INFORMATION CIRCULAR 42

A GRAVITY SURVEY OF THE SOUTH–CENTRAL GEORGIA PIEDMONT

by

Robert H. Carpenter and Preston Prather

THE GEOLOGICAL SURVEY OF GEORGIA

DEPARTMENT OF MINES, MINING AND GEOLOGY

Jesse H. Auvil, Jr.
State Geologist and Director

ATLANTA

1971

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ILLUSTRATIONS

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Robert H. Carpenter[1] and Preston Prather[2]

ABSTRACT

A gravity survey of a 1000 square mile area (210 gravity stations) in the south-central Georgia Piedmont defines in considerable detail a segment of a major gravity anomaly that extends along the Appalachians from Alabama to Vermont. The major feature is a northeast-trending gravity ridge with a steep negative northwest gradient which averages about 2 mgal/mile. Superimposed on the ridge is a pronounced positive anomaly with an amplitude of 20 mgals and a diameter of approximately 12 miles.

The anomaly is interpreted to reflect the subsurface distribution of diorite, gabbro, and norite intrusives. Small bodies of these rocks exposed at the surface are probably apophyses from much larger intrusive bodies at depth.

INTRODUCTION

This report describes a gravity survey of an area of approximately 1000 square miles in the south-central Georgia Piedmont. Bouguer anomaly values are reported for 210 stations in Butts, Jasper, Putnam, Jones, Bibb, and Monroe Counties (Figure 1).

Previously, Carpenter and Hughes (1970) described a detailed gravity survey in southern Jasper County in the vicinity of the Gladesville Norite. Disclosure of a pronounced gravity gradient suggested that exposed mafic intrusives in the area were probably apophyses from a large mafic intrusive at depth.

The present study was undertaken to obtain closure on the indicated positive anomaly and to determine the subsurface distribution of dense mafic rocks which appear to account for the anomalous positive Bouguer values in this area.

ACKNOWLEDGMENTS

The authors would like to express their appreciation to the Georgia Department of Mines, Mining and Geology for providing financial support for this investigation and to Mr. R. W. Johnson, Jr., of the Geologic Branch, Tennessee Valley Authority, for assistance in arranging for computer analysis of the gravity data on the TVA computer.

METHOD OF STUDY

A LaCoste and Romberg Model G geodetic gravity meter was utilized in measurement of gravitational acceleration. The instrument has a reading accuracy of ±0.01 milligals and a drift rate normally less than 1 milligal/month.

All measurements are relative to a base station established by the Coast and Geodetic Survey in the town square of Monticello, Georgia. The value reported for this station is 979563.00 milligals (written communication, J. A. Kozlosky). A secondary base station was established at station 5061 in eastern Monroe County. During field operation, base stations were reoccupied every 3 or 4 hours to determine the rate of instrumental and diurnal drift. Observed gravity values are corrected for drift and are estimated to be accurate to ±0.03 milligals. For the computer programs, the value is rounded off to the nearest 0.1 milligal.

Sites selected for measurement are separated by distances normally less than 2 miles. The sites are either at bench marks or at road intersections where elevations are presented on the topographic maps published by the U. S. Geological Survey. The maximum uncertainty in elevation is probably ±4 feet at road intersections and the corresponding maximum error in Bouguer anomaly values is about .24 milligals.

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[1] Dr. Carpenter is Associate Professor of Geology, University of Georgia.

[2] Mr. Prather was a candidate for Masters degree, Department of Geology, University of Georgia.

Figure 1. Location Map of Area Studied

Bouguer values were calculated for each station on the Tennessee Valley Authority IBM 360/50 computer utilizing a program developed at the University of Wisconsin. The basic equation involved in the calculation is:

Bouguer anomaly = Obs. Gravity - (theoretical gravity + free air correction - Bouguer correction)

Observed gravity is the measured value corrected for drift and related to a station for which the absolute gravity has been determined.

Theoretical gravity is the calculated gravity at sea level for any particular latitude according to the International Gravity Formula of 1930. This formula is:

Theoretical gravity = $978.049\ (1 + 0.0052884 \sin^2 w - 0.0000059 \sin^2 w)$ where w is the latitude in degrees.

Both the free air correction and the Bouguer correction are elevation-dependent terms. The free air correction compensates for the vertical distance a gravity station stands above sea level. The correction is 0.09406 milligals/foot. The Bouguer correction compensates for the effect of the rock lying between the land surface and sea level. This correction requires an assumption of the density of the rock mass. The formula for the Bouguer correction is:

$$\text{Bouguer correction} = 2\pi G\delta h$$

Where G = Gravitational Constant,
δ = density, and
h = Elevation.

From the above discussion, it is apparent that the principal facts necessary for computation of Bouguer anomaly values are: observed gravity, latitude, and elevation. This information is summarized on the computer print-out (Appendix A), as well as Bouguer anomaly values calculated for the following assumed densities: 2.20, 2.35, 2.50, 2.67, 2.75, and 2.85.

Results

A Bouguer anomaly map of the study area is shown in Plate 1 for an assumed density of 2.67 gm/cc. A striking feature of the map is the pronounced gravity gradient along the western edge of a northeast trending gravity high. In a distance of only 26 miles, values range from -32.0 milligals for station 5110 in the northwest to +38.2 milligals for station 5009 on the positive closure at the Jones-Jasper County boundary. This amounts to a total variation of 70.2 milligals or 2.7 milligals/mile.

