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III. GRAVIMETRIC SURVEY IN THE GH80–5 CRUISE

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Air-sea gravity meter of Lacoste Lomberg Co. settled on board the R/V Hakurei-maru was used in this survey area. Gravity value was connected to absolute land gravity value at Funabashi port. The base reading of counter of gravity meter at Funabashi was 10717.2 at 244 day (GMT; Greenich Mean Time) and 10717.4 at the same port at 284 day, 60 days later. In the midterm of the cruise the gravity value of port Honolulu in the Oafu Island in Hawaii was measured by connecting the counter value of ship to the absolute gravity value which was measured a year before last year (MIYAZAKI 1981), and the change of drift rate was checked. The results of the measurement are shown in Table 1 and Fig. III–1.

The data of free air gravity anomaly in the detaled survey area is shown by the contour description in a map in Fig. III–2. Other data obtained by Hakurei-maru near to the area, such as GH76–1, GH77–1, and GH80–1 areas, were also compiled in the same figure.

There are several high anomalies, and one of them is higher than +20 milligal, which seems to correspond to seamounts northwest of detailed survey area I. In the northern part of detailed survey area I, there are high anomalies which seems to correspond to small hills whose hights are about 400 m against the southern deep basin, of 5900 m depth. There are several low anomalies whose values are lower than −20 milligal in the deep basin area. The value of deep basin is usually in the band of −15 to −20 milligal and there is no distinct anomaly in the deep basin area.

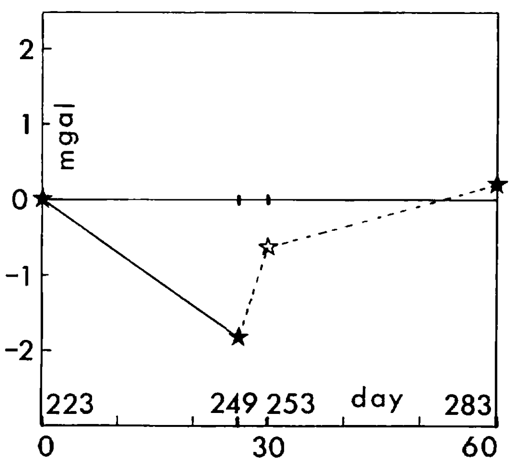


Fig. III–1 Change of base reading value of gravity meter calculated as the value at Funabashi.

