

## Chapter 3 Bathymetry

### 3-1 Bathymetric Survey

#### (1) Classification and division of seamounts

The nine seamounts surveyed were named consecutively from MS01 to MS09. These seamounts were classified by their characteristic shape as shown in Table 3-1-1. Their topography was further divided into top and slope by their water depth, by considering topographic feature as shown in Table 3-1-2 and Figure 3-1-1. The top corresponds, for table seamounts to the flat top of seamounts, and to the shallowest part and its vicinity with gentle slope for peaked seamounts. The water-depth distribution of the slope differs by individual seamounts and thus the slope classification was done individually for each seamount by considering its topographic gradient distribution. The result is shown in Table 3-1-3. And the characteristic features of the seamounts are listed in Table 3-1-4.

#### (2) Outline of seafloor topography

The bathymetric maps of the seamounts and the topographic gradient maps are shown in Figures 3-1-2 (1) ~ (9) and Figures 3-1-3 (1) ~ (9) respectively. The track line maps are shown in Annexed Figures 1 (1) ~ (9), the color-coded bathymetric maps are shown in Annexed Figures 2 (1) ~ (9), the bird's eye views of bathymetry are shown in Annexed Figures 3 (1) ~ (9) and the bird's eye views of bathymetry projected with topographic gradient are shown in Annexed Figures 4 (1) ~ (9).

##### a. MS01

This is a table seamount and its shallowest part is 1,040 m deep, relative height 4,000 m. It extends 70 km east-west and 60 km north-south. The top is oriented in the WNW-ESE direction, triangular shaped and its area is 443 km<sup>2</sup>.

The average slope of the flat top is 4.9°, the central part of the top is flat, and the southwestern slope has terrace type structure. There are some depressions (1.5 km X 1.5 km) in the southern and northwestern parts of the top.

The upper slope has an average gradient of 26° and is the steepest slope of the seamounts of the survey area. The middle slope is 22°, and the lower slope dips 10°. This seamount has five characteristically large ridges extending radially.

##### b. MS02

This is a table seamount and its shallowest part is 1,330 m deep, relative height 4,200 m. It extends

Table 3-1-1 Classification of seamount topographic type.

Classification	Morphological Characteristics
Table Seamount (Guyot)	The summit is flat and horizontal.
Peaked Seamount	The summit is steeple-shaped or ridge-shaped.

Table 3-1-2 Classification of seamount topography.

Classification		Topographical Characteristics
Top	Central part	The center of the summit where it is flat or gently inclined.
	Marginal part	The transitional zone from the central part of the top to the upper part of the slope.
Slope	Upper part	The upper part where the slope is steep.
	Middle part	The lot between the upper and the lower part of the slope. The inclination is medium.
	Lower part	The lower part where the slope is gentle
Foot of seamount		The transitional zone from the lower part to the ocean floor

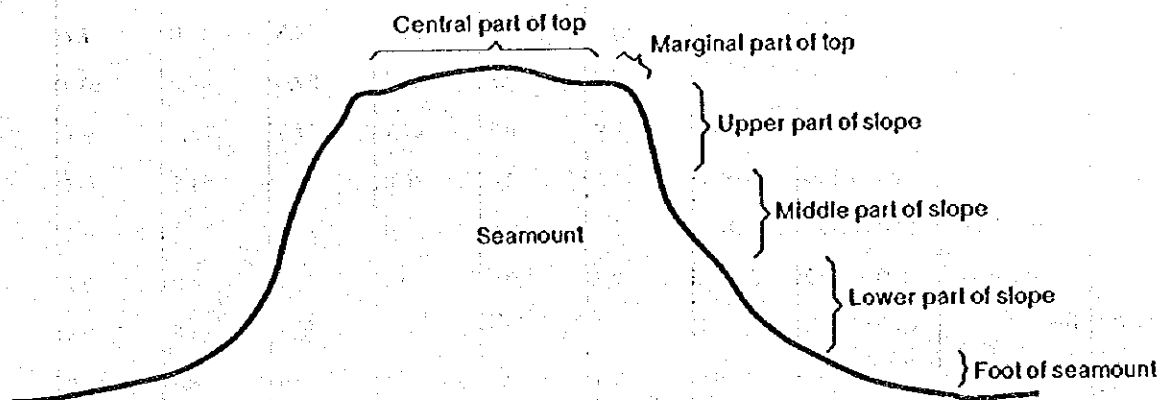


Fig. 3-1-1 Schematic model of seamount topographic classification

Table 3-1-3 Area and average slope of each seamount.

Seamount		Depth Range (m)	Area (km <sup>2</sup> )	Average slope(°)	Mini mum(°)	Maxi mum(°)	0° -10° (%)	10° -20° (%)	20° -30° (%)	30° > (%)
MS01	Top	1,000-1,600	443	4.9	0.0	40.8	84.7	10.2	4.7	0.4
	Upper slope	1,600-2,000	95	25.6	1.6	51.6	3.3	18.6	49.2	28.9
	Middle slope	2,000-2,600	200	21.9	1.8	48.2	2.7	33.7	57.1	6.5
	Lower slope	2,600-5,000	2,439	10.1	0.0	40.2	55.6	32.8	11.1	0.5
MS02	Top	1,300-2,100	406	6.9	0.0	45.6	78.4	14.1	5.9	1.5
	Upper slope	2,100-2,600	154	20.1	1.3	42.5	12.9	32.8	44.5	9.9
	Middle slope	2,600-3,400	330	18.8	0.3	40.8	5.1	54.2	37.1	3.5
	Lower slope	3,400-5,500	2,038	8.6	0.0	39.2	64.4	29.2	6.3	0.2
MS03	Top	1,700-2,400	2,247	2.8	0.0	46.1	95.2	2.9	1.6	0.2
	Upper slope	2,400-2,900	777	9.9	0.0	55.4	63.8	17.2	13.6	5.3
	Middle slope	2,900-3,500	1,180	9.4	0.1	46.1	67.7	21.7	9.3	1.3
MS04	Top	900-1,200	252	2.8	0.0	28.4	92.9	4.8	2.3	0.0
	Upper slope	1,200-1,700	151	16.5	0.2	34.1	19.8	48.0	30.9	1.3
	Middle slope	1,700-2,600	471	14.1	0.2	35.3	35.4	41.2	21.3	2.1
	Lower slope	2,600-4,500	2,261	9.0	0.0	41.6	63.6	26.3	9.5	0.6
MS05	Top	900-1,000	1.3	8.2	1.1	19.8	71.0	29.0	0.0	0.0
	Upper slope	1,000-1,500	22	20.6	2.0	37.1	6.5	40.5	46.2	6.7
	Middle slope	1,500-2,500	103	20.9	1.7	45.8	4.0	43.0	44.6	8.4
	Lower slope	2,500-4,800	1,796	9.6	0.0	40.0	63.3	25.1	11.1	0.6
MS06	Top	1,500-1,900	149	4.7	0.1	40.2	88.9	7.0	3.3	0.8
	Upper slope	1,900-2,500	85	25.1	4.0	46.1	1.4	20.0	56.0	22.6
	Middle slope	2,500-3,300	218	18.7	0.2	43.2	10.4	45.6	41.6	2.4
	Lower slope	3,300-5,200	1,547	11.2	0.0	37.9	48.9	37.1	13.6	0.5
MS07	Top	1,700-1,800	0.54	12.7	5.0	21.8	46.2	38.5	15.4	0.0
	Upper slope	1,800-2,200	23	16.4	2.2	38.4	22.8	46.0	27.7	3.6
	Middle slope	2,200-3,200	324	15.8	0.3	40.5	27.0	40.2	30.9	1.9
	Lower slope	3,200-4,900	2,021	9.2	0.0	42.7	64.5	25.4	9.7	0.5
MS08	Top	1,300-1,600	1,074	1.5	0.0	40.8	98.5	1.2	0.3	0.0
	Upper slope	1,600-2,400	1,447	7.3	0.0	50.0	77.4	16.5	5.2	0.9
	Middle slope	2,400-3,400	3,245	7.9	0.0	39.3	72.4	24.8	2.7	0.1
MS09	Top	1,100-1,300	145	2.8	0.0	30.1	95.8	3.6	0.6	0.0
	Upper slope	1,300-1,700	67	20.5	0.6	36.4	19.6	18.8	46.0	15.5
	Middle slope	1,700-2,700	341	16.7	0.2	38.1	13.3	56.9	28.7	1.1
	Lower slope	2,700-5,000	3,627	6.8	0.0	34.3	82.3	13.7	3.9	0.1

Table 3-1-4 Topographic Features of each seamount.

Seamount	Location	Type	Depth of Top(m)	Bottom of lower part (m)	Height Difference (m)	Scale (EW km X NS km)	Characteristic of Top	Top area (km <sup>2</sup> )	Slope area (km <sup>2</sup> )
MS01	14° 23' N · 161° 02' E	Guyot	1,040	5,000	4,000	70 X 60	The principal axis is WNW-ESE. Triangular shape.	443	2,733
MS02	14° 05' N · 163° 11' E	Guyot	1,330	5,500	4,200	60 X 50	The principal axis is NE-SW.	356	2,573
MS03	14° 00' N · 164° 02' E	Guyot	1,740	...	...	more than 80 X more than 70	The principal axis is NE-SW.	2,247	1,957(*1)
MS04	14° 21' N · 165° 50' E	Guyot	980	4,500	3,500	60 X 60	The principal axis is N-S. Elliptic shape.	252	2,884
MS05	11° 20' N · 171° 05' E	Peaked Seamount	950	4,800	3,800	50 X 50	The principal axis is N-S.	1.3	1,921
MS06	13° 05' N · 169° 26' E	Guyot	1,580	5,200	3,600	40 X 50	The principal axis is NE-SW. Elliptic shape.	149	1,850
MS07	12° 39' N · 169° 29' E	Peaked Seamount	1,750	4,900	3,100	50 X 50	The principal axis is NE-SW.	0.52	2,368
MS08	13° 53' N · 167° 31' E	Guyot	1,350	5,000	3,600	130 X more than 100	Twin peaks. The principal axis of the southern part is NW-SE. northern part is NNW-SSE Both show elliptic shape.	1,074	4,692(*1)
MS09	16° 30' N · 167° 10' E	Guyot	1,140	5,000	3,900	70 X 70	The principal axis is NE-SW. Diamond shape.	145	4,035

(\*1) : it shows the total of upper part area and middle part area.

