V. GRAVITY ANOMALIES

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Data Processing

Gravity data was continuously collected throughout the whole cruise, using a gyrostabilized LaCoste and Romberg Sea Gravity Meter S-63. The digital gravity data obtained were transferred to NNSS in real time, and were recorded on magnetic tapes together with navigational, bathymetric, and geomagnetic data. An on-board off-line computer YHP 2100A was used for data processing. All the gravity data were connected with the base station at Funabashi port in Japan. The relative difference of the reading value of the base gravity station after the cruise (on the 9th March) was +2.7 mgal as compared with that before the cruise on 10th January, and the drift rate of the gravity meter amounts to +1.4 mgal/month. This drift rate is not serious compared with the accuracy of the obtained gravity values, and the data processing was carried out without drift correction.

All the data were then converted to free air and Bouguer anomaly data at 5-min intervals. Free air anomalies were calculated by making latitude correction and Eötvös correction. Simple Bouguer anomalies were computed under the assumption of a water density of 1.03 gr/cm^3 and a rock density of 2.00 gr/cm^3.

The calculated data were recorded on magnetic tapes. Using those data, profiles and maps of the surveyed area were drawn with an X-Y plotter. Figs. V-1—4 show gravity anomaly profiles of some tracks along the meridians in the surveyed area. Profiles of topography and magnetic anomalies are also shown in these figures. A free air and a Bouguer anomaly maps are presented in Figs. V-5 and 6, respectively.

Results

Free air anomalies in the survey area are rather uniform and almost negative except over seamount areas (Fig. V-5). There are three high anomalies in the southwestern part of the survey area, and each of them correlates very well with topographic highs. Two of them are shown in Fig. V-1. Anomaly values there exceed 80, 60 and 110 mgal at the seamounts from north to south, respectively. The lowest part of the free air anomaly with a minimum of lower than −40 mgal is found west of the southernmost seamount. At another seamount in the northeastern part, anomaly values exceed 110 mgal. The GH76–1 Trough is accompanied with a low free air anomaly zone where anomaly values are lower than −20 mgal.

Bouguer anomalies of the survey area are also rather uniform, but a high anomaly zone extends from the northwestern part to the southeastern part, and Bouguer anomalies tend to decrease northeastwards and southwestwards (Fig. V-6). There are no significant anomaly regions around seamounts. According to the data of DSDP leg 17 (WINTERER, EWING, *et al.*, 1973), the sediment layers on the basaltic basement have an average density of about 1.6 gr/cm^3 at Sites 166, 167 and 170 around this area. This

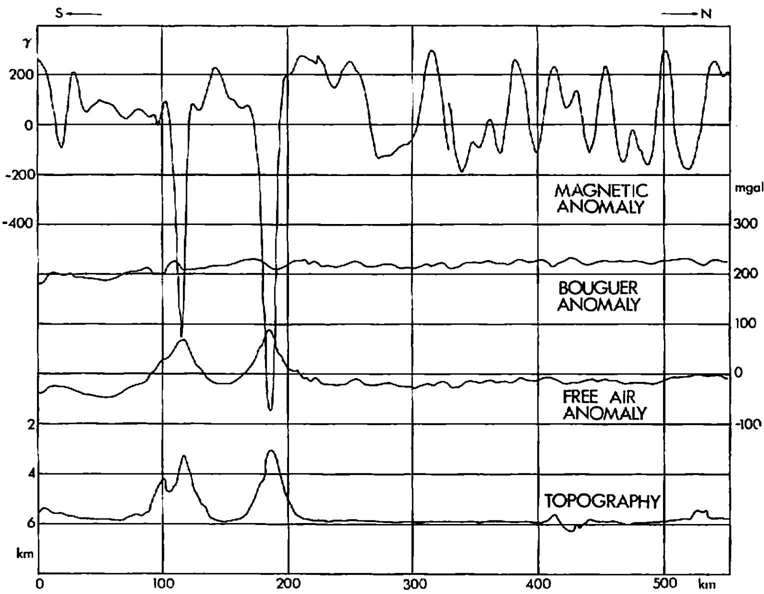

Fig. V-1 Magnetic and gravity anomaly profile at 174°W from 5°N to 10°N.