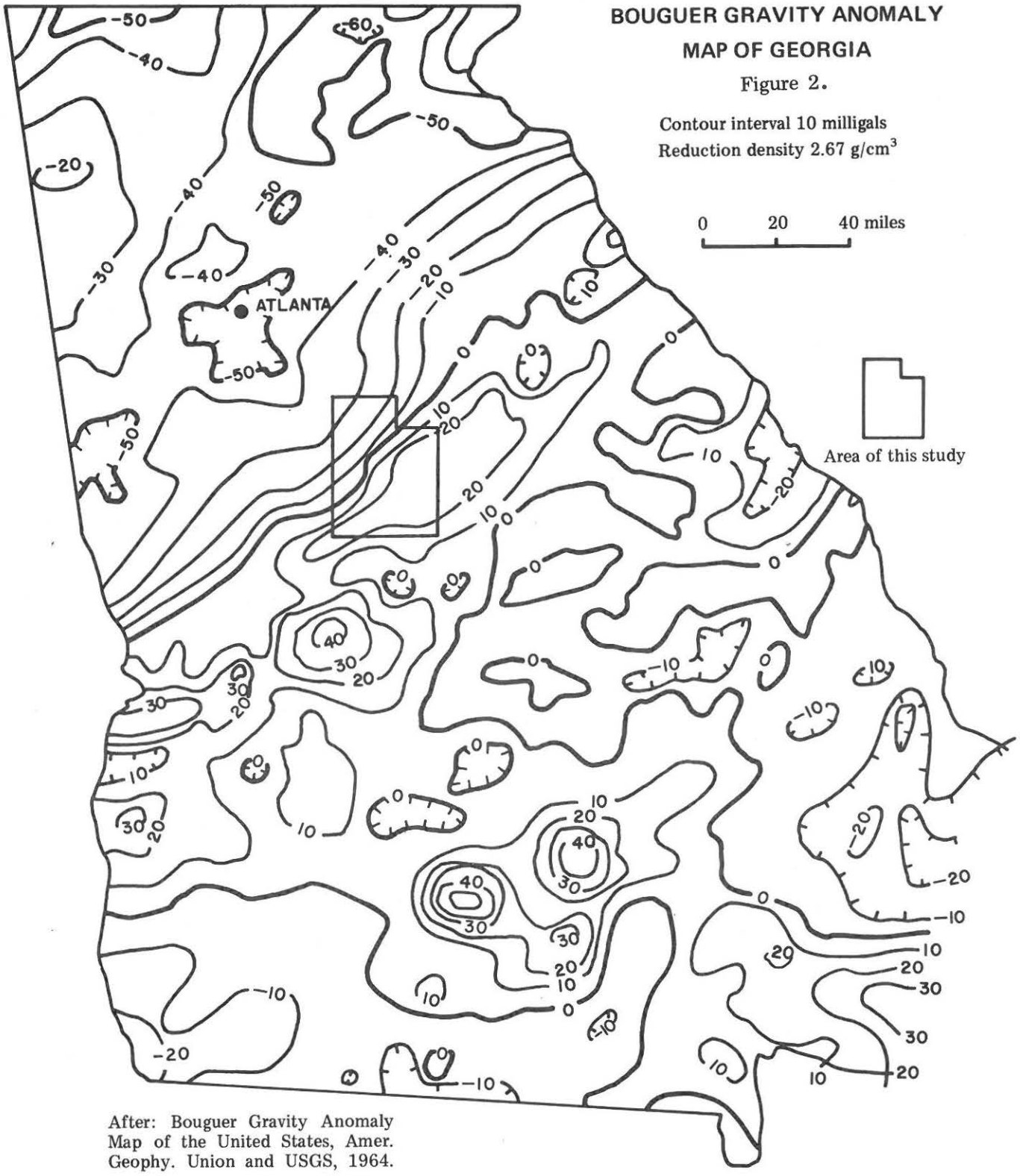
There are some relationships between features on the gravity map and major geological features shown on the Geologic Map of Georgia (1939) (Figure 2). The unit mapped as Hornblende Gneiss and described by the statement, "includes diorite gneiss, gabbro, and injection gneiss," underlies the gradient northwest of the central gravity ridge. The axis of the gravity ridge corresponds reasonably well with the eastern boundary of the hornblende gneiss unit in the eastern portion of the study area. However, the hornblende gneiss unit is shown to terminate east of Forsyth even though the gravity ridge extends southwest of the terminus. The decrease in gradient between the 0 and +20 milligal contours in northeastern Monroe County possibly reflects the southern termination of the hornblende gneiss as shown on the Geologic Map of Georgia.

Along the crest of the gravity ridge in central Jones County, the gravity surface is relatively flat. Two weak gravity lows are present on the ridge southwest of Gray. These features appear to be related to the outcrop of a granitic intrusive shown on the Geologic Map of Georgia (1939).

Known norite occurrences lie in a rather restricted zone which parallels the isogal contours. The relationship is probably not fortuitous as the isogal contours bend away from the northeast regional strike. The Gladesville Norite, mapped by Matthews (1967) in southwestern Jasper County, occurs between the +8 and +16 milligal contours. Three other norites have been mapped by Prather (M. S. Thesis, Univ. of Georgia, in preparation) in northeastern Monroe County. These lie between the +4 and +16 milligal contours.

CONCLUSIONS

The gravity ridge with the steep western gradient is probably a part of a long, more or less continuous, gravity anomaly that extends from Vermont to Alabama (Figure 3). The gravity pattern determined in the present study is virtually identical to