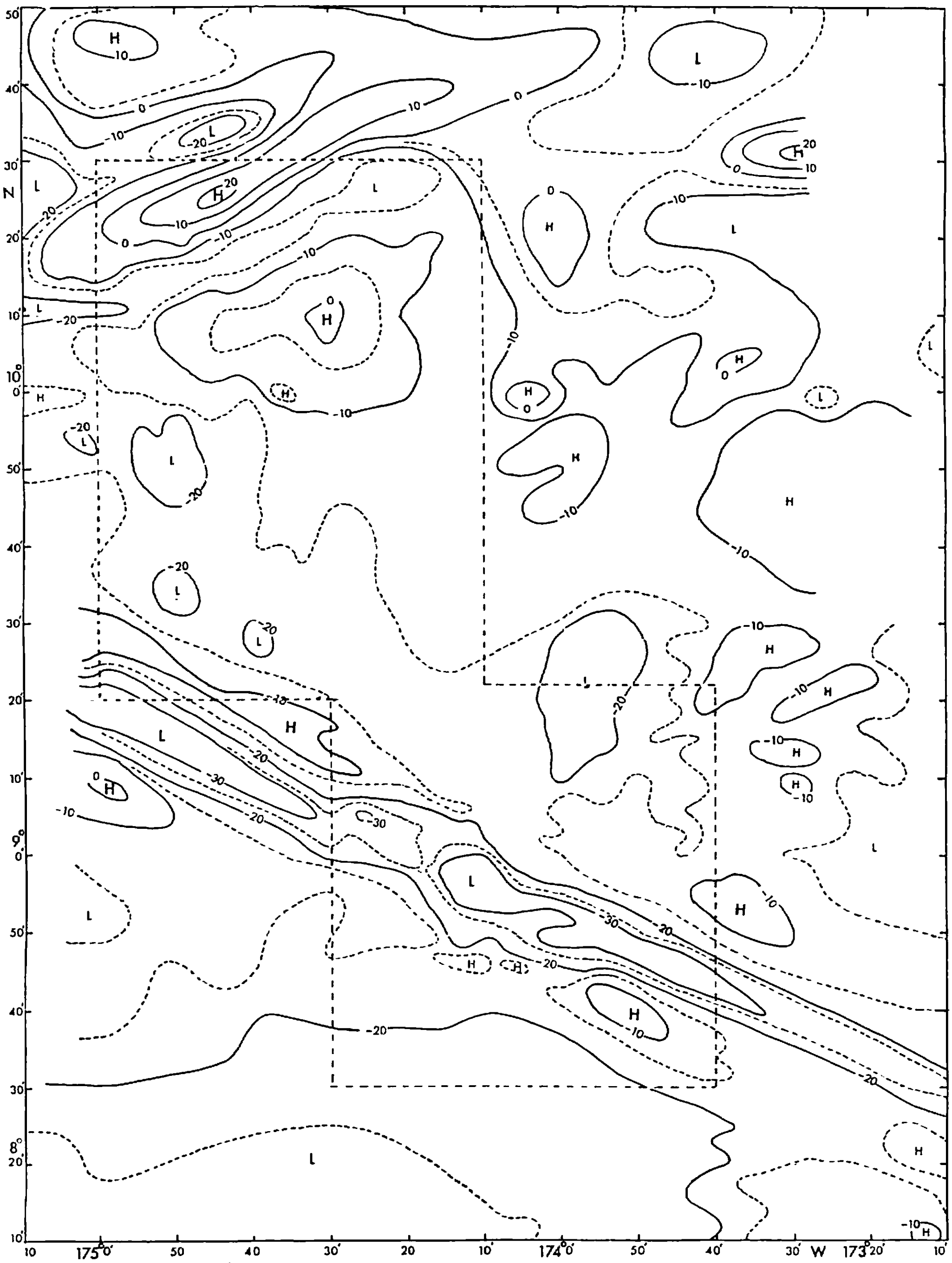


Fig. III–2 Contour description of free air gravity anomaly. Detail survey area in GH80–5 cruise are enclosed by broken lines.

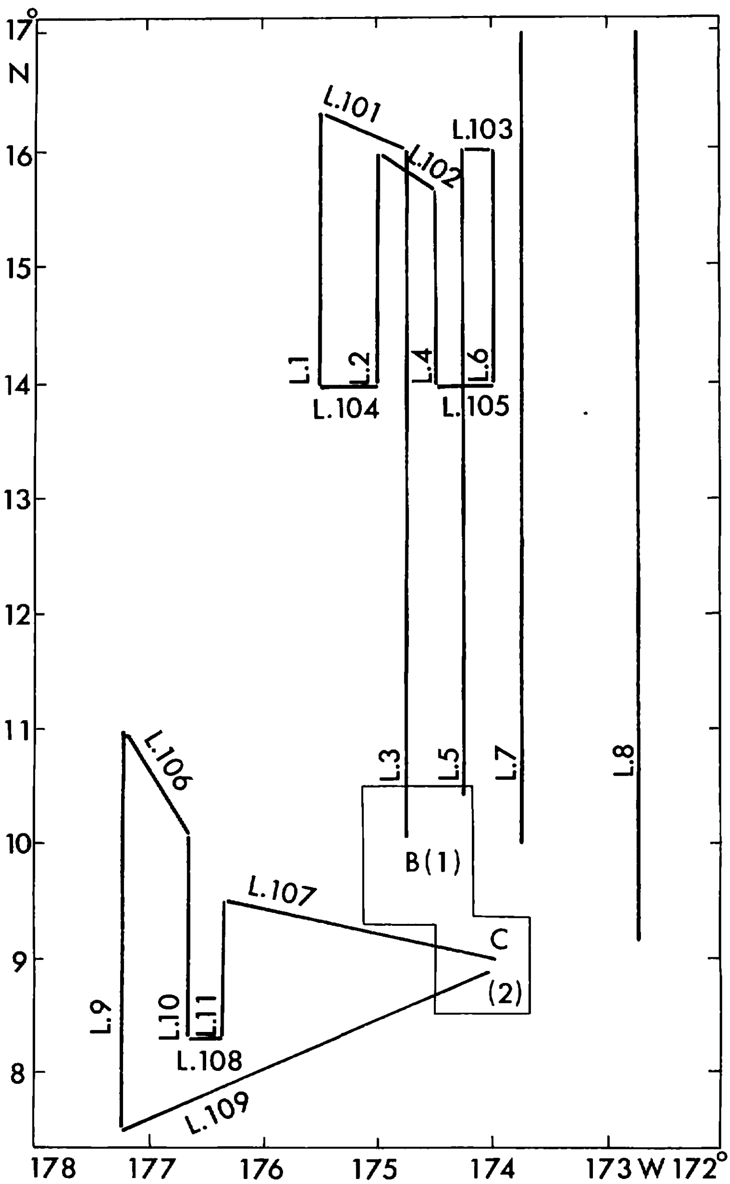


Fig. III-3 (1)

Fig. III-3 Profiles of magnetic anomaly, Bouguer gravity anomaly, free air gravity anomaly and water depth. All profiles in around area were named as Fig. III-3(1). The position of typical profiles in detailed survey area are shown in Fig. III-3(2) and (3). And typical profiles are shown in Fig. III-3(12) and (13).