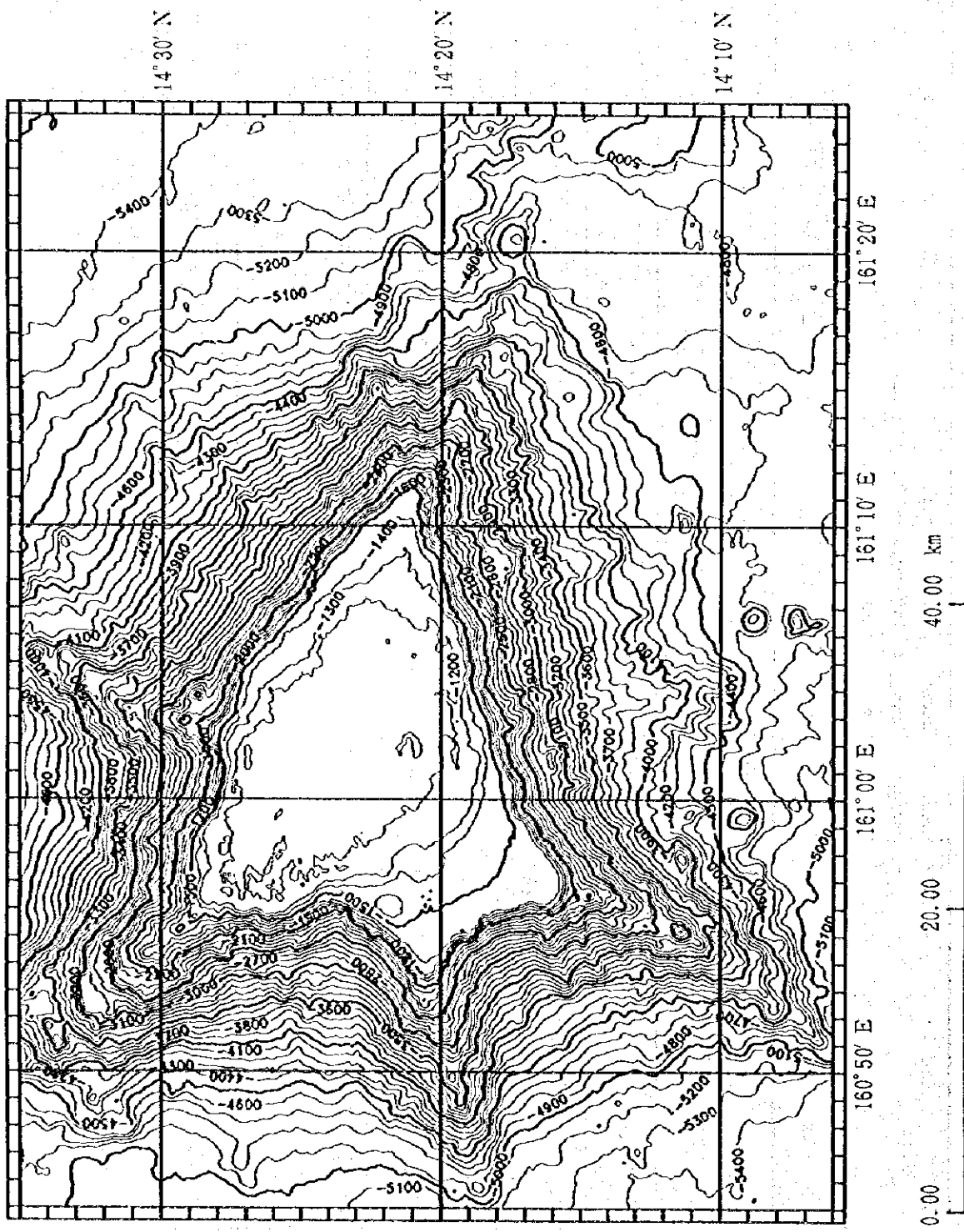


Fig. 3-1-2 (1) Bathymetric map based on MBES of seamount MS01.  
 MBES data are gridded at an about 200m spacing.  
 Contour interval is 100m.

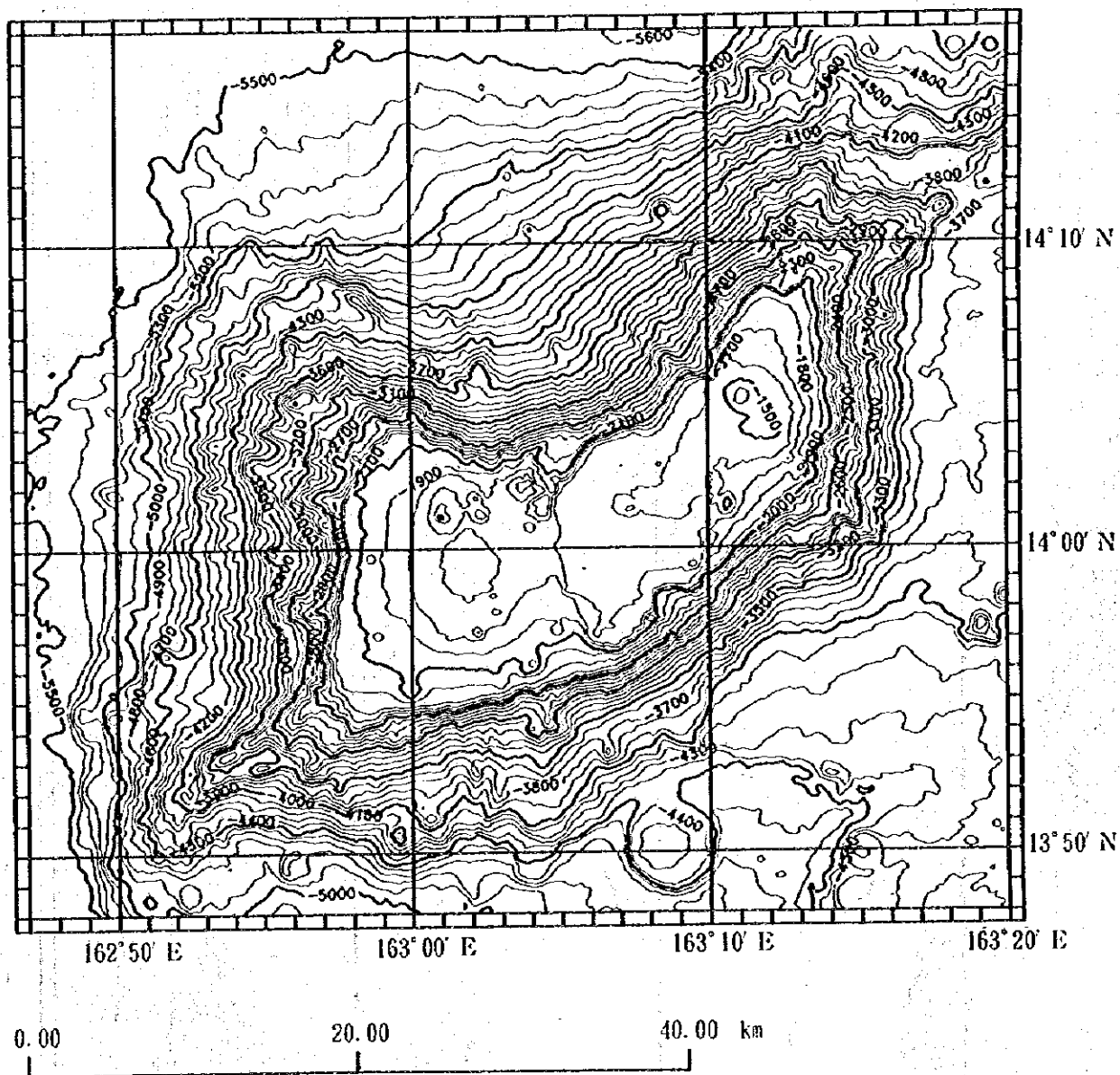
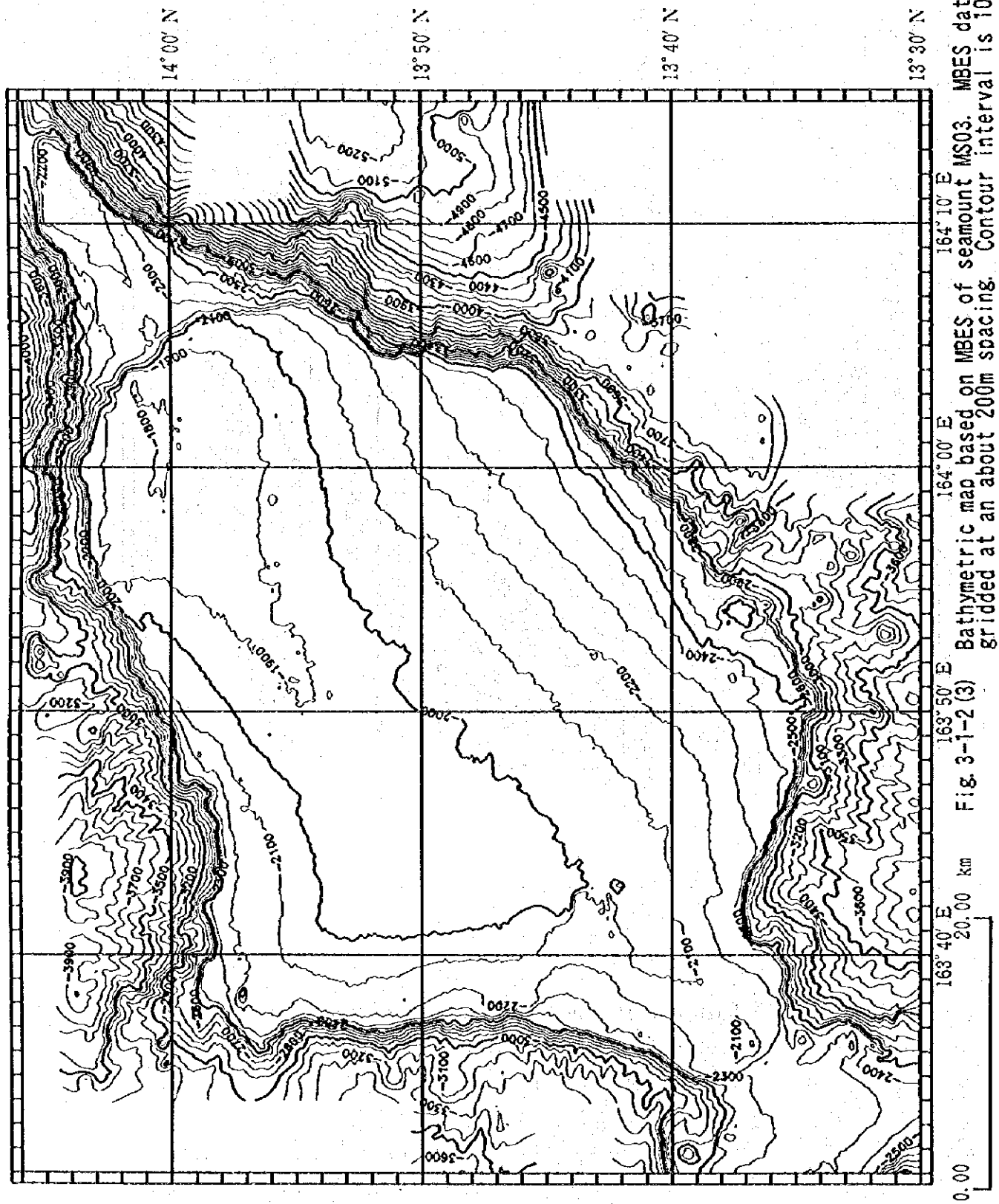