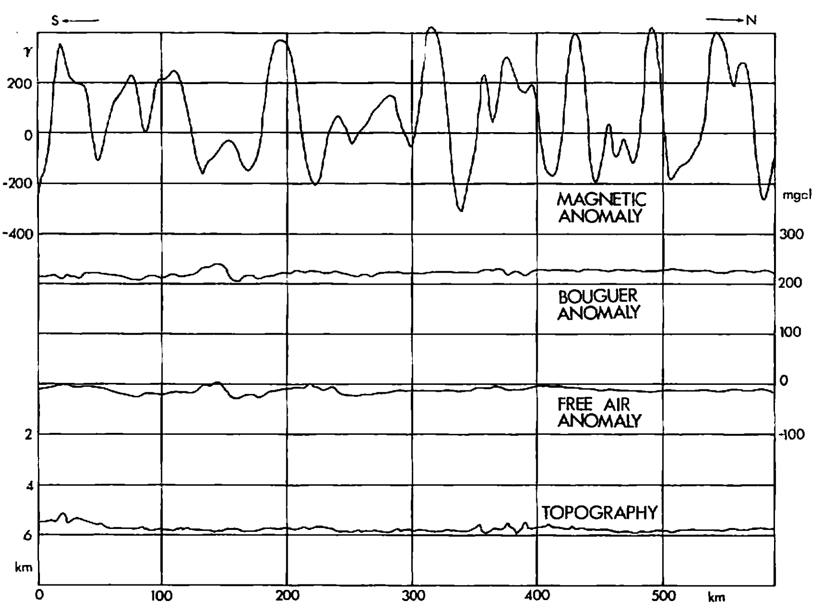

Fig. V-2 Magnetic and gravity anomaly profile at 173°W from 4°50′N to 10°10′N.

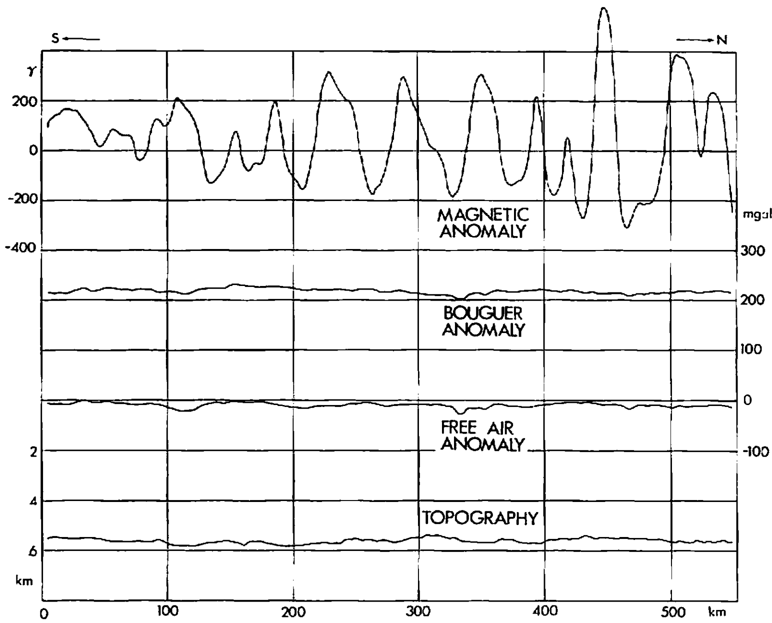

Fig. V-3 Magnetic and gravity anomaly profile at 172°W from 5°N to 10°N.

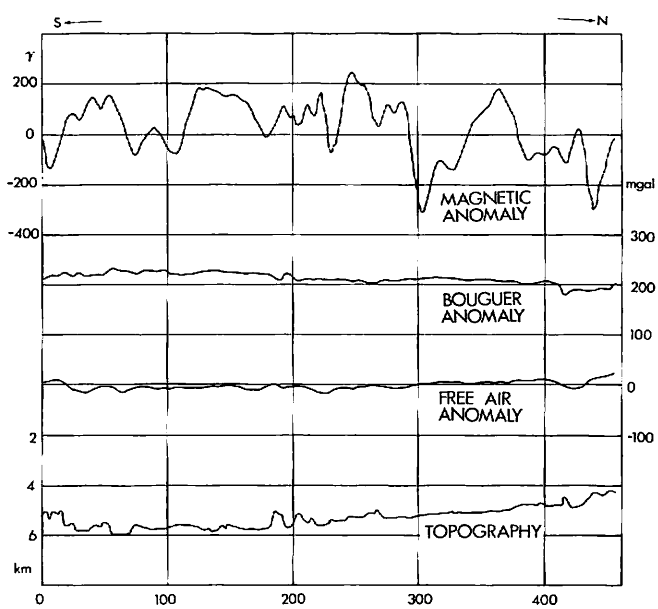

Fig. V-4 Magnetic and gravity anomaly profile at 171°W from 5°50′N to 10°N.