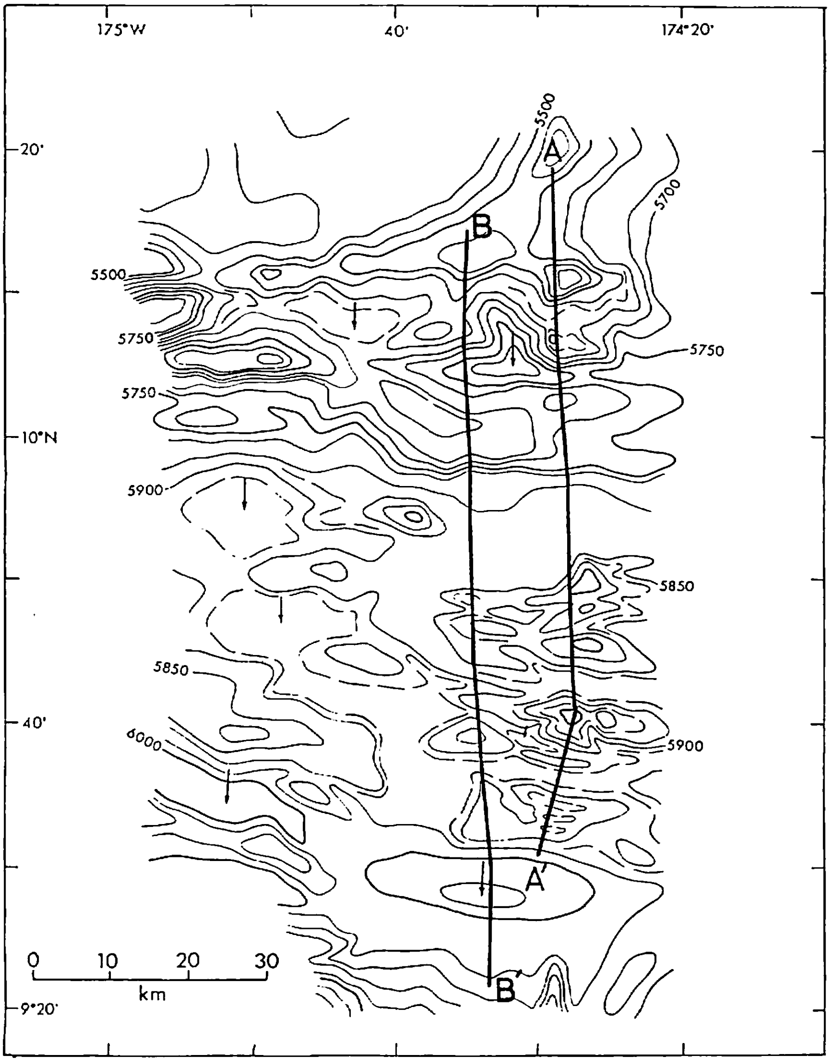


Fig. III-3 (2)

There is a low anomaly area in the center of detailed survey area II where the lowest value reaches to -30 milligal. The position of low anomaly maches well to the topography of Magellan Trough. There are two high anomalies whose value are approximately -10 milligal, each being 15 km apart from the lowest anomaly. The positions of high anomalies mach well to the topographic highs of approximately 5,600 m. There are several high anomalies around northwest of the survey area here and there, but the difference of value in the northeast part of detailed survey area II is at most 5 milligal. The value of free air gravity in the southern part of detailed survey area II shows gradual decrease toward the southwest direction. It seems to be caused by think deposits containing turbidity layers. Figs. III–3 show all profiles around the survey area and several typical profiles of magnetic anomaly, Bouguer gravity anomaly, free-air