Fig. 3-1-2 (2) Bathymetric map based on MBES of seamount MS02. MBES data are gridded at an about 200m spacing. Contour interval is 100m.



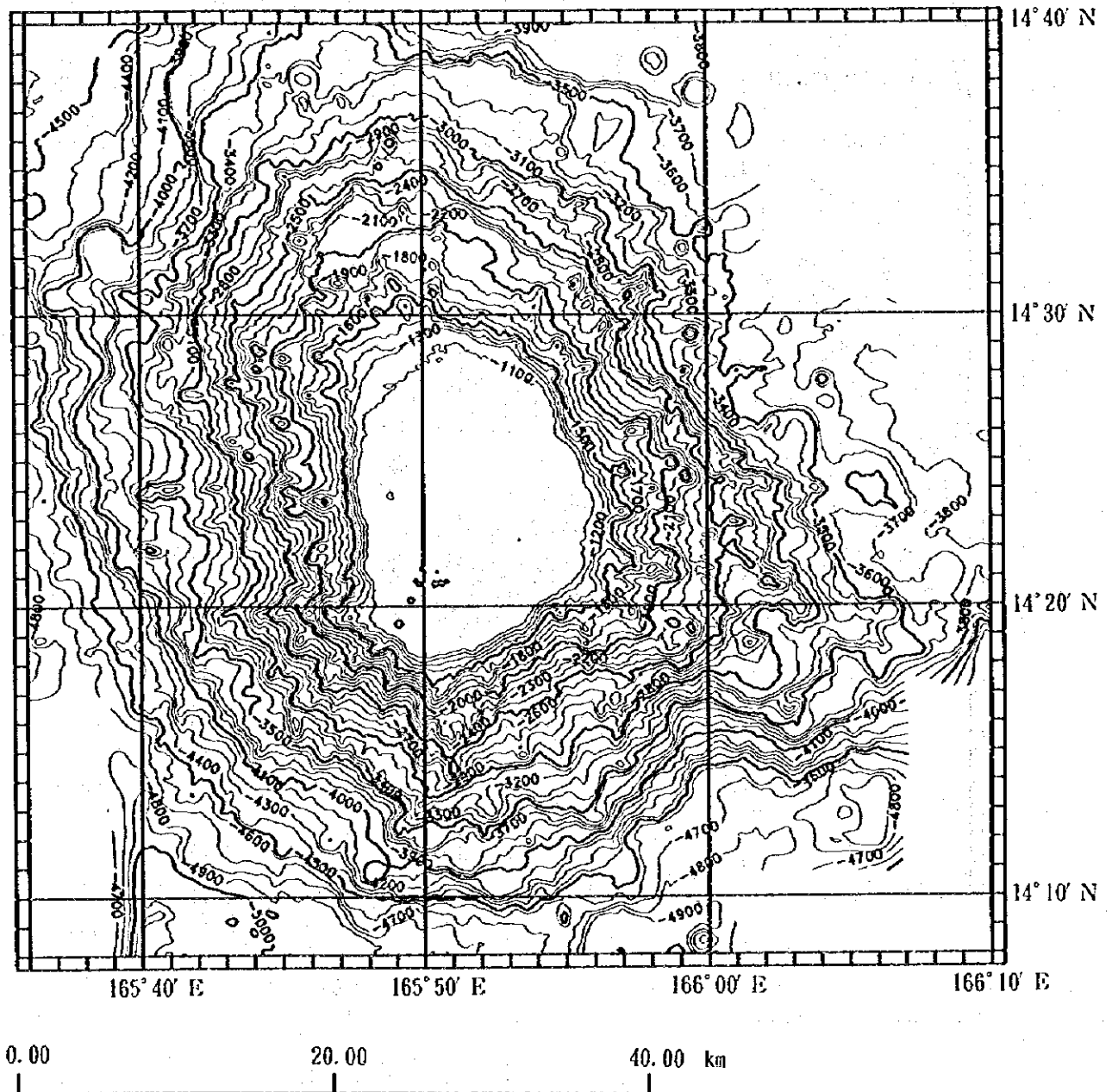


Fig. 3-1-2 (4) Bathymetric map based on MBES of seamount MS04. MBES data are gridded at an about 200m spacing. Contour interval is 100m.



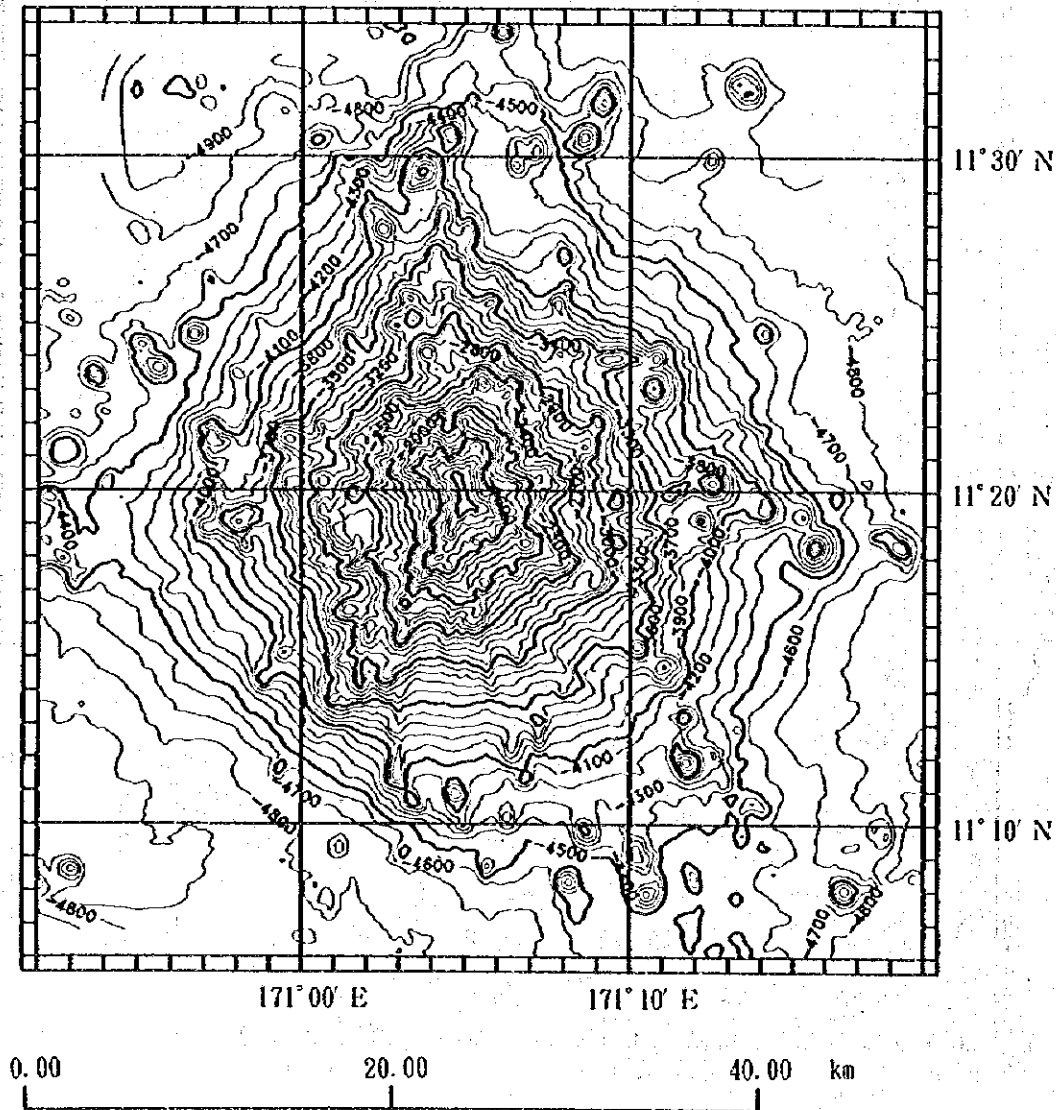


Fig. 3-1-2 (5) Bathymetric map based on MBES of seamount MS05. MBES data are gridded at an about 200m spacing. Contour interval is 100m.