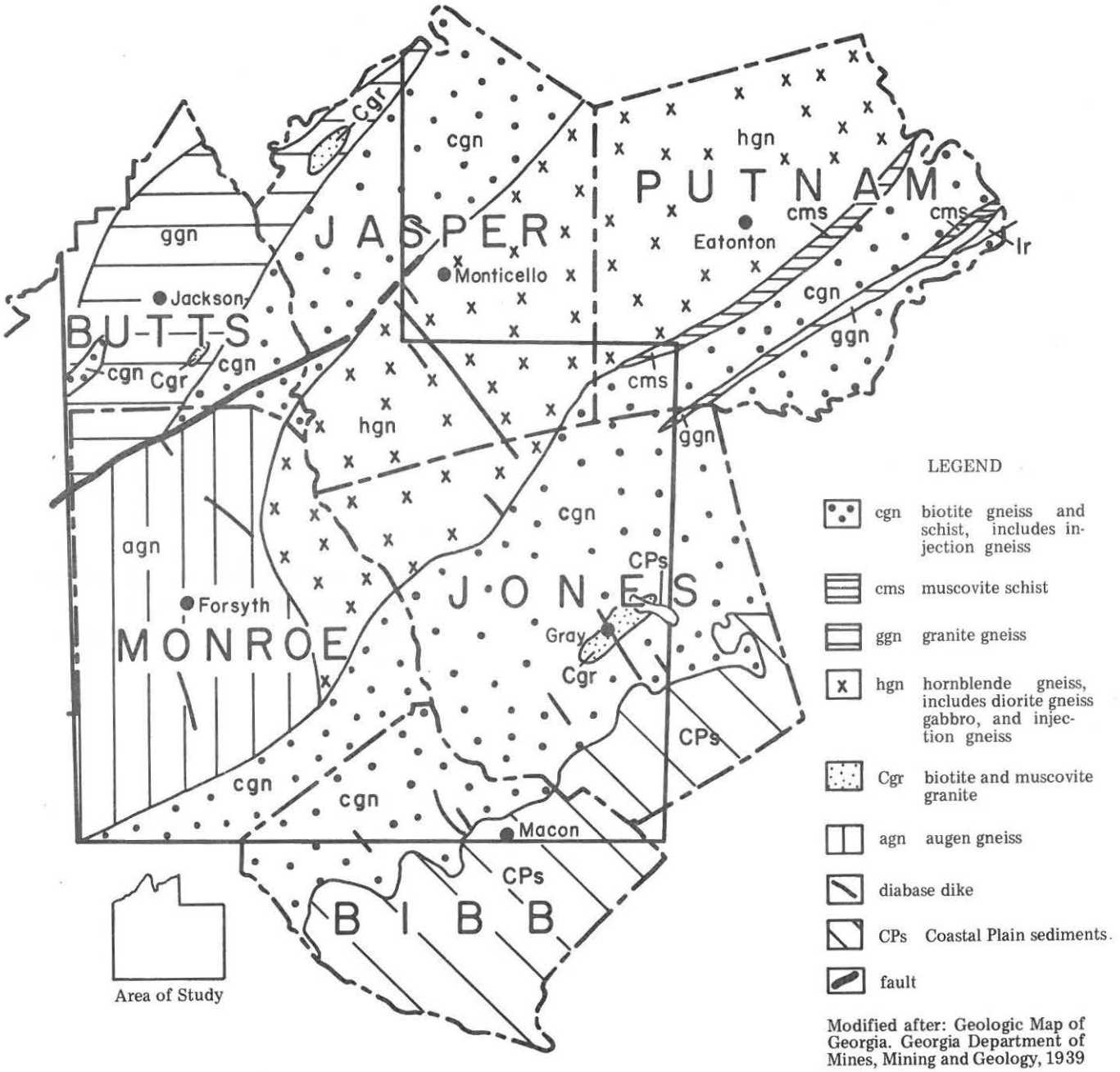
BOUGUER GRAVITY ANOMALY MAP OF GEORGIA

Figure 2.

Contour interval 10 milligals
Reduction density 2.67 g/cm^3

After: Bouguer Gravity Anomaly Map of the United States, Amer. Geophy. Union and USGS, 1964.

Figure 3. GENERALIZED GEOLOGIC MAP OF THE STUDY AREA



Modified after: Geologic Map of Georgia. Georgia Department of Mines, Mining and Geology, 1939

that determined by Mann (1962) and Best and others (1970) in portions of the Piedmont of North Carolina. Based on a model analysis of the gradient near Lexington, North Carolina, Best and others (1970) determined that the best model was represented by a mass 50,000 feet thick, with a density contrast of 0.28 gm/cc. The top of the mass is estimated to be within 2000 feet of the surface. Preliminary model analysis of the gravity data in the south-central Piedmont of Georgia suggests a similar subsurface distribution of anomalously dense rocks.

Basic intrusives of the diorite-gabbro-norite association commonly occur along the Piedmont gravity high in the eastern United States. However, even the largest of these intrusives is too small to account for the magnitude of the observed gravity anomaly. The most probable explanation is that the anomaly reflects a more or less continuous mafic intrusive originating in the mantle or lower crust and extending upward to within a few thousand feet of the present erosional surface. Small mafic intrusives occurring along the gravity high probably represent apophyses from the parent intrusive at depth.

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APPENDIX A

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5001	33 14.10	83 37.40	621	979.5839	979.5978	-83.6233333	33.2350000	44.5	27.0	25.8	24.7	23.3	22.7	21.9
T5002	33 14.80	83 36.70	636	979.5825	979.5988	-83.6116667	33.2466667	43.5	25.7	24.4	23.2	21.9	21.2	20.4
T5003	33 14.70	83 35.90	630	979.5838	979.5987	-83.5983333	33.2450000	44.4	26.7	25.5	24.3	22.9	22.3	21.5
T5004	33 13.20	83 34.40	556	979.5916	979.5966	-83.5733333	33.2200000	47.3	31.7	30.6	29.6	28.4	27.8	27.1
T5005	33 14.30	83 33.80	634	979.5858	979.5981	-83.5633333	33.2383333	47.3	29.5	28.3	27.1	25.7	25.1	24.3
T5006	33 14.60	83 33.30	615	979.5854	979.5985	-83.5550000	33.2433333	44.7	27.5	26.3	25.1	23.8	23.1	22.3
T5007	33 14.70	83 30.50	585	979.5865	979.5987	-83.5083333	33.2450000	42.9	26.4	25.3	24.2	22.9	22.3	21.6
T5008	33 13.40	83 30.10	621	979.5861	979.5969	-83.5016667	33.2233333	47.6	30.2	29.0	27.8	26.5	25.8	25.0
T5009	33 10.70	83 35.70	572	979.5971	979.5932	-83.5950000	33.1783333	57.7	41.7	40.6	39.5	38.3	37.7	36.9
T5010	33 11.20	83 37.40	626	979.5878	979.5939	-83.6233333	33.1866667	52.8	35.3	34.1	32.9	31.5	30.9	30.1
T5011	33 13.20	83 36.40	559	979.5904	979.5966	-83.6066667	33.2200000	46.4	30.7	29.6	28.5	27.3	26.8	26.0
T5012	33 10.20	83 34.00	505	979.5998	979.5925	-83.5666667	33.1700000	54.8	40.6	39.7	38.7	37.6	37.1	36.5
T5013	33 10.50	83 31.60	579	979.5846	979.5929	-83.5266667	33.1750000	46.2	29.9	28.8	27.7	26.5	25.9	25.1
T5014	33 11.20	83 31.50	598	979.5845	979.5939	-83.5250000	33.1866667	46.9	30.1	29.0	27.8	26.5	25.9	25.1
T5015	33 11.90	83 31.90	590	979.5864	979.5948	-83.5316667	33.1983333	47.1	30.5	29.4	28.3	27.0	26.4	25.6
T5016	33 8.70	83 31.30	482	979.5901	979.5904	-83.5216667	33.1450000	45.0	31.5	30.6	29.6	28.6	28.1	27.5
T5017	33 9.10	83 35.60	489	979.5986	979.5910	-83.5933333	33.1516667	53.6	39.9	39.0	38.0	37.0	36.5	35.8
T5018	33 8.10	83 34.20	602	979.5851	979.5896	-83.5700000	33.1350000	52.1	35.2	34.1	32.9	31.6	31.0	30.2
T5019	33 7.30	83 31.70	463	979.5881	979.5885	-83.5283333	33.1216667	43.2	30.2	29.3	28.4	27.4	26.9	26.3
T5020	33 5.80	83 30.00	571	979.5763	979.5864	-83.5000000	33.0966667	43.6	27.6	26.5	25.4	24.1	23.5	22.8
T5021	33 3.20	83 30.30	548	979.5721	979.5829	-83.5050000	33.0533333	40.8	25.4	24.4	23.3	22.1	21.6	20.9
T5022	33 0.60	83 32.00	603	979.5652	979.5793	-83.5333333	33.0100000	42.6	25.7	24.5	23.4	22.1	21.5	20.7
T5023	33 1.90	83 32.30	623	979.5659	979.5811	-83.5383333	33.0316667	43.4	25.9	24.7	23.6	22.2	21.6	20.8
T5024	33 3.20	83 33.50	624	979.5689	979.5829	-83.5583333	33.0533333	44.7	27.2	26.0	24.8	23.5	22.8	22.0
T5025	33 4.10	83 32.10	633	979.5706	979.5841	-83.5350000	33.0683333	46.0	28.3	27.1	25.9	24.5	23.8	23.0
T5026	33 5.00	83 33.20	580	979.5778	979.5853	-83.5533333	33.0833333	47.0	30.7	29.6	28.5	27.3	26.7	25.9
T5027	33 6.00	83 34.10	456	979.5861	979.5867	-83.5683333	33.1000000	42.3	29.5	28.6	27.7	26.8	26.3	25.7
T5028	33 9.60	83 37.30	499	979.5957	979.5917	-83.6216667	33.1600000	51.0	37.0	36.0	35.1	34.0	33.5	32.8
T5029	33 7.60	83 36.80	614	979.5839	979.5889	-83.6133333	33.1266667	52.8	35.5	34.3	33.2	31.8	31.2	30.4