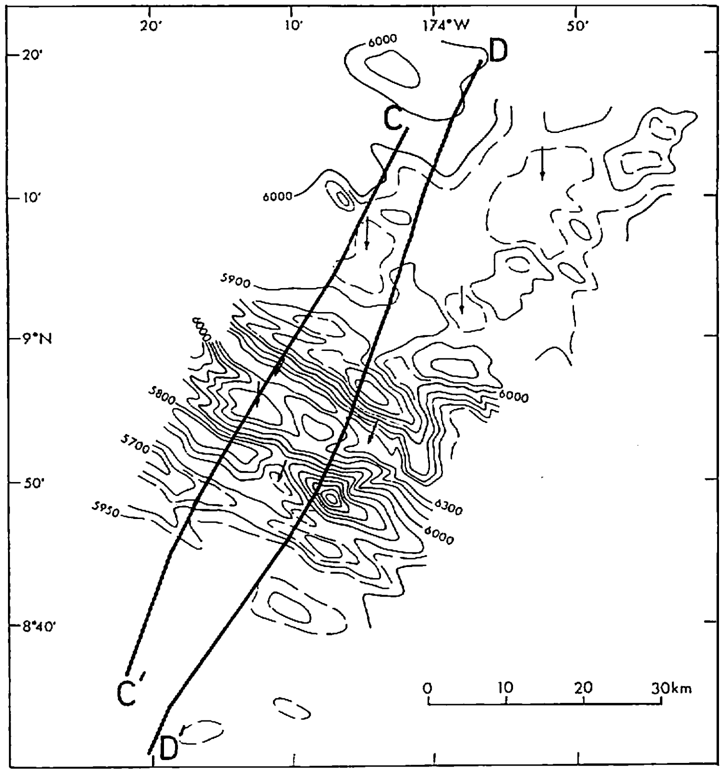


Fig. III-3 (3)

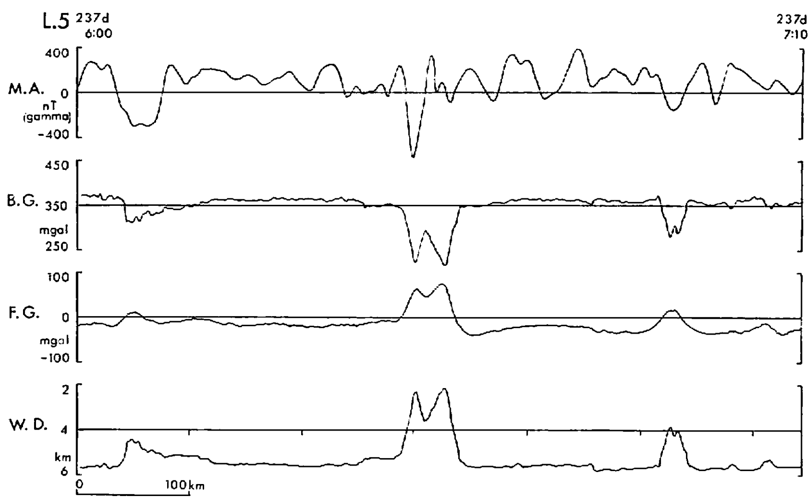


Fig. III-3 (4)

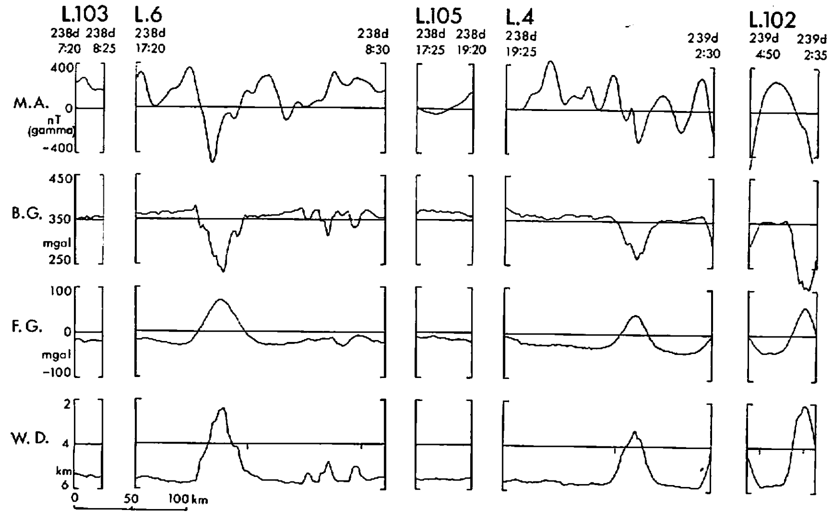
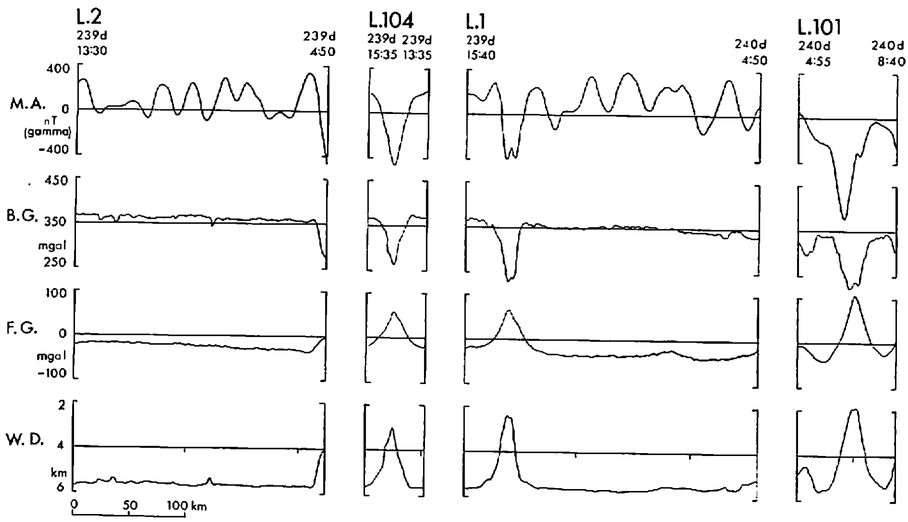