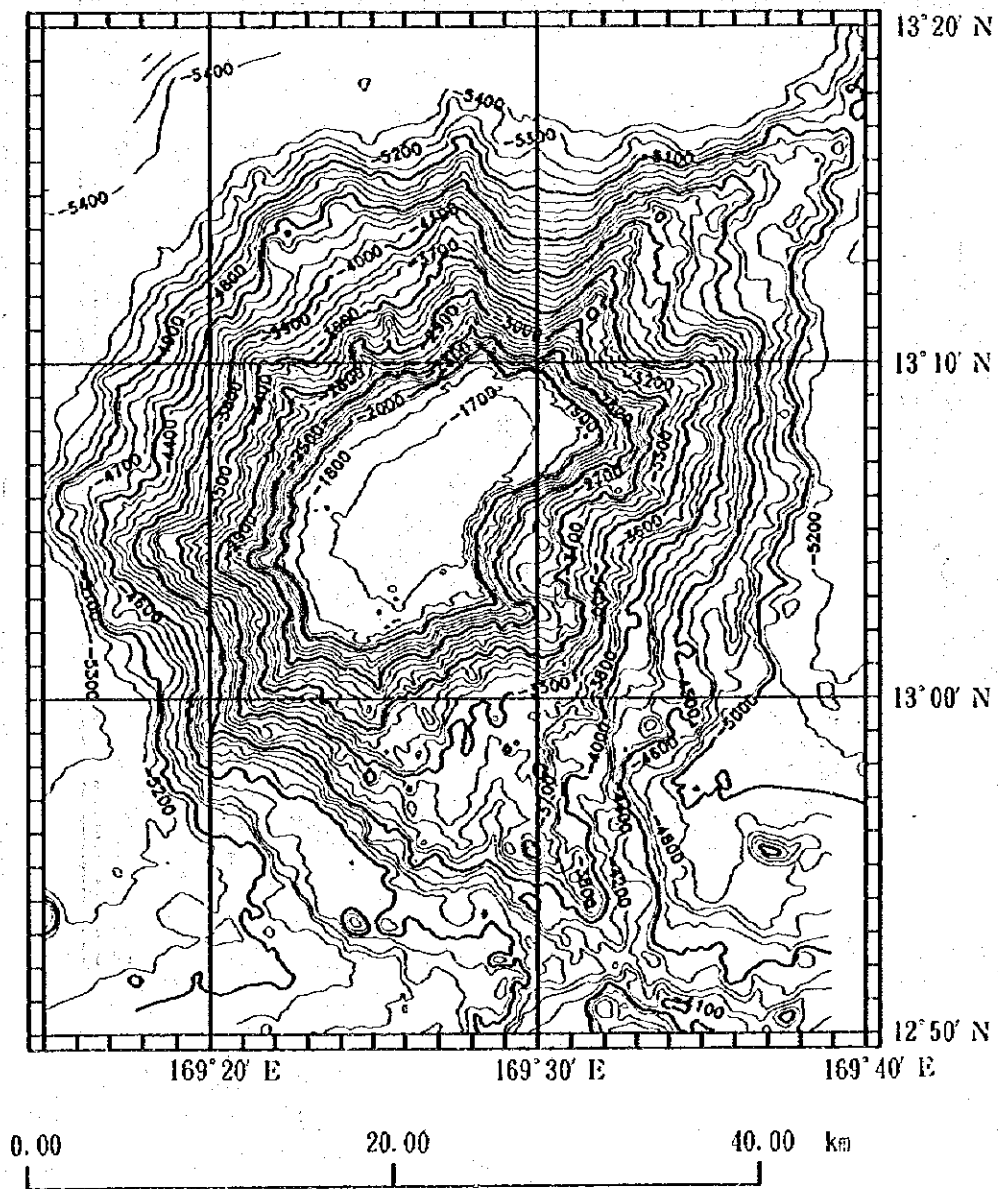


Fig 3-1-2 (6) Bathymetric map based on MBES of seamount MS06. MBES data are gridded at an about 200m spacing. Contour interval is 100m.

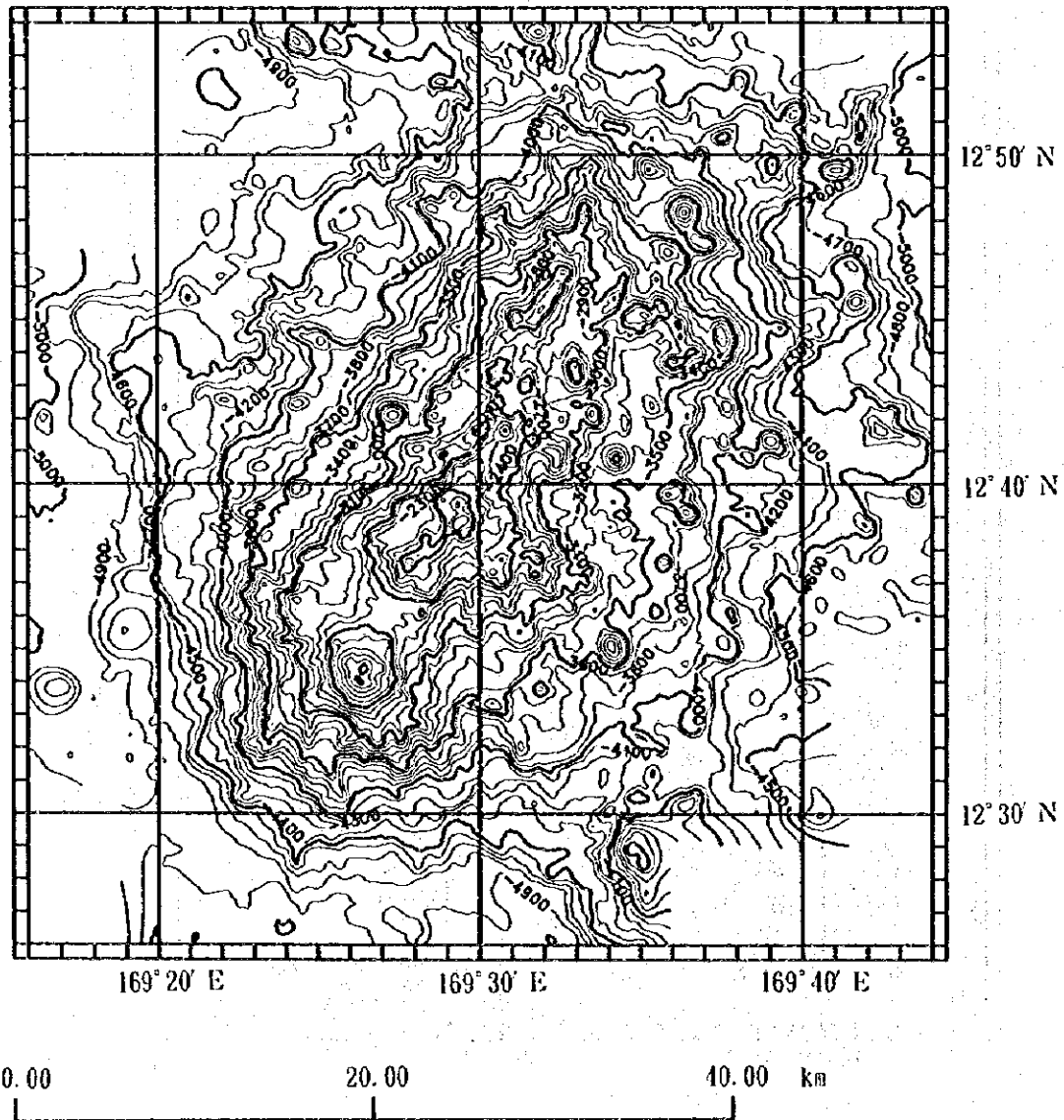


Fig. 3-1-2 (7) Bathymetric map based on MBES of seamount MS07.  
 MBES data are gridded at an about 200m spacing.  
 Contour interval is 100m.

