UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Principal facts for sixty-nine gravity stations near the Mt. Jefferson Wilderness Area, Oregon

by

Carol Finn

Open File Report 83-466

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Explanation of the headings of the accompanying table of principal facts are as follows.

STATION IDENTIFICATION — All stations were taken with LaCoste and Romberg[1] gravity meter G-550. For a complete description of the gravity reduction procedures currently in use by most people in the U.S. Geological Survey (USGS) for defining the corrections and anomalies, see Cordell and others (1982).

LATITUDE AND LONGITUDE — Values listed are in degrees and minutes to the nearest one hundredth of a minute (accurate to one tenth of a minute). To obtain the positions of the gravity stations, the stations were transferred from U.S. Forest Service and USGS aerial photographs to USGS 1:62,500 topographic quadrangle maps and then were digitized.

ELEVATION — Elevations are in feet to the nearest tenth. Elevations were determined from USGS 1:62,500 scale topographic quadrangle maps having a contour interval of 80 feet. Most of the stations were taken on spot elevations (accurate to about ± 5 feet). Others were determined by

[1]Use of tradenames is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey.

contour interpolation and maybe accurate to only ±40 feet. The data contoured at 2 mgals looks smooth so it is unlikely that any stations elevations are off by as much as 40 feet.

OBSERVED GRAVITY

Values are to the nearest hundredth of a milligal. All stations are relative to two Oregon State University base stations. Station NC 79G404 is located at the Oregon State Highway Maintenance Compound at Santiam Junction, approximately one foot north of Rock Standard for Highway Department sign - above BML 279, 1941. It is at 44°26.18′ latitude, 121°56.56′ longitude, an elevation of 3733′ feet with an observed gravity of 980238.32±.04 mgals. The other base station is in Sisters, Oregon at the Earl E. Russell Grade School at the small brick structure housing the administrative offices. The new grade school is located approximately one-fourth mile east of the administrative offices. The gravity base station is located in the northeast corner of the concrete porch on the south side of the administrative building. The gravity meter base plate is placed directly over USC & GS benchmark E476, 1941, set into the step. The observed gravity is 980246.40±.03 mgals.

THEORETICAL GRAVITY

Values were calculated using the Geodetic

Reference System 1967 (International Association of Geodesy, 1971).

TERRAIN CORRECTIONS

Most of the stations were corrected for terrain by computer from the station to 166.7 km (Richard Godson, unpublished program , U.S. Geological Survey), implementing the procedure of Plouff (1977). Some of the inner zone (Hammer zones D-F, Hammer, 1939) terrain corrections were done by template. Although the density used in these corrections was 2.2 g/cm^3, the value in the terrain correction column is for 2.67 g/cm^3. This density was obtained by a modified Nettleton profiling technique described in Finn and Williams (1982).

FREE-AIR ANOMALY

Free-air anomaly values are in milligals. The free-air correction was obtained by the following calculation: observed gravity - theoretical gravity - free-air anomaly = free-air correction.

COMPLETE BOUGUER ANOMALY

Complete Bouguer anomaly values are in milligals using densities of 2.2 and 2.43 g/cm^3.

REFERENCES CITED

Cordell, L., Keller, G. R, and Hildenbrand, T., 1982, Bouguer gravity map of the Rio Grande Rift: U.S. Geological Survey Geophysical Investigations Map GP-949.

Finn, Carol, and Williams, D. L., 1982, Gravity evidence for a shallow intrusion under Medicine Lake Volcano in northern California: Geology, v. 10, p. 503-507.

Hammer, Sigmund, 1939, Terrain corrections for gravimeter stations: Geophysics, v. 4, p. 184-194.

International Association of Geodesy, 1971, Geodetic reference system 1967: International Association of Geodesy Special Publication no. 3 (Bureau Central Association International Geodesie, Paris), 116 p.

Plouff, Donald, 1977, Preliminary documentation for a Fortran program to compute gravity-terrain corrections based on topography digitized on a geographic grid: U.S. Geological Survey Open-File Report 77-535, 45 p.