Fig. III-3 (5)



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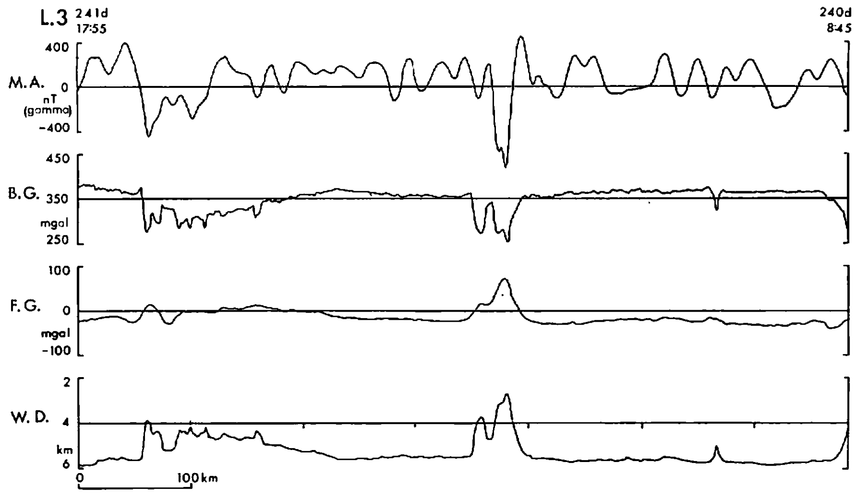

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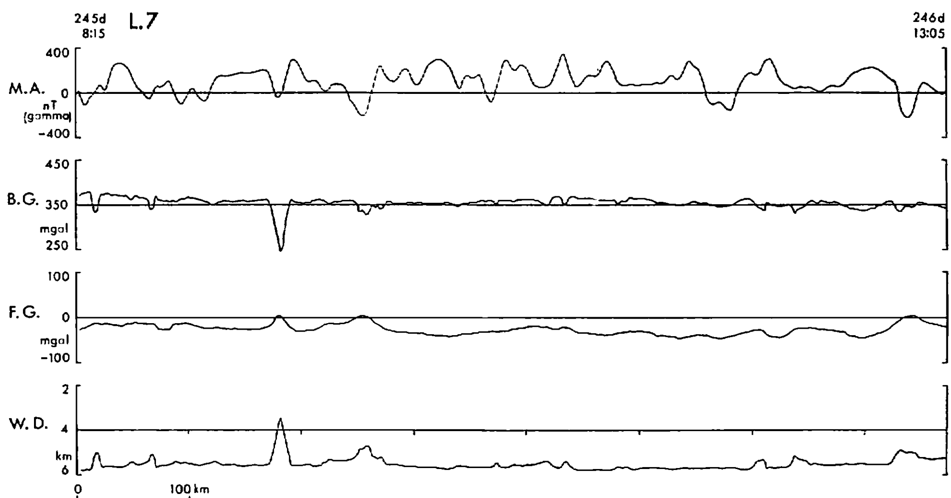


Fig. III-3 (8)