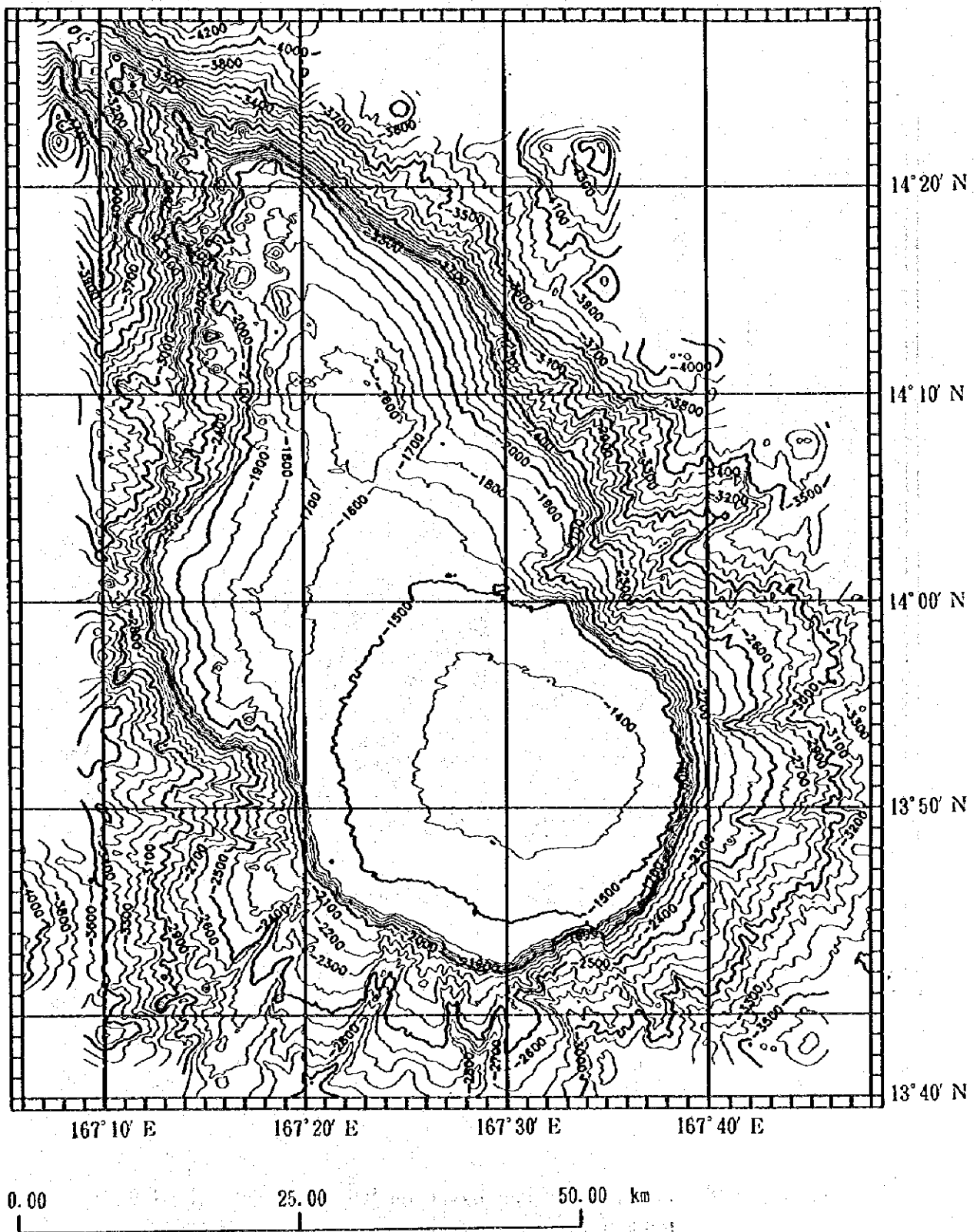


Fig. 3-1-2 (8) Bathymetric map based on MBES of seamount MS08. MBES data are gridded at an about 200m spacing. Contour interval is 100m.

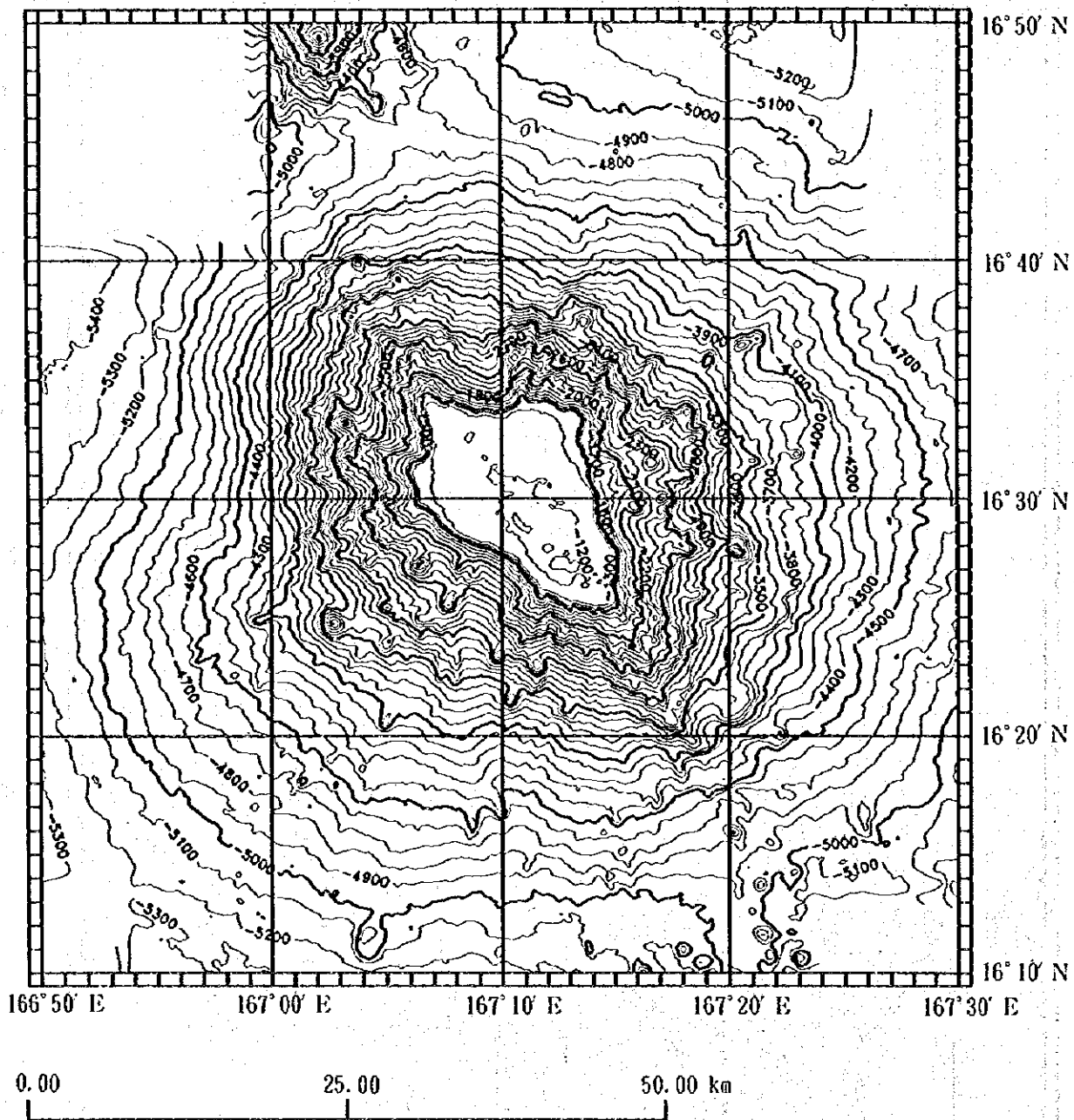


Fig. 3-1-2 (9) Bathymetric map based on MBES of seamount MS09. MBES data are gridded at an about 200m spacing. Contour interval is 100m.