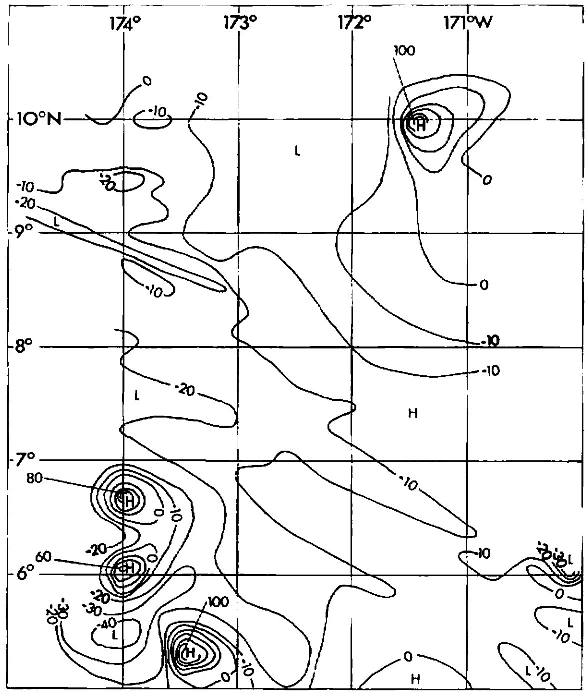

Fig. V-5 Free air anomaly map of the survey area. The contour interval is 10 mgal in the negative area, and 20 mgal in the positive area.

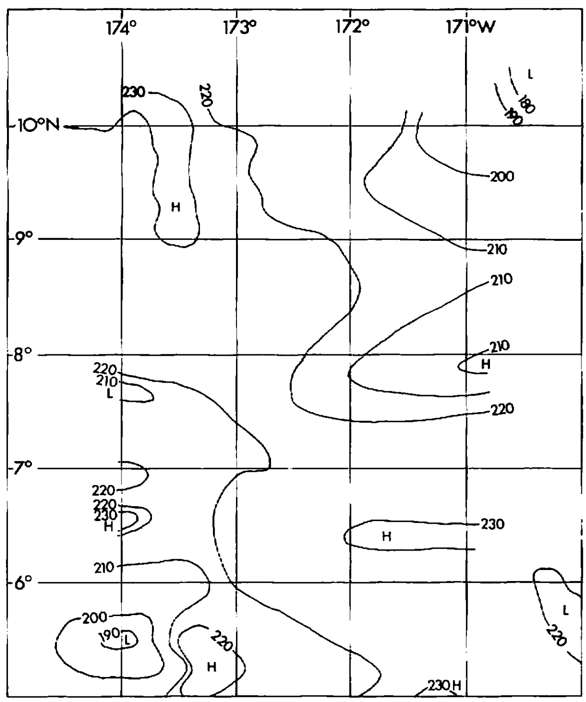

Fig. V-6 Bouguer anomaly map of the survey area. The density used in the Bouguer correction is 2.00 gr/cm³. The contour interval is 10 mgal.

value is considerably less than 2.0 gr/cm^3 used in the Bouguer anomaly calculation. The above-mentioned tendency, however, does not change except that there are high anomaly regions around seamounts, even if a rock density 1.6 gr/cm^3 is assumed in the Bouguer correction. The simultaneous seismic reflection (air-gun) survey shows that the basaltic basement is buried in the southwestern area (TAMAKI. in this report), and this is consistent with the Bouguer anomaly data. Bouguer anomaly data suggest that the thickest part of the sediment layer likely exists in the environs of 5°30′N, 174°W, where free air anomalies are also minimum. Unfortunately, the air-gun survey was not carried out there. Seismic reflection surveying also shows that the basement is shallow in the northeastern part. This discrepancy between the Bouguer anomaly data and the seismic reflection data suggests that the crust beneath the high Bouguer anomaly zone is thinner than that beneath the northeastern part.

Reference

WINTERER, E. L., EWING, J. I., *et al.* (1973) *Initial Reports of the Deep Sea Drilling Project,* vol. 17, Washinton (U. S. Government Printing Office). xx+930p.