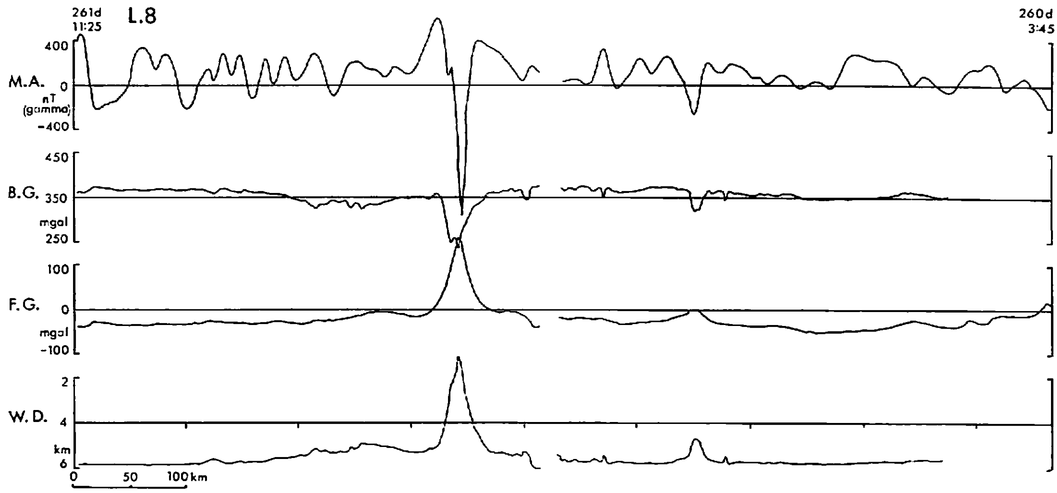
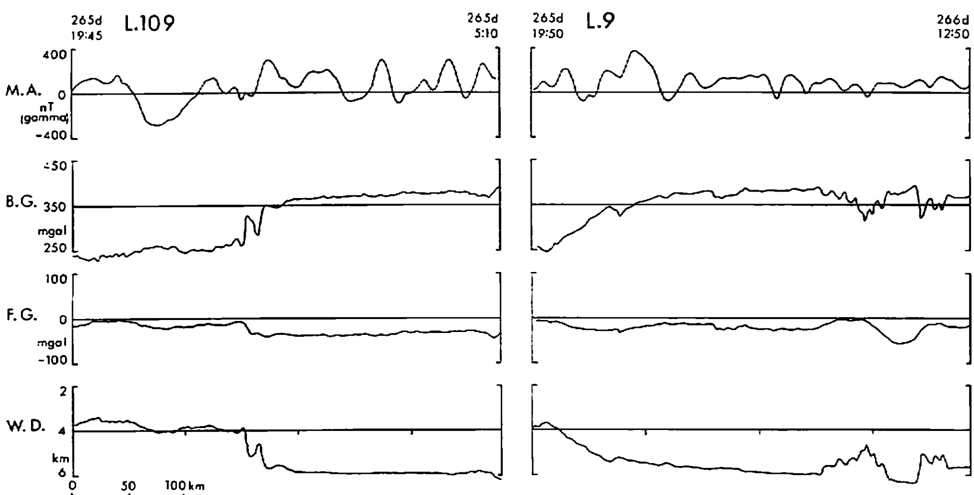


Fig. III-3 (9)



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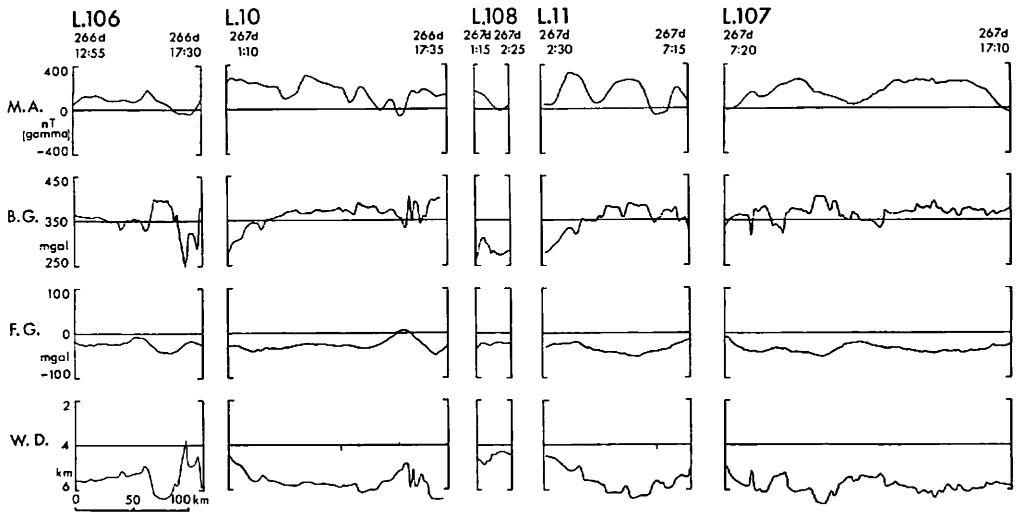

Fig. III-3 (11)

