990	8.38	1.12	- 0.77	3.47	- 0.13
1100	9.08	0.57	- 0.52	4.88	0.37
1196	7.93	1.19	- 0.53	2.98	- 0.15
1301	8.72	0.92	- 0.60	4.00	0.13
1409	8.72	0.75	- 0.02	3.13	0.04
1500	8.51	0.86	- 0.25	3.26	- 0.25
1590	8.39	0.93	- 0.60	4.21	0.19
1700	8.41	0.90	- 0.42	3.56	0.09
1800	8.32	0.84	- 0.30	3.73	0.18
1895	8.39	0.94	- 0.99	5.61	0.26
2000	7.73	1.07	- 0.53	3.47	0.02
2090	8.67	0.73	- 0.34	4.34	0.32
2210	8.40	0.88	- 0.72	5.27	0.36
2515	8.90	0.76	- 0.13	2.89	- 0.05
2600	8.91	0.81	- 0.71	4.31	0.15
2680	8.83	0.72	- 0.21	3.61	0.16
2990	8.02	1.39	- 1.23	4.36	- 0.25
3090	8.63	0.77	- 0.00	2.64	- 0.13
3170	8.58	0.77	- 0.48	4.32	0.27
3300	8.95	0.77	- 0.75	5.14	0.32
3408	8.80	0.74	- 0.06	2.39	- 0.23
3495	8.74	0.75	- 0.32	3.76	0.18
3690	8.62	0.77	- 0.38	4.10	0.25
3604	8.57	0.88	- 0.68	4.29	0.16
3800	8.30	0.90	- 0.46	4.02	0.20
3910	8.70	0.70	- 0.20	3.85	0.23
4010	8.85	0.82	- 0.37	3.31	0.03
4085	8.83	0.75	- 0.07	3.08	0.02
4219	8.44	0.86	- 0.21	3.17	0.03
4320	9.21	0.66	- 0.47	3.94	0.18
4430	8.30	1.25	- 1.40	5.25	- 0.17
4600	8.63	0.89	- 0.51	3.61	0.07
4710	8.59	0.77	- 0.30	3.94	0.23
4805	8.32	0.90	- 0.24	3.61	0.16
4900	8.47	0.90	- 0.75	4.76	0.24
4999	8.86	0.72	- 0.33	3.43	0.08
5100	8.60	0.88	- 0.45	3.45	0.05
5199	8.77	0.71	- 0.19	4.20	0.32
5315	8.66	0.77	- 0.41	4.26	0.28
5435	8.68	0.84	- 0.32	3.20	0.01
5505	8.26	0.83	- 0.33	4.12	0.27
5595	8.57	0.80	- 0.38	3.88	0.19
5700	8.45	0.76	- 0.46	5.07	0.43
5810	8.55	0.85	- 0.46	3.95	0.18
5903	8.78	0.74	- 0.20	3.41	0.11
6001	8.41	0.86	- 0.36	3.69	0.15

Depth cm	X _φ	S _φ	Sk _φ	K _φ	ε value
6097	8.48	0.80	- 0.45	4.26	0.26
6190	8.51	0.86	- 0.36	3.73	0.16
6289	8.55	0.73	- 0.09	2.89	- 0.04
6410	8.62	0.75	- 0.15	3.14	0.03
6510	8.78	0.88	- 0.72	4.21	0.12
6600	8.23	0.95	- 0.32	3.36	0.06
6700	8.53	0.83	- 0.37	3.74	0.16
6796	8.94	0.72	- 0.13	3.32	0.09
6903	8.81	0.81	- 0.61	3.97	0.12
6991	8.53	0.82	- 0.43	4.18	0.25
7108	8.79	0.81	- 0.42	3.49	0.07
7194	8.72	0.87	- 0.41	3.45	0.06
7300	8.65	0.86	- 0.59	4.24	0.20
7387	8.50	0.88	- 0.84	5.19	0.28
7520	8.64	0.85	- 0.45	3.75	0.13
7607	8.64	0.74	- 0.43	4.37	0.30
7693	8.58	0.77	- 0.17	3.87	0.24
7799	8.37	0.97	- 0.66	3.98	0.09
7896	8.47	0.94	- 0.47	3.17	- 0.05
8002	8.60	0.77	- 0.14	3.52	0.15
8109	8.60	0.80	- 0.47	4.42	0.29
8195	8.63	0.82	- 0.52	4.37	0.26
8291	8.61	0.78	- 0.08	3.80	0.23
8387	8.55	0.86	- 0.94	6.05	0.38
8521	8.50	0.81	- 0.39	4.06	0.24
8617	8.70	0.81	- 0.20	3.28	0.07
8704	8.25	0.94	- 1.01	6.27	0.38
8799	8.55	0.71	- 0.15	3.06	0.01
8896	8.46	0.78	- 0.29	3.67	0.16
8993	8.39	0.82	- 0.70	5.15	0.35
9110	8.56	0.89	- 0.31	3.38	0.07
9195	8.67	0.90	- 0.75	4.43	0.16
9312	8.62	0.81	- 0.55	4.25	0.22
9394	8.15	0.85	- 0.19	3.90	0.25
9491	8.36	0.82	- 0.50	4.41	0.28
9572	8.56	0.81	- 0.18	3.88	0.24
9668	8.91	0.78	- 0.38	3.82	0.16
9947	8.49	0.95	- 0.78	4.43	0.14
10014	8.65	0.75	- 0.08	2.40	- 0.23
10099	8.05	1.32	- 1.13	4.20	- 0.20
10201	8.55	0.78	- 0.33	4.57	0.37
10297	8.71	0.79	- 0.02	2.45	- 0.20
10400	8.61	0.91	- 1.02	6.00	0.32
10496	7.96	1.30	- 1.04	3.93	- 0.20
10578	8.78	0.73	- 0.62	4.93	0.34
10710	8.12	1.14	- 0.74	3.48	- 0.11
10798	8.38	0.89	- 0.62	4.52	0.25
10857	8.51	0.84	- 0.41	4.46	0.32
11000	8.47	1.27	- 1.42	5.37	- 0.16
11111	8.30	1.36	- 1.61	5.98	0.20
11213	8.45	0.86	- 0.46	4.18	0.24
11294	8.29	0.89	- 0.15	3.67	0.19
11391	8.21	0.86	- 0.12	3.61	0.18
11496	8.43	0.82	- 0.47	4.02	0.20
Average	8.55	0.33	- 0.47	3.99	0.19