BOUGUER GRAVITY DATA

jefferson gravity
collected summer 1981
Meter ID: a-126 Date: 12/23/82

STATION IDENTIFICATION		LOCATIONS					GRAVITY		CORRECTIONS				ANOMALIES		
prol	sta-id	LATITUDE deg min		LONGITUDE deg min		ST	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE AIR	COMPLETE-BOUGUER d1=2.20	d2=2.43	SPEC FIELDS
jorf	:1001	44 28.32		-121 50.70	6765.1 (in ft)	or	980045.21	980571.27	18.85	-190.12	-1.25	0.00	109.88	-62.64	-80.67	
jorf	:1003	44 28.68		-121 49.38	6665.0	or	980049.81	980571.80	21.23	-187.31	-1.25	0.00	104.54	-62.79	-80.29	
jorf	:1004	44 29.16		-121 51.06	6537.2	or	980068.72	980572.53	10.81	-183.72	-1.25	0.00	110.71	-63.44	-81.65	
jorf	:1005	44 29.34		-121 50.34	5886.8	or	980116.70	980572.80	6.23	-165.44	-1.23	0.00	97.31	-63.13	-79.90	
jorf	:1006	44 28.68		-121 52.92	5124.0	or	980156.63	980571.80	3.10	-144.00	-1.17	0.00	66.55	-75.53	-90.38	
jorf	:1007	44 27.84		-121 54.06	6229.0	or	980068.09	980570.54	16.67	-175.06	-1.24	0.00	83.12	-76.51	-93.20	
jorf	:1008	44 27.36		-121 53.88	5404.0	or	980137.50	980569.81	4.03	-151.87	-1.20	0.00	75.72	-73.32	-88.90	
jorf	:1009	44 27.84		-121 55.74	4990.6	or	980168.70	980570.54	4.06	-140.25	-1.16	0.00	67.35	-70.00	-84.36	
jorf	:1010	44 29.16		-121 54.96	4734.6	or	980185.18	980572.53	2.53	-133.06	-1.13	0.00	57.78	-73.89	-87.65	
jorf	:1011	44 30.48		-121 55.38	4447.0	or	980198.87	980574.52	2.61	-124.98	-1.10	0.00	42.44	-81.02	-93.93	
jorf	:1012	44 30.48		-121 52.26	5843.0	or	980104.58	980574.52	11.58	-164.21	-1.23	0.00	79.35	-74.51	-90.59	
jorf	:1013	44 32.76		-121 54.96	4620.0	or	980187.01	980577.96	2.53	-129.84	-1.12	0.00	43.41	-85.02	-98.45	
jorf	:1014	44 32.88		-121 52.74	5351.0	or	980138.46	980578.14	9.53	-150.38	-1.19	0.00	63.37	-78.67	-93.52	
jorf	:1015	44 32.94		-121 54.00	4415.0	or	980201.61	980578.23	2.91	-124.08	-1.10	0.00	38.47	-83.80	-96.58	
jorf	:1016	44 34.26		-121 50.88	4660.0	or	980189.70	980580.22	3.63	-130.96	-1.13	0.00	47.60	-80.85	-94.28	
jorf	:1017	44 34.14		-121 48.42	6766.0	or	980041.29	980580.04	18.57	-190.15	-1.25	0.00	97.27	-75.56	-93.63	
jorf	:1018	44 33.96		-121 47.22	6250.0	or	980081.02	980579.77	12.15	-175.65	-1.24	0.00	88.79	-75.95	-93.17	
jorf	:1019	44 33.12		-121 48.12	6280.1	or	980083.21	980578.50	10.84	-176.49	-1.24	0.00	95.07	-71.83	-89.28	