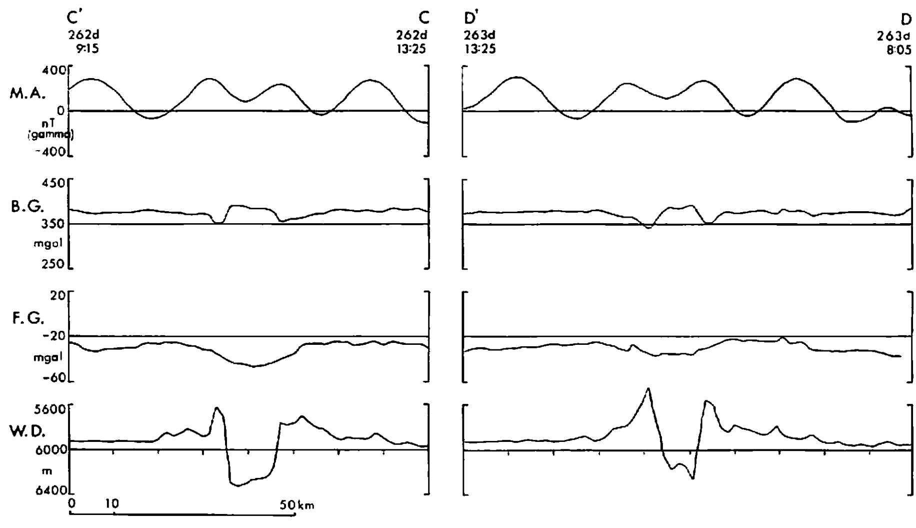

Fig. III-3 (12)

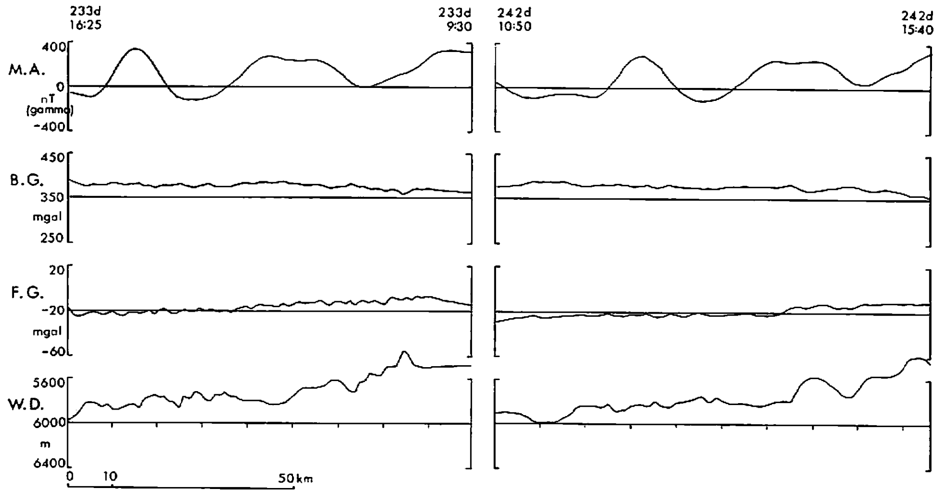

Fig. III-3 (13)

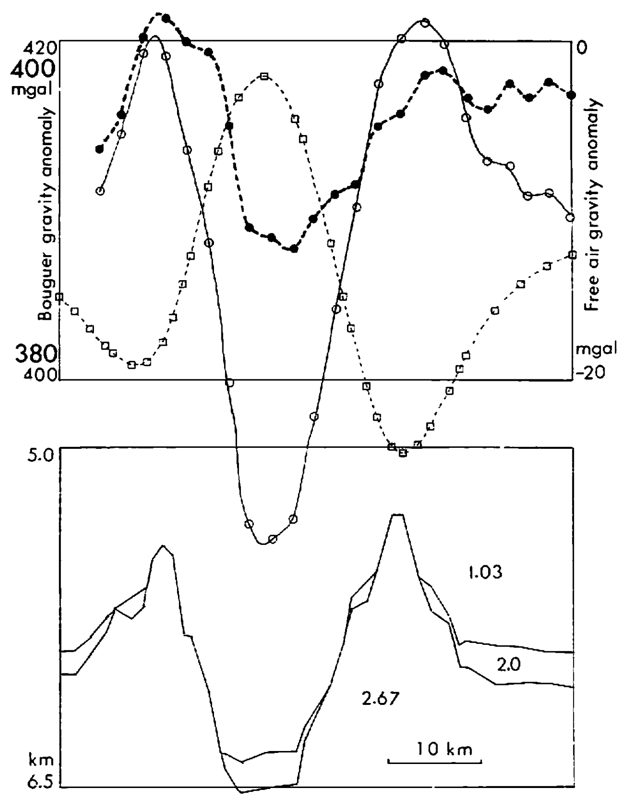

Fig. III-4 (1)

Fig. III–4 Two dimensional Bouguer gravity anomalies of the transect of the Magellan Trough in detailed survey area II. Open circle and solid line shows free air gravity anomalies, open square and broken line shows calculated values from topography, solid circle and thick broken line shows the recalculated two dimensional Bouguer gravity anomalies.