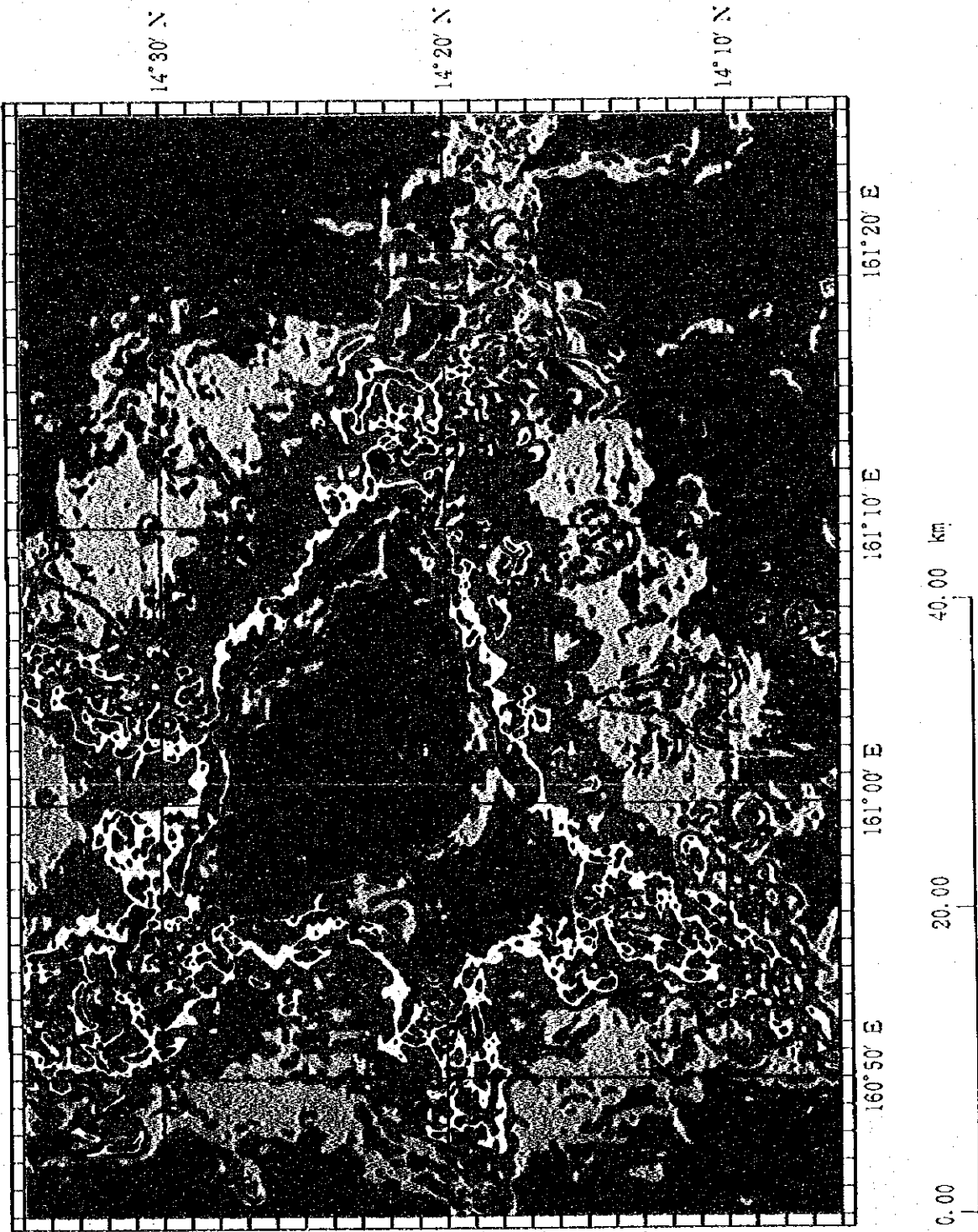
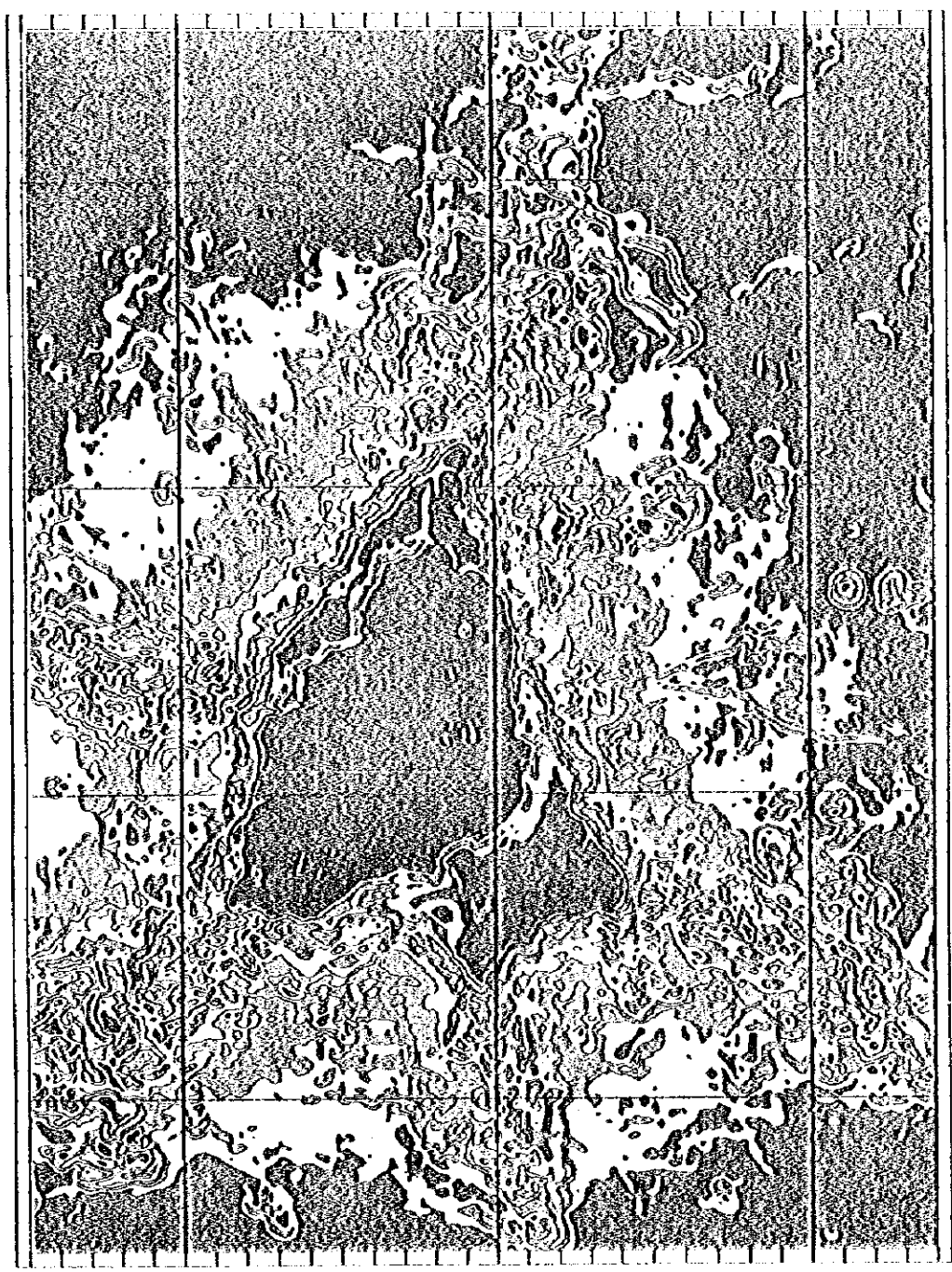


Fig. 3-1-3(1) Topographic gradient map based on MBES of seamount MS01.  
Contour interval is 5 degrees.

1000000  
1000000  
1000000  
1000000  
1000000



1000000  
1000000  
1000000  
1000000  
1000000

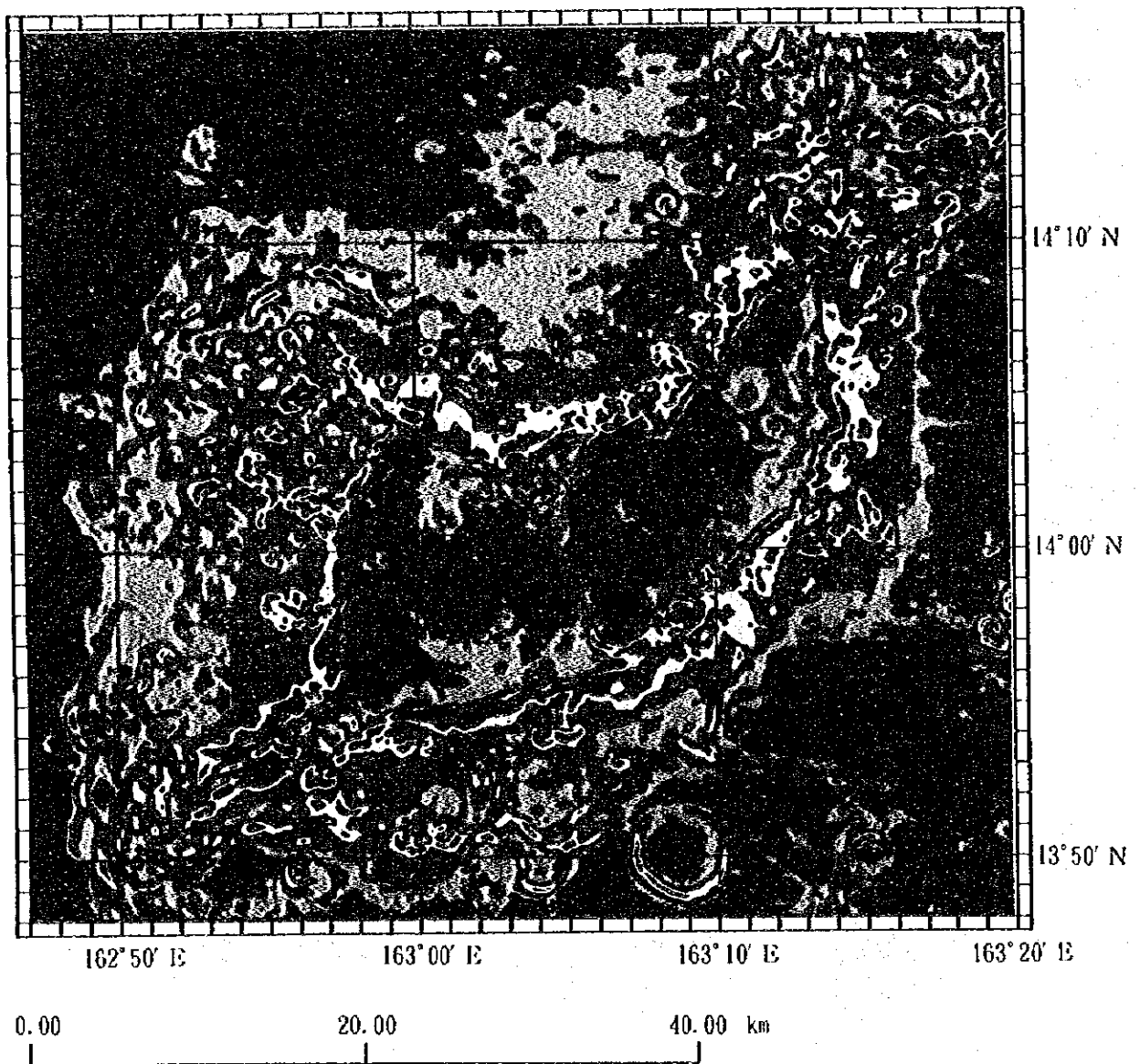


Fig. 3-1-3 (2) Topographic gradient map based on MBES of seamount MS02.  
 Contour interval is 5 degrees.