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5030	33 7.40	83 35.60	626	979.5800	979.5886	-83.5933333	33.1233333	50.3	32.7	31.5	30.3	28.9	28.3	27.5
T5031	33 6.10	83 37.00	630	979.5725	979.5868	-83.6166667	33.1016667	44.9	27.2	26.0	24.8	23.5	22.8	22.0
T5032	33 5.10	83 35.60	601	979.5740	979.5855	-83.5933333	33.0850000	45.1	28.2	27.0	25.9	24.6	24.0	23.2
T5033	33 3.70	83 36.90	621	979.5702	979.5835	-83.6150000	33.0616667	45.1	27.6	26.4	25.3	23.9	23.3	22.5
T5034	33 1.50	83 34.40	545	979.5694	979.5805	-83.5733333	33.0250000	40.1	24.8	23.8	22.8	21.6	21.0	20.3
T5035	33 1.00	83 36.20	477	979.5703	979.5798	-83.6033333	33.0166667	35.3	21.9	21.0	20.1	19.1	18.6	18.0
T5036	33 2.50	83 35.50	603	979.5676	979.5819	-83.5916667	33.0416667	42.4	25.5	24.3	23.2	21.9	21.3	20.5
T5037	33 18.80	83 45.60	693	979.5534	979.6043	-83.7600000	33.3133333	14.3	-5.2	-6.5	-7.8	-9.3	-10.1	-10.9
T5038	33 18.70	83 48.40	656	979.5507	979.6042	-83.8066667	33.3116667	8.2	-10.2	-11.5	-12.7	-14.1	-14.8	-15.6
T5039	33 18.50	83 50.60	533	979.5525	979.6039	-83.8433333	33.3083333	-1.3	-16.2	-17.3	-18.3	-19.4	-20.0	-20.7
T5040	33 20.50	83 52.20	571	979.5460	979.6067	-83.8700000	33.3416667	-7.0	-23.0	-24.1	-25.2	-26.4	-27.0	-27.7
T5041	33 17.60	83 52.40	647	979.5423	979.6027	-83.8733333	33.2933333	0.5	-17.7	-18.9	-20.1	-21.5	-22.2	-23.0
T5042	33 15.80	83 51.80	585	979.5492	979.6002	-83.8633333	33.2633333	4.0	-12.4	-13.5	-14.6	-15.9	-16.5	-17.2
T5043	33 20.70	83 45.30	728	979.5502	979.6069	-83.7550000	33.3450000	11.7	-8.7	-10.1	-11.5	-13.1	-13.8	-14.7
T5044	33 22.10	83 45.30	716	979.5494	979.6089	-83.7550000	33.3683333	7.9	-12.2	-13.6	-15.0	-16.5	-17.2	-18.2
T5045a	33 22.30	83 48.70	630	979.5484	979.6091	-83.8116667	33.3716667	-1.5	-19.2	-20.4	-21.6	-22.9	-23.6	-24.4
T5045b	33 21.00	83 50.70	585	979.5462	979.6074	-83.8450000	33.3500000	-6.1	-22.5	-23.7	-24.8	-26.1	-26.7	-27.4
T5046	33 20.70	83 48.70	480	979.5588	979.6069	-83.8116667	33.3450000	-3.0	-16.5	-17.4	-18.3	-19.3	-19.8	-20.4
T5047	33 16.70	83 49.40	543	979.5563	979.6014	-83.8233333	33.2783333	6.0	-9.3	-10.3	-11.4	-12.5	-13.1	-13.8
T5048	33 15.60	83 48.40	493	979.5616	979.5999	-83.8066667	33.2600000	8.1	-5.8	-6.7	-7.7	-8.7	-9.2	-9.9
T5059	33 16.60	83 47.10	524	979.5618	979.6013	-83.7850000	33.2766667	9.8	-4.9	-5.9	-6.9	-8.0	-8.6	-9.3
T5060	33 16.20	83 45.80	496	979.5665	979.6007	-83.7633333	33.2700000	12.4	-1.5	-2.5	-3.4	-4.5	-5.0	-5.6
T5061	33 1.40	83 44.70	363	979.5801	979.5804	-83.7450000	33.0233333	33.9	23.7	23.0	22.3	21.5	21.1	20.7
T5062	33 0.80	83 42.10	531	979.5689	979.5796	-83.7016667	33.0133333	39.3	24.4	23.4	22.3	21.2	20.7	20.0
T5063	33 0.30	83 37.90	438	979.5748	979.5789	-83.6316667	33.0050000	37.1	24.8	24.0	23.2	22.2	21.8	21.2
T5064	33 1.20	83 39.50	582	979.5666	979.5801	-83.6583333	33.0200000	41.2	24.9	23.8	22.7	21.4	20.8	20.1
T5065	33 3.00	83 38.20	560	979.5721	979.5826	-83.6366667	33.0500000	42.2	26.5	25.4	24.3	23.1	22.5	21.8
T5066	33 3.70	83 40.50	566	979.5722	979.5835	-83.6750000	33.0616667	41.9	26.0	24.9	23.8	22.6	22.0	21.3
T5204	33 2.90	83 41.50	451	979.5784	979.5824	-83.6916667	33.0483333	38.4	25.7	24.9	24.0	23.0	22.6	22.0