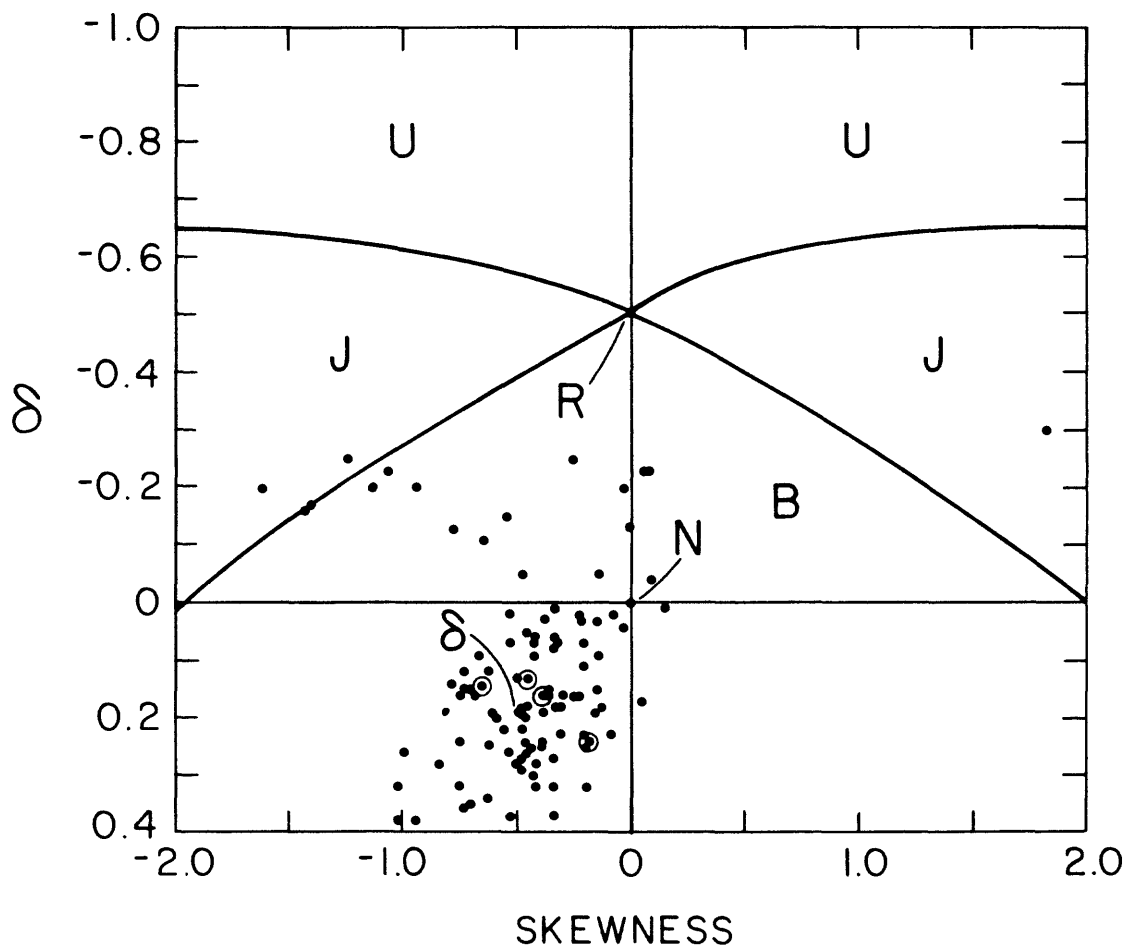


Figure 2. Plot of 109 grain size analyses from Clear Lake core CL-73-4 on a modified Craig diagram (LeRoy, 1981).

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