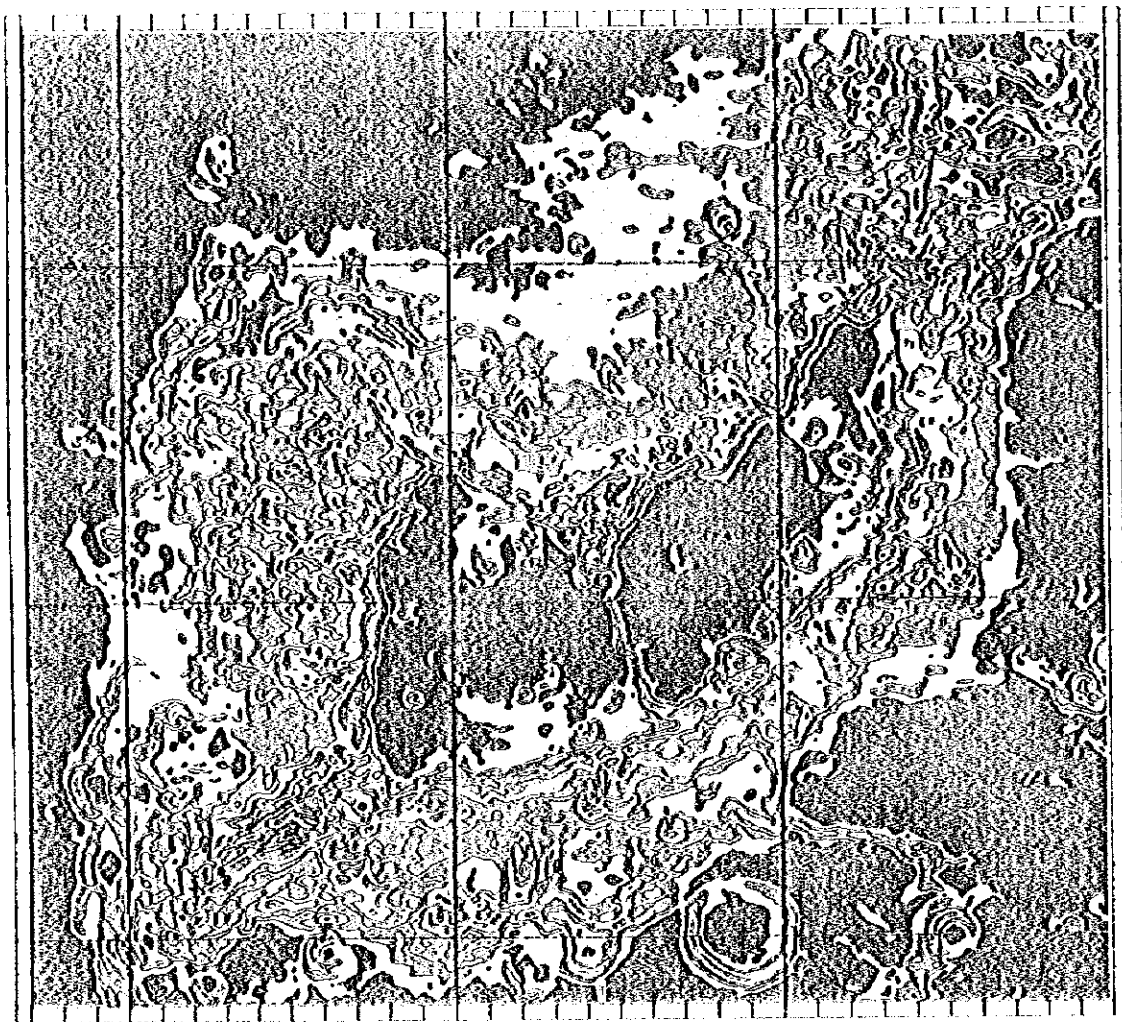
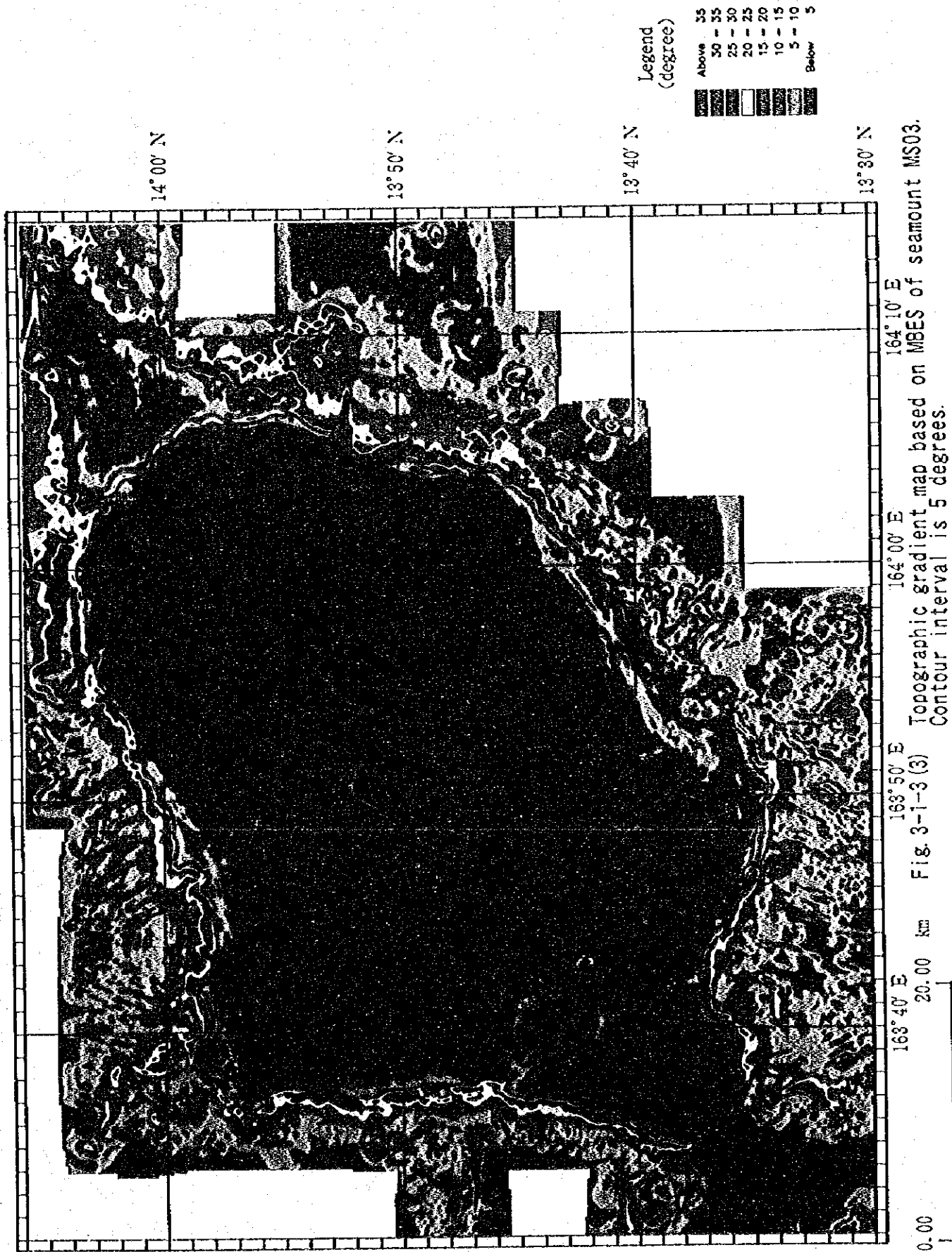


Figure 3.1.3(2) Topographic gradient map based on MBES of seamount MS02. Contour interval is 5 degrees.

Color/Pattern	Value
Dark Grey	35
Medium-Dark Grey	30
Medium Grey	25
Light Grey	20
Very Light Grey	15
White	10
White	5
White	0