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5205	33 2.90	83 42.80	437	979.5773	979.5824	-83.7133333	33.0483333	36.0	23.7	22.9	22.0	21.1	20.6	20.1
T5206	33 5.30	83 44.50	528	979.5768	979.5857	-83.7416667	33.0883333	40.7	25.9	24.9	23.9	22.7	22.2	21.5
T5207	33 3.90	83 43.70	479	979.5776	979.5838	-83.7283333	33.0650000	38.8	25.4	24.5	23.6	22.5	22.0	21.4
T5208	33 5.10	83 40.10	585	979.5739	979.5855	-83.6683333	33.0850000	43.5	27.0	25.9	24.8	23.5	22.9	22.2
T5209	33 6.90	83 40.60	465	979.5895	979.5879	-83.6766667	33.1150000	45.3	32.2	31.4	30.5	29.5	29.0	28.4
T5210	33 6.70	83 38.90	595	979.5782	979.5877	-83.6483333	33.1116667	46.5	29.8	28.7	27.5	26.2	25.6	24.9
T5211	33 5.70	83 42.50	512	979.5802	979.5863	-83.7083333	33.0950000	42.1	27.7	26.7	25.7	24.6	24.1	23.4
T5212	33 7.20	83 44.70	427	979.5831	979.5884	-83.7450000	33.1200000	34.9	22.9	22.1	21.3	20.4	19.9	19.4
T5067	32 58.80	83 36.50	498	979.5687	979.5768	-83.6083333	32.9800000	38.7	24.7	23.8	22.8	21.8	21.3	20.6
T5069	32 56.60	83 36.40	490	979.5646	979.5738	-83.6066667	32.9433333	36.9	23.1	22.2	21.3	20.2	19.7	19.1
T5070	32 54.80	83 36.50	391	979.5643	979.5713	-83.6083333	32.9133333	29.7	18.8	18.0	17.3	16.4	16.0	15.5
T5071	32 53.40	83 36.10	496	979.5546	979.5694	-83.6016667	32.8900000	31.8	17.9	17.0	16.0	14.9	14.4	13.8
T5072	32 52.60	83 34.70	408	979.5577	979.5683	-83.5783333	32.8766667	27.8	16.3	15.5	14.7	13.9	13.4	12.9
T5073	32 54.00	83 31.50	658	979.5436	979.5702	-83.5250000	32.9000000	35.3	16.8	15.5	14.3	12.8	12.2	11.3
T5074	32 55.80	83 30.10	530	979.5584	979.5727	-83.5016667	32.9300000	35.5	20.7	19.7	18.6	17.5	17.0	16.3
T5075	32 54.20	83 33.90	509	979.5570	979.5705	-83.5650000	32.9033333	34.4	20.1	19.1	18.1	17.0	16.5	15.9
T5076	32 55.90	83 33.70	410	979.5654	979.5728	-83.5616667	32.9316667	31.1	19.6	18.8	18.0	17.2	16.7	16.2
T5077	32 57.20	83 32.60	555	979.5584	979.5746	-83.5433333	32.9533333	36.0	20.4	19.3	18.3	17.1	16.5	15.8
T5078	32 58.80	83 32.80	606	979.5605	979.5768	-83.5466667	32.9800000	40.7	23.7	22.5	21.4	20.0	19.4	18.6
T5079	32 59.80	83 37.40	443	979.5727	979.5782	-83.6233333	32.9966667	36.2	23.7	22.9	22.0	21.1	20.6	20.1
T5080	32 59.90	83 34.20	539	979.5675	979.5783	-83.5700000	32.9983333	39.9	24.7	23.7	22.7	21.5	21.0	20.3
T5081	32 59.50	83 30.20	511	979.5656	979.5778	-83.5033333	32.9916667	35.9	21.5	20.6	19.6	18.5	18.0	17.3
T5082	32 58.10	83 34.90	492	979.5675	979.5759	-83.5816667	32.9683333	37.9	24.1	23.2	22.2	21.2	20.7	20.0
T5083	32 59.70	83 39.40	554	979.5653	979.5781	-83.6566667	32.9950000	39.4	23.8	22.7	21.7	20.5	19.9	19.2
T5084	32 58.90	83 39.80	480	979.5637	979.5770	-83.6633333	32.9816667	31.9	18.4	17.5	16.6	15.5	15.1	14.4
T5085	32 58.10	83 38.50	544	979.5648	979.5759	-83.6416667	32.9683333	40.1	24.8	23.8	22.8	21.6	21.0	20.3
T5086	32 52.90	83 37.70	489	979.5533	979.5687	-83.6283333	32.8816667	30.6	15.6	15.9	15.0	13.9	13.4	12.8
T5087	32 54.30	83 39.60	311	979.5683	979.5706	-83.6600000	32.9050000	26.9	18.2	17.6	17.0	16.3	16.0	15.6
T5088	32 54.00	83 38.10	503	979.5555	979.5702	-83.6350000	32.9000000	32.6	18.5	17.5	16.5	15.4	14.9	14.3