jorf	:1020	44 32.58		-121 48.78	6488.0	or	980060.67	980577.69	15.37	-182.33	-1.25	0.00	92.88	-75.33	-92.92	
jorf	:1021	44 31.68		-121 48.96	5720.0	or	980118.53	980576.33	5.32	-160.75	-1.22	0.00	79.93	-76.71	-93.09	
jorf	:1022	44 27.12		-121 49.68	5223.0	or	980158.31	980569.45	3.43	-146.78	-1.18	0.00	79.89	-64.65	-79.76	
jorf	:1023	44 30.48		-121 48.36	5080.0	or	980163.25	980574.52	4.38	-142.77	-1.17	0.00	66.32	-73.23	-87.82	
jorf	:1024	44 31.86		-121 51.12	4400.1	or	980206.67	980576.60	2.66	-123.66	-1.09	0.00	43.75	-78.33	-91.10	
jorf	:1025	44 35.28		-121 50.04	4983.3	or	980179.70	980581.76	4.92	-140.05	-1.16	0.00	66.44	-69.84	-84.09	
jorf	:1026	44 36.30		-121 46.98	6505.0	or	980066.81	980583.30	15.87	-182.81	-1.25	0.00	95.01	-73.18	-90.77	
jorf	:1027	44 37.74		-121 47.04	6140.1	or	980103.10	980585.47	10.93	-172.56	-1.24	0.00	94.84	-68.03	-85.06	
jorf	:1028	44 38.88		-121 47.58	6920.1	or	980048.49	980587.19	11.13	-194.48	-1.25	0.00	111.79	-72.80	-92.10	
jorf	:1029	44 39.48		-121 47.76	7427.0	or	980012.91	980588.09	16.48	-208.72	-1.24	0.00	122.94	-70.55	-90.77	
jorf	:1030	44 39.66		-121 46.86	7060.1	or	980041.41	980588.37	14.53	-198.41	-1.25	0.00	116.69	-68.43	-87.79	
jorf	:1031	44 41.46		-121 46.14	6967.6	or	980046.99	980591.08	16.43	-195.81	-1.25	0.00	110.87	-69.76	-88.65	
jorf	:1032	44 41.34		-121 47.16	8086.0	or	979964.18	980590.90	26.31	-227.24	-1.21	0.00	133.30	-68.83	-89.97	
jorf	:1033	44 41.52		-121 48.12	8022.0	or	979970.72	980591.17	28.14	-225.44	-1.21	0.00	133.56	-64.95	-85.71	
jorf	:1034	44 40.74		-121 48.90	8479.0	or	979928.07	980589.99	36.98	-238.29	-1.17	0.00	135.02	-67.46	-88.63	
jorf	:1035	44 39.84		-121 48.54	7867.0	or	979990.18	980588.64	23.26	-221.09	-1.22	0.00	140.99	-58.05	-78.86	
jorf	:1036	44 31.92		-121 54.00	4930.0	or	980172.51	980576.70	3.24	-138.55	-1.16	0.00	59.31	-77.16	-91.42	
jorf	:1037	44 34.80		-121 45.84	4680.0	or	980189.16	980581.04	3.91	-131.52	-1.13	0.00	48.13	-80.61	-94.07	
jorf	:1038	44 34.86		-121 47.28	5600.1	or	980136.03	980581.13	6.02	-157.38	-1.21	0.00	81.36	-71.20	-87.15	
jorf	:1039	44 35.76		-121 47.64	6400.1	or	980078.33	980582.48	13.50	-179.86	-1.25	0.00	97.48	-70.13	-87.66	
jorf	:1040	44 37.08		-121 45.42	4760.1	or	980192.16	980584.48	3.88	-133.77	-1.14	0.00	55.21	-75.82	-89.52	
jorf	:1041	44 37.32		-121 48.06	6100.1	or	980109.66	980584.84	5.47	-171.43	-1.24	0.00	98.27	-68.93	-86.41	