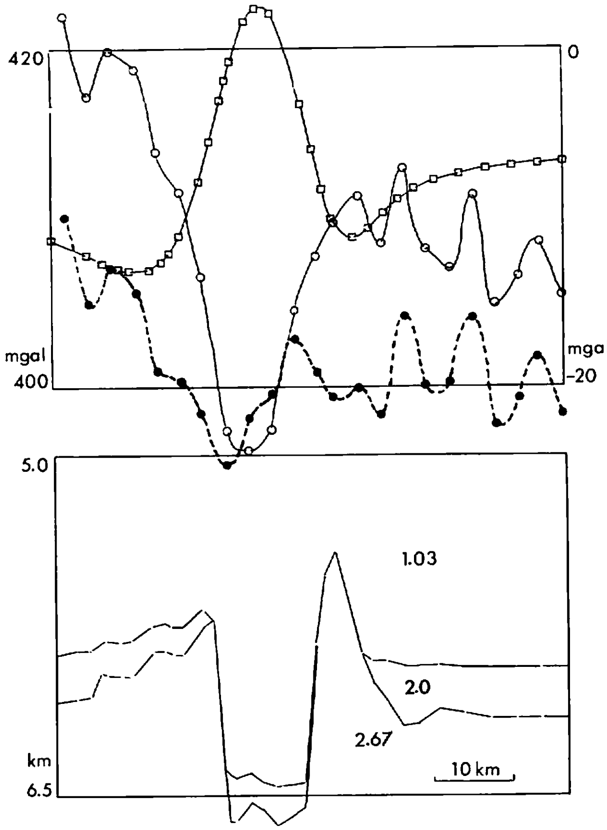

Fig. III-4 (2)

Table III-1 Change of gravity base reading value

Jurian day	Base reading	Gravity value*	Woldon	Gravity*	Diff.**
223 d	10717.2	979802.9			0.0
249	9854.7	978941.09	1060.25	978942.92	−1.83
			1053.3	978942.22	
253	9790.9	978877.34	419.7	978877.97	−0.63
283	10717.4	979803.1			0.2

* Gravity values are calculated by Potsudam system for comparing the value measured at Hawaii a year before last year.

** This values are the change of base reading value if gravity meter was set at Funabashi port.

gravity anomaly and water depth, which transect the two detailed survey area. The names of profiles were shown in Figs. III-3-(1), (2) and (3).

Two dimensional Bouguer gravity anomalies were calculated following the formula of TALWANI (1959) assuming that the density of the mass under sea bottom and water are 2.67 and 1.03, respectively, and the results are shown in Fig. III-4. The topographic effect of this small trough is approximately several milligals in the

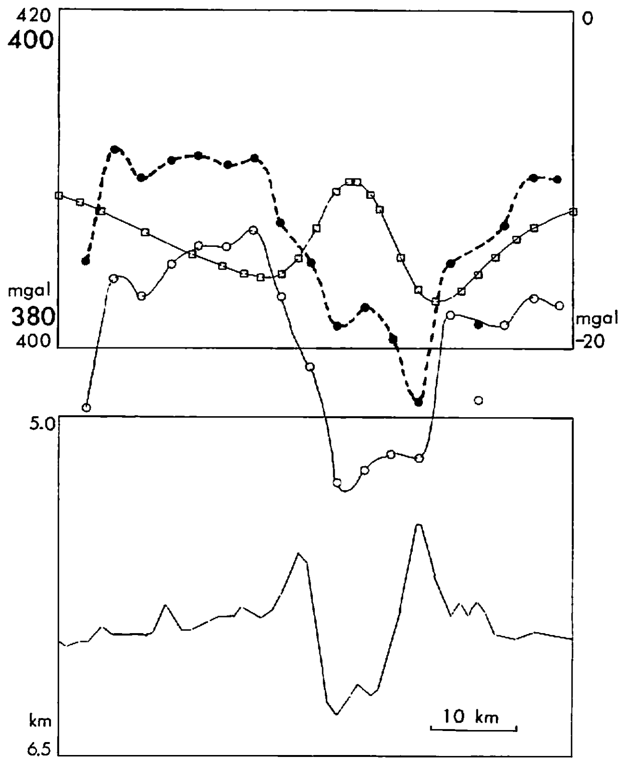

Fig. III-4 (3)

center of detailed survey area II. The results, after the recalculation considering 150 m's sediment in the bottom of the trough and around the outer topographic highs whose density is assumed to be 2.0, are nearly the same as those not considering sediments. There seems to exist density anomalies under the basement mass. But the residual value is only 10 to 15 milligals.

References

MIYAZAKI, T. (1981) Gravity anomalies in the GH79–1 area. *Geol. Surv. Japan Cruise Report*, no. 15, p. 57–70.

TALWANI, M., WORZEL, J. L., and LANDISMAN, M. (1959) Rapid gravity computations for two-dimensional bodies with application to the Mendocino Submarine Fracture Zone. *J. Geophis. Res.*, vol. 64, p. 49–59.