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5089	32 55.30	83 38.40	468	979.5624	979.5720	-83.6400000	32.9216667	34.4	21.3	20.4	19.5	18.5	18.0	17.4
T5090	32 56.70	83 38.80	546	979.5630	979.5739	-83.6466667	32.9450000	40.4	25.1	24.0	23.0	21.8	21.3	20.6
T5091	32 58.20	83 39.90	604	979.5615	979.5760	-83.6650000	32.9700000	42.3	25.4	24.2	23.1	21.7	21.1	20.4
T5092	32 59.30	83 44.30	430	979.5734	979.5775	-83.7383333	32.9883333	36.3	24.3	23.4	22.6	21.7	21.3	20.7
T5093	32 55.80	83 42.20	339	979.5731	979.5727	-83.7033333	32.9300000	32.3	22.8	22.1	21.5	20.7	20.4	20.0
T5094	32 52.60	83 40.00	345	979.5615	979.5683	-83.6666667	32.8766667	25.6	15.9	15.3	14.6	13.9	13.5	13.1
T5095	33 14.90	83 47.50	526	979.5613	979.5989	-83.7916667	33.2483333	11.8	-2.9	-3.9	-4.9	-6.1	-6.6	-7.3
T5096	33 14.60	83 45.60	635	979.5638	979.5985	-83.7600000	33.2433333	25.0	7.2	6.0	4.7	3.4	2.7	1.9
T5097	33 14.00	83 46.40	641	979.5615	979.5977	-83.7733333	33.2333333	24.1	6.1	4.9	3.6	2.3	1.6	0.8
T5098	33 13.50	83 48.50	510	979.5604	979.5970	-83.8083333	33.2250000	11.4	-3.0	-3.9	-4.9	-6.0	-6.5	-7.2
T5099	33 12.70	83 49.10	517	979.5581	979.5959	-83.8183333	33.2116667	10.8	-3.7	-4.7	-5.7	-6.8	-7.3	-8.0
T5100	33 12.50	83 48.70	525	979.5620	979.5956	-83.8116667	33.2083333	15.7	1.0	-0.0	-1.0	-2.1	-2.7	-3.4
T5101	33 11.80	83 47.60	415	979.5745	979.5947	-83.7933333	33.1966667	18.9	7.2	6.4	5.6	4.7	4.3	3.8
T5102	33 11.40	83 46.80	500	979.5774	979.5941	-83.7800000	33.1900000	30.3	16.3	15.3	14.4	13.3	12.8	12.1
T5103	33 10.20	83 46.70	601	979.5699	979.5925	-83.7783333	33.1700000	34.0	17.1	15.9	14.8	13.5	12.9	12.1
T5104	33 9.20	83 46.50	509	979.5764	979.5911	-83.7750000	33.1533333	33.2	18.9	17.9	16.9	15.8	15.3	14.7
T5105	33 17.00	83 52.80	670	979.5396	979.6018	-83.8800000	33.2833333	0.8	-18.0	-19.3	-20.6	-22.0	-22.7	-23.6
T5106	33 15.60	83 53.80	605	979.5437	979.5999	-83.8966667	33.2600000	0.7	-16.3	-17.4	-18.6	-19.9	-20.5	-21.3
T5107	33 15.40	83 58.00	646	979.5348	979.5996	-83.9666667	33.2566667	-4.1	-22.2	-23.4	-24.7	-26.1	-26.7	-27.6
T5108	33 16.00	83 59.40	701	979.5309	979.6005	-83.9900000	33.2666667	-3.6	-23.3	-24.6	-26.0	-27.5	-28.2	-29.1
T5109	33 18.40	83 58.90	683	979.5351	979.6038	-83.9816667	33.3066667	-4.4	-23.6	-24.9	-26.2	-27.7	-28.4	-29.3
T5120	33 20.80	83 59.60	657	979.5357	979.6071	-83.9933333	33.3466667	-9.6	-28.0	-29.3	-30.5	-32.0	-32.6	-33.5
T5121	33 21.60	83 53.90	616	979.5400	979.6082	-83.8983333	33.3600000	-10.2	-27.5	-28.7	-29.9	-31.2	-31.9	-32.6
T5112	33 21.20	83 56.20	688	979.5377	979.6076	-83.9366667	33.3533333	-5.2	-24.5	-25.8	-27.2	-28.6	-29.4	-30.2
T5113	33 22.20	83 54.90	541	979.5480	979.6090	-83.9150000	33.3700000	-10.1	-25.3	-26.3	-27.4	-28.5	-29.1	-29.8
T5114	33 21.60	83 53.00	586	979.5449	979.6082	-83.8833333	33.3600000	-8.2	-24.6	-25.7	-26.9	-28.1	-28.7	-29.5
T5115	33 15.80	83 56.10	613	979.5399	979.6002	-83.9350000	33.2633333	-2.6	-19.8	-21.0	-22.2	-23.5	-24.1	-24.9
T5116	33 17.20	83 56.10	715	979.5333	979.6021	-83.9350000	33.2866667	-1.6	-21.6	-23.0	-24.4	-25.9	-26.6	-27.6
T5117	33 18.40	83 54.30	631	979.5405	979.6038	-83.9050000	33.3066667	-3.9	-21.6	-22.8	-24.0	-25.4	-26.1	-26.9

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5118	33 18.90	83 56.50	608	979.5410	979.6045	-83.9416667	33.3150000	-6.3	-23.3	-24.5	-25.7	-27.0	-27.6	-28.4
T5119	33 20.00	83 57.90	723	979.5345	979.6060	-83.9650000	33.3333333	-3.5	-23.8	-25.2	-26.5	-28.1	-28.8	-29.8
T5120	33 19.70	83 52.90	638	979.5412	979.6056	-83.8816667	33.3283333	-4.3	-22.3	-23.5	-24.7	-26.1	-26.7	-27.6
T5121	33 14.70	83 43.30	633	979.5715	979.5987	-83.7216667	33.2450000	32.4	14.6	13.4	12.2	10.8	10.2	9.3
T5122	33 14.70	83 40.90	652	979.5750	979.5987	-83.6816667	33.2450000	37.7	19.4	18.1	16.9	15.5	14.8	13.9
T5123	33 14.10	83 39.00	567	979.5862	979.5978	-83.6500000	33.2350000	41.7	25.8	24.7	23.6	22.4	21.8	21.1
T5124	33 13.40	83 40.40	660	979.5791	979.5969	-83.6733333	33.2233333	44.3	25.8	24.5	23.2	21.8	21.1	20.3
T5125a	33 13.30	83 44.80	596	979.5754	979.5967	-83.7466667	33.2216667	34.7	18.0	16.8	15.7	14.4	13.8	13.0
T5125b	33 12.40	83 42.70	612	979.5773	979.5955	-83.7116667	33.2066667	39.4	22.2	21.0	19.8	18.5	17.9	17.1
T5126	33 12.60	83 39.80	626	979.5833	979.5958	-83.6633333	33.2100000	46.4	28.8	27.6	26.4	25.1	24.4	23.6
T5127	33 12.00	83 38.20	584	979.5876	979.5950	-83.6366667	33.2000000	47.6	31.2	30.1	28.9	27.7	27.1	26.3
T5128	33 11.80	83 41.30	494	979.5890	979.5947	-83.6883333	33.1966667	40.8	26.9	26.0	25.0	24.0	23.5	22.8
T5129	33 11.60	83 44.70	605	979.5737	979.5944	-83.7450000	33.1933333	36.2	19.2	18.1	16.9	15.6	15.0	14.2
T5130	33 10.90	83 44.30	558	979.5793	979.5934	-83.7383333	33.1816667	38.3	22.7	21.6	20.5	19.3	18.8	18.1
T5131	33 10.80	83 42.90	538	979.5861	979.5933	-83.7150000	33.1800000	43.4	28.3	27.3	26.2	25.1	24.5	23.6
T5132	33 10.00	83 39.80	600	979.5841	979.5922	-83.6633333	33.1666667	48.3	31.5	30.3	29.2	27.9	27.3	26.5
T5133	33 10.30	83 38.90	616	979.5858	979.5926	-83.6483333	33.1716667	51.1	33.8	32.7	31.5	30.1	29.5	28.7
T5134a	33 8.90	83 40.80	593	979.5818	979.5907	-83.6800000	33.1483333	46.9	30.2	29.1	28.0	26.7	26.1	25.3
T5134b	33 9.50	83 44.10	524	979.5813	979.5915	-83.7350000	33.1583333	39.1	24.4	23.4	22.4	21.2	20.7	20.0
T5135	33 7.80	83 43.70	527	979.5829	979.5892	-83.7283333	33.1300000	43.3	28.5	27.5	26.5	25.3	24.8	24.1
T5136	33 7.70	83 37.80	612	979.5834	979.5890	-83.6300000	33.1283333	51.9	34.7	33.6	32.4	31.1	30.5	29.7
T5137	33 5.10	83 47.70	433	979.5743	979.5855	-83.7950000	33.0850000	29.6	17.4	16.6	15.8	14.8	14.4	13.8
T5138	33 3.80	83 48.10	502	979.5678	979.5837	-83.8016667	33.0633333	31.3	17.2	16.3	15.3	14.2	13.7	13.1
T5139	33 4.80	83 49.70	516	979.5619	979.5851	-83.8283333	33.0800000	25.4	10.9	9.9	8.9	7.8	7.3	6.6
T5140	33 5.40	83 50.40	550	979.5577	979.5859	-83.8400000	33.0900000	23.6	8.1	7.1	6.0	4.8	4.3	3.6
T5141	33 7.10	83 49.30	440	979.5701	979.5882	-83.8216667	33.1183333	23.3	10.9	10.1	9.2	8.3	7.8	7.3
T5142	33 9.10	83 50.10	416	979.5645	979.5910	-83.8350000	33.1516667	12.7	1.0	0.2	-0.8	-1.5	-1.9	-2.5
T5143	33 8.30	83 52.50	535	979.5538	979.5899	-83.8750000	33.1383333	14.3	-0.8	-1.8	-2.8	-4.0	-4.5	-5.2
T5144	33 8.50	83 53.90	599	979.5468	979.5901	-83.8983333	33.1416667	13.0	-3.8	-5.0	-6.1	-7.4	-8.0	-8.8