BOUGUER GRAVITY DATA

Jefferson gravity
collected summer 1981
Meter ID: g-126 Date: 12/23/82

STATION IDENTIFICATION proj	sta-id	LOCATIONS LATITUDE deg	min	LONGITUDE deg	min	ELE (in ft)	ST	GRAVITY OBSERVED	THEORETICAL	CORRECTIONS TERRAIN	BOUGUER	CURV	SPECIAL	ANOMALIES FREE AIR	COMPLETE-BOUGUER d1=2.20	d2=2.43	SPEC FIELDS
jorf	:j042	44	38.22	-121	48.96	5880.1	or	980124.59	980586.20	6.46	-165.25	-1.23	0.00	91.17	-68.84	-85.57	
jorf	:j043	44	38.64	-121	51.18	5774.0	or	980114.89	980586.83	16.87	-162.27	-1.22	0.00	70.87	-75.75	-91.08	
jorf	:j044	44	28.62	-121	51.18	6077.0	or	980103.63	980571.72	7.13	-170.78	-1.24	0.00	103.20	-61.70	-78.93	
jorf	:j045	44	36.18	-121	49.14	5500.1	or	980145.87	980583.12	5.70	-154.57	-1.20	0.00	79.81	-70.26	-85.95	
jorf	:j046	44	37.02	-121	51.30	4700.1	or	980192.82	980584.38	3.83	-132.09	-1.13	0.00	50.32	-79.07	-92.60	
jorf	:j047	44	37.86	-121	51.84	4740.0	or	980192.75	980585.65	6.05	-133.21	-1.14	0.00	52.74	-75.56	-88.97	
jorf	:j048	44	38.64	-121	51.18	5799.0	or	980113.52	980586.83	17.59	-162.97	-1.22	0.00	71.85	-74.75	-90.08	
jorf	:j051	44	40.86	-121	46.98	8000.1	or	979982.19	980590.18	23.80	-224.83	-1.21	0.00	143.97	-58.27	-79.41	
jorf	:j052	44	40.38	-121	47.88	10400.1	or	979775.17	980589.45	68.36	-292.28	-0.90	0.00	163.10	-61.72	-85.23	
jorf	:j054	44	40.32	-121	48.78	6955.0	or	980040.13	980589.36	27.86	-195.46	-1.25	0.00	104.54	-64.31	-81.96	
jorf	:j055	44	41.52	-121	51.54	3800.0	or	980257.31	980591.17	6.43	-106.79	-1.01	0.00	23.43	-77.95	-88.55	
jorf	:j056	44	42.12	-121	50.22	4973.0	or	980190.33	980592.08	6.64	-139.76	-1.16	0.00	65.78	-68.50	-82.53	
jorf	:j057	44	42.45	-121	47.90	5710.1	or	980142.40	980592.58	10.29	-160.47	-1.22	0.00	86.62	-64.78	-80.61	
jorf	:j058	44	43.74	-121	49.62	5720.1	or	980137.42	980594.52	8.05	-160.75	-1.22	0.00	80.64	-73.28	-89.37	
jorf	:j059	44	35.22	-121	40.80	3199.8	or	980279.35	980581.67	2.21	-89.93	-0.90	0.00	-1.45	-90.07	-99.33	
jorf	:j060	44	36.66	-121	44.16	5676.7	or	980126.47	980583.84	10.70	-159.53	-1.22	0.00	76.29	-73.75	-89.44	
jorf	:j062	44	43.08	-121	42.00	6110.0	or	980100.86	980593.52	19.95	-171.71	-1.24	0.00	81.71	-71.29	-87.28	
jorf	:j063	44	44.34	-121	39.06	4358.0	or	980230.30	980595.42	2.99	-122.47	-1.09	0.00	44.60	-75.97	-88.58	
jorf	:j064	44	43.38	-121	45.78	6708.0	or	980061.41	980593.98	17.70	-188.52	-1.25	0.00	98.00	-74.07	-92.05	
jorf	:j065	44	43.26	-121	46.86	6702.0	or	980067.19	980593.80	16.15	-188.35	-1.25	0.00	103.39	-70.06	-88.19	
jorf	:j066	44	43.74	-121	48.18	7018.0	or	980049.66	980594.52	15.86	-197.23	-1.25	0.00	114.84	-67.78	-86.87	
jorf	:j067	44	45.24	-121	48.36	6322.0	or	980099.86	980596.78	13.52	-177.67	-1.24	0.00	97.37	-68.02	-85.31	
jorf	:j068	44	45.00	-121	50.94	6043.0	or	980113.99	980596.42	15.87	-169.83	-1.23	0.00	85.65	-69.54	-85.76	
jorf	:j069	44	46.02	-121	51.12	4880.0	or	980203.34	980597.96	6.48	-137.15	-1.15	0.00	64.18	-67.63	-81.41	
jorf	:j070	44	45.66	-121	52.56	4852.0	or	980204.44	980597.41	4.70	-136.36	-1.15	0.00	63.18	-69.62	-83.50	
jorf	:j071	44	46.56	-121	53.28	4482.0	or	980227.11	980598.77	3.95	-125.96	-1.10	0.00	49.72	-73.40	-86.27	
jorf	:j072	44	43.50	-121	53.82	5251.0	or	980164.21	980594.16	13.32	-147.57	-1.19	0.00	63.71	-71.72	-85.88	
jorf	:j073	44	27.90	-121	51.84	5699.7	or	980122.55	980570.63	4.37	-160.18	-1.22	0.00	87.75	-69.29	-85.70	
jorf	:j074	44	27.84	-121	48.84	5402.0	or	980148.15	980570.54	5.74	-151.81	-1.20	0.00	85.46	-61.81	-77.21	