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5145	33 10.80	83 50.70	484	979.5585	979.5933	-83.8450000	33.1800000	10.7	-2.9	-3.8	-4.7	-5.8	-6.3	-6.9
T5146	33 11.10	83 53.10	590	979.5478	979.5937	-83.8850000	33.1850000	9.6	-7.0	-8.1	-9.2	-10.5	-11.1	-11.9
T5147	33 13.40	83 50.50	536	979.5561	979.5969	-83.8416667	33.2233333	9.6	-5.4	-6.4	-7.5	-8.8	-9.2	-9.9
T5148	33 14.40	83 51.40	528	979.5549	979.5983	-83.8566667	33.2400000	6.3	-8.5	-9.5	-10.5	-11.7	-12.2	-12.9
T5149	33 1.40	83 46.00	471	979.5718	979.5804	-83.7666667	33.0233333	35.7	22.5	21.6	20.7	19.7	19.2	18.6
T5150	33 1.80	83 47.50	496	979.5684	979.5809	-83.7916667	33.0300000	34.1	20.2	19.2	18.3	17.2	16.7	16.1
T5151	33 1.70	83 49.90	531	979.5610	979.5808	-83.8316667	33.0283333	30.2	15.2	14.2	13.2	12.1	11.5	10.8
T5152	33 2.60	83 51.70	588	979.5544	979.5820	-83.8616667	33.0433333	27.7	11.2	10.0	8.9	7.6	7.0	6.3
T5153a	33 3.30	83 53.60	625	979.5488	979.5830	-83.8933333	33.0550000	24.6	7.1	5.9	4.7	3.3	2.7	1.9
T5153b	33 4.00	83 51.90	529	979.5566	979.5840	-83.8650000	33.0666667	22.4	7.6	6.5	5.5	4.4	3.8	3.2
T5154	33 5.90	83 52.60	439	979.5609	979.5866	-83.8766667	33.0983333	15.6	3.3	2.5	1.6	0.7	0.2	-0.3
T5155	33 5.30	83 55.80	615	979.5459	979.5857	-83.9300000	33.0883333	18.0	0.7	-0.4	-1.6	-2.9	-3.6	-4.4
T5156	33 6.80	83 56.60	534	979.5492	979.5878	-83.9433333	33.1133333	11.6	-3.4	-4.4	-5.4	-6.6	-7.1	-7.8
T5157	33 8.20	83 58.80	578	979.5423	979.5897	-83.9800000	33.1366667	6.9	-9.3	-10.4	-11.5	-12.7	-13.3	-14.1
T5158a	33 8.10	83 56.60	582	979.5455	979.5896	-83.9433333	33.1350000	10.7	-5.7	-6.8	-7.9	-9.2	-9.8	-10.5
T5158b	33 9.60	83 57.40	642	979.5382	979.5917	-83.9566667	33.1600000	6.9	-11.1	-12.3	-13.5	-14.9	-15.6	-16.4
T5159	33 12.10	83 55.30	577	979.5454	979.5951	-83.9216667	33.2016667	4.6	-11.6	-12.7	-13.8	-15.1	-15.7	-16.4
T5160	33 10.30	83 54.70	635	979.5431	979.5926	-83.9116667	33.1716667	10.2	-7.6	-8.8	-10.0	-11.4	-12.1	-12.9
T5161	33 12.60	83 52.80	485	979.5545	979.5958	-83.8800000	33.2100000	4.3	-9.3	-10.2	-11.1	-12.2	-12.7	-13.3
T5162	33 14.80	83 53.60	576	979.5464	979.5988	-83.8933333	33.2466667	1.8	-14.4	-15.5	-16.6	-17.8	-18.4	-19.2
T5163	33 13.60	83 55.30	565	979.5444	979.5972	-83.9216667	33.2266667	0.4	-15.5	-16.6	-17.6	-18.9	-19.4	-20.2
T5164	33 12.50	83 57.60	629	979.5346	979.5956	-83.9600000	33.2083333	-1.9	-19.5	-20.7	-21.9	-23.3	-23.9	-24.8
T5165	33 14.10	83 59.90	608	979.5361	979.5978	-83.9983333	33.2350000	-4.6	-21.6	-22.8	-23.9	-25.3	-25.9	-26.7
T5166	33 11.20	83 57.40	631	979.5387	979.5939	-83.9566667	33.1866667	4.2	-13.5	-14.7	-15.9	-17.3	-17.9	-18.7
T5167	33 5.60	83 58.70	658	979.5412	979.5862	-83.9783333	33.0933333	16.9	-1.5	-2.8	-4.0	-5.5	-6.1	-7.0
T5168	33 4.30	83 57.30	679	979.5417	979.5844	-83.9550000	33.0716667	21.2	2.1	0.8	-0.5	-1.9	-2.6	-3.5
T5169	33 7.20	83 45.60	572	979.5732	979.5884	-83.7600000	33.1200000	38.7	22.6	21.5	20.4	19.2	18.6	17.8
T5170	33 3.60	83 58.80	677	979.5408	979.5834	-83.9800000	33.0600000	21.1	2.1	0.8	-0.5	-2.0	-2.7	-3.5
T5171	33 0.90	83 58.40	626	979.5457	979.5797	-83.9733333	33.0150000	24.9	7.3	6.1	4.9	3.6	2.9	2.1

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5172	33 1.50	83 57.10	645	979.5454	979.5805	-83.9516667	33.0250000	25.5	7.4	6.2	5.0	3.6	2.9	2.1
T5173	33 0.90	83 54.80	658	979.5485	979.5797	-83.9133333	33.0150000	30.7	12.2	11.0	9.7	8.3	7.6	6.8
T5174	33 1.70	83 52.80	613	979.5522	979.5808	-83.8800000	33.0283333	29.1	11.9	10.7	9.5	8.2	7.6	6.8
T5175	33 0.70	83 49.40	477	979.5656	979.5794	-83.8233333	33.0116667	31.0	17.7	16.7	15.8	14.8	14.3	13.7
T5176	32 59.40	83 46.50	570	979.5646	979.5776	-83.7750000	32.9900000	40.6	24.6	23.5	22.4	21.2	20.6	19.8
T5177	32 59.70	83 48.80	473	979.5680	979.5781	-83.8133333	32.9950000	34.4	21.2	20.3	19.4	18.3	17.8	17.2
T5178	32 59.40	83 50.70	575	979.5614	979.5776	-83.8450000	32.9900000	37.8	21.7	20.6	19.5	18.3	17.7	16.9
T5179	32 58.30	83 49.60	460	979.5687	979.5761	-83.8266667	32.9716667	35.8	22.9	22.0	21.2	20.2	19.7	19.1
T5180	32 56.60	83 48.80	570	979.5619	979.5738	-83.8133333	32.9433333	41.7	25.7	24.6	23.5	22.3	21.7	21.0
T5181	32 58.40	83 52.40	589	979.5578	979.5763	-83.8733333	32.9733333	36.9	20.4	19.3	18.1	16.9	16.3	15.5
T5182	32 59.70	83 53.70	642	979.5522	979.5781	-83.8950000	32.9950000	34.5	16.5	15.3	14.1	12.7	12.0	11.2
T5183	32 57.80	83 55.70	580	979.5564	979.5754	-83.9283333	32.9633333	35.5	19.2	18.1	17.0	15.8	15.2	14.4
T5184a	32 59.30	83 56.00	554	979.5556	979.5775	-83.9333333	32.9883333	30.2	14.7	13.6	12.5	11.3	10.8	10.1
T5184b	33 0.20	83 56.40	607	979.5505	979.5505	-83.9400000	32.0033333	—	—	—	—	8.1	—	—
T5185	32 55.20	83 48.80	587	979.5575	979.5719	-83.8133333	32.9200000	40.8	24.4	23.2	22.1	20.8	20.2	19.5
T5186	32 54.10	83 49.40	537	979.5575	979.5704	-83.8233333	32.9016667	37.6	22.6	21.5	20.5	19.3	18.8	18.1
T5187	32 54.30	83 51.60	507	979.5607	979.5706	-83.8600000	32.9050000	37.7	23.5	22.5	21.6	20.5	19.9	19.3
T5188	32 55.90	83 52.00	581	979.5583	979.5728	-83.8666667	32.9316667	40.1	23.8	22.7	21.6	20.3	19.7	19.0
T5189	32 55.60	83 52.90	521	979.5616	979.5724	-83.8816667	32.9266667	38.2	23.6	22.6	21.6	20.4	19.9	19.2
T5190	32 54.60	83 53.80	512	979.5613	979.5711	-83.8966667	32.9100000	38.4	24.0	23.0	22.1	21.0	20.4	19.8
T5191	32 55.80	83 55.70	584	979.5572	979.5727	-83.9283333	32.9300000	39.4	23.0	21.9	20.8	19.5	18.9	18.2
T5192	32 55.20	83 56.40	540	979.5591	979.5719	-83.9400000	32.9200000	38.0	22.9	21.8	20.8	19.6	19.1	18.4
T5193	32 56.20	83 58.50	628	979.5526	979.5733	-83.9750000	32.9366667	38.4	20.8	19.6	18.4	17.0	16.4	15.6
T5194	32 57.30	83 57.40	635	979.5528	979.5748	-83.9566667	32.9550000	37.8	19.9	18.7	17.5	16.1	15.5	14.7
T5195	32 57.40	83 45.20	506	979.5661	979.5749	-83.7533333	32.9566667	38.8	24.6	23.6	22.7	21.6	21.0	20.4
T5196	32 55.20	83 42.60	326	979.5732	979.5719	-83.7100000	32.9200000	32.0	22.8	22.2	21.6	20.9	20.5	20.1
T5197	32 54.40	83 45.50	528	979.5591	979.5708	-83.7583333	32.9066667	38.0	23.2	22.1	21.1	20.0	19.5	18.8
T5198	32 53.70	83 45.70	531	979.5571	979.5698	-83.7616667	32.8950000	37.2	22.3	21.3	20.3	19.1	18.6	17.9
T5199	32 52.20	83 46.90	456	979.5548	979.5678	-83.7816667	32.8700000	29.9	17.1	16.2	15.4	14.4	13.9	13.3

GRAVITY PROGRAM

NO	LAT	LONG	ELEV	OBSERVED	THEOR	LONG	LAT	FA	B2.20	B2.35	B2.50	B2.67	B2.75	B2.85
T5200	32 52.40	83 49.90	480	979.5573	979.5680	-83.8316667	32.8733333	34.4	20.9	20.0	19.1	18.1	17.6	16.9
T5201	32 51.80	83 52.60	536	979.5530	979.5672	-83.8766667	32.8633333	36.2	21.1	20.1	19.1	17.9	17.4	16.7
T5202	32 52.80	83 55.90	613	979.5524	979.5686	-83.9316667	32.8800000	41.5	24.3	23.1	21.9	20.6	20.0	19.2
T5203	32 53.00	83 57.80	577	979.5555	979.5689	-83.9633333	32.8833333	40.9	24.7	23.6	22.5	21.3	20.7	19.9

BOUGUER ANOMALY MAP
OF
THE SOUTH-CENTRAL GEORGIA PIEDMONT

by

R. H. CARPENTER and J. P. PRATHER

(PLATE I.)

5123 ○ Gravity station and number

— Isogal contour
(contour interval 2 milligals)

Assumed density 2.67

AREA STUDIED

SCALE
0 2 miles

HENRY CO.
BUTTS CO.
NEWTON CO.
JASPER CO.
PUTNAM CO.
JONES CO.
MONROE CO.
BIBB CO.
JONES CO.
BIBB CO.
MONROE CO.
BUTTS CO.
MONROE CO.
JASPER CO.
MONTICELLO
PALATKA
ENKINSBURG
BLACKSHEAR
FLOVILLA
EDGARTOWN
HIGH FALLS
EASTMAN
JULIETTE
SANDERS
EXPERIMENT
GRAY

-30 -20 -10 0 +10 +20 +30

Drafting—T. LEMASTER

Base map compiled from Georgia county highway maps