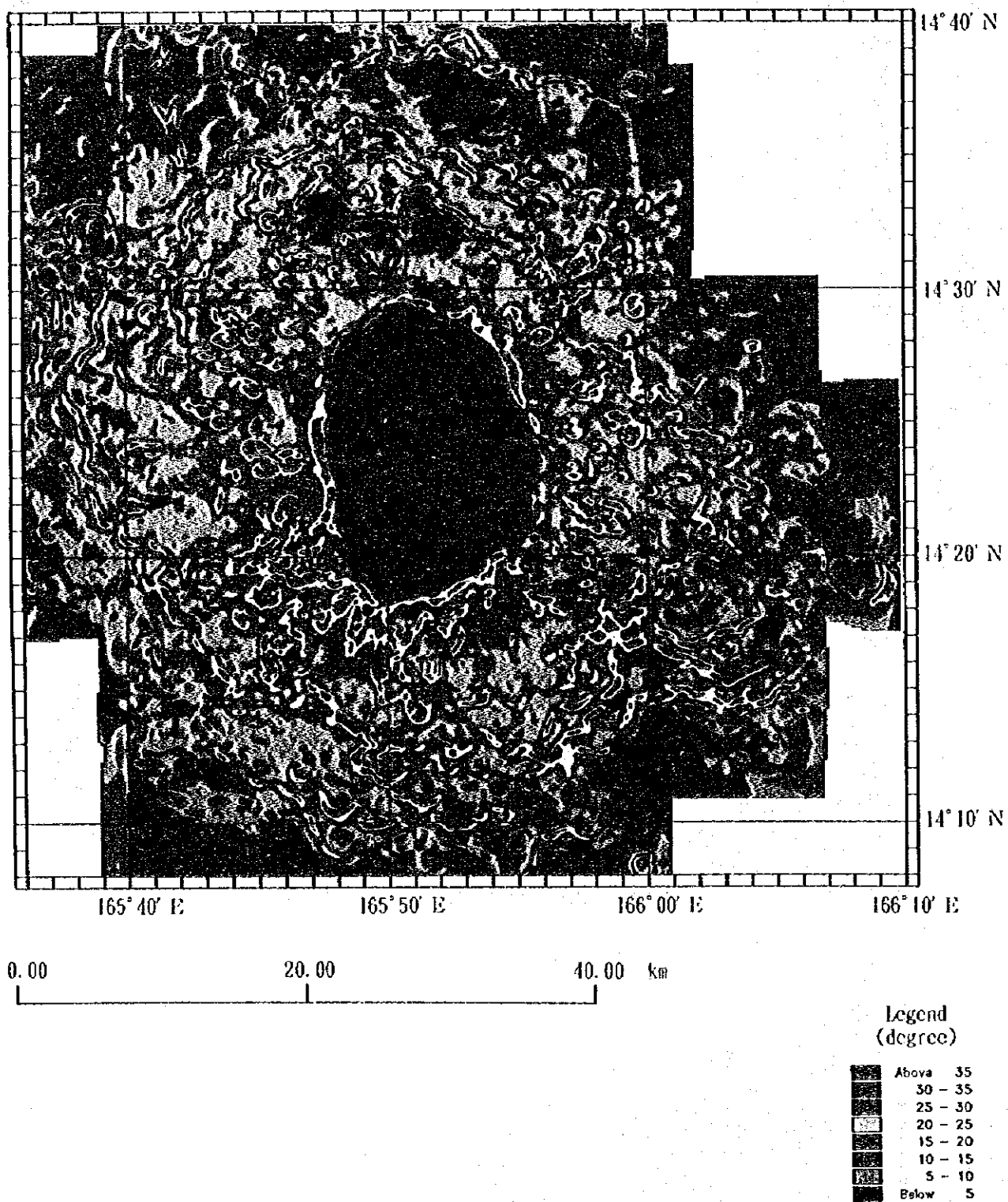


Fig. 3-1-3 (4) Topographic gradient map based on MBES of seamount MS04.  
Contour interval is 5 degrees.

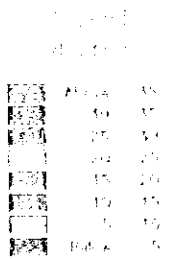
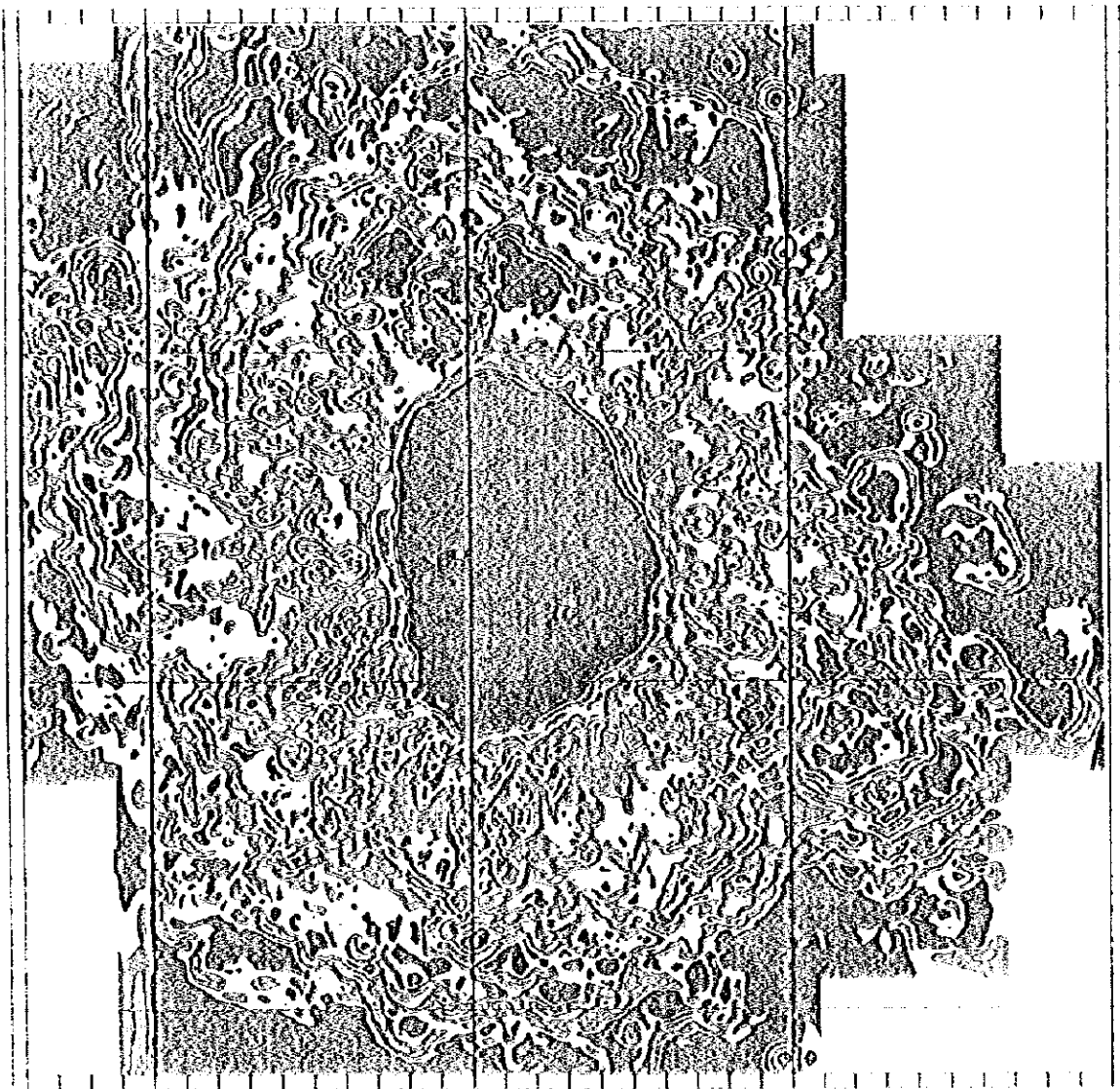
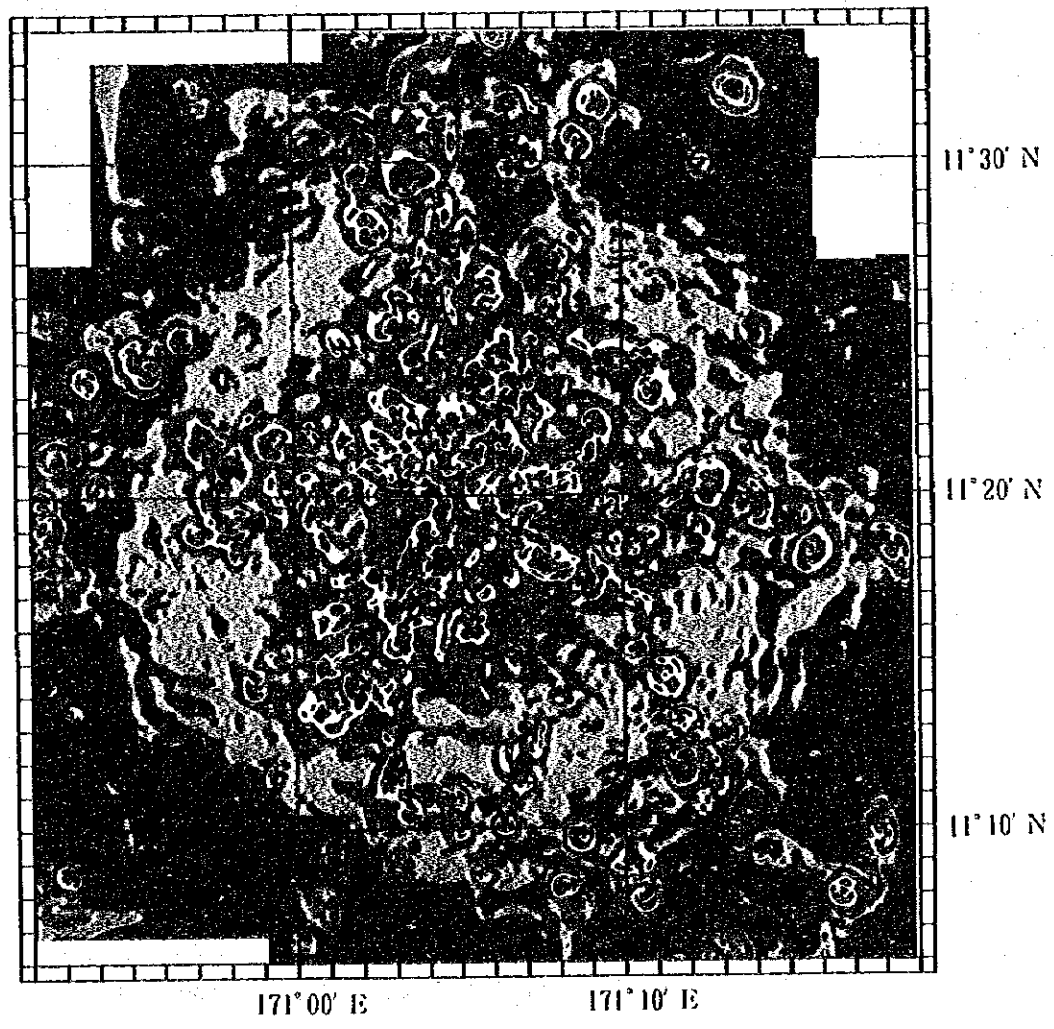


Fig. 3.1.3 (D) Tomographic gradient map based on MBLS of seamount MS04.  
Contour interval is 5 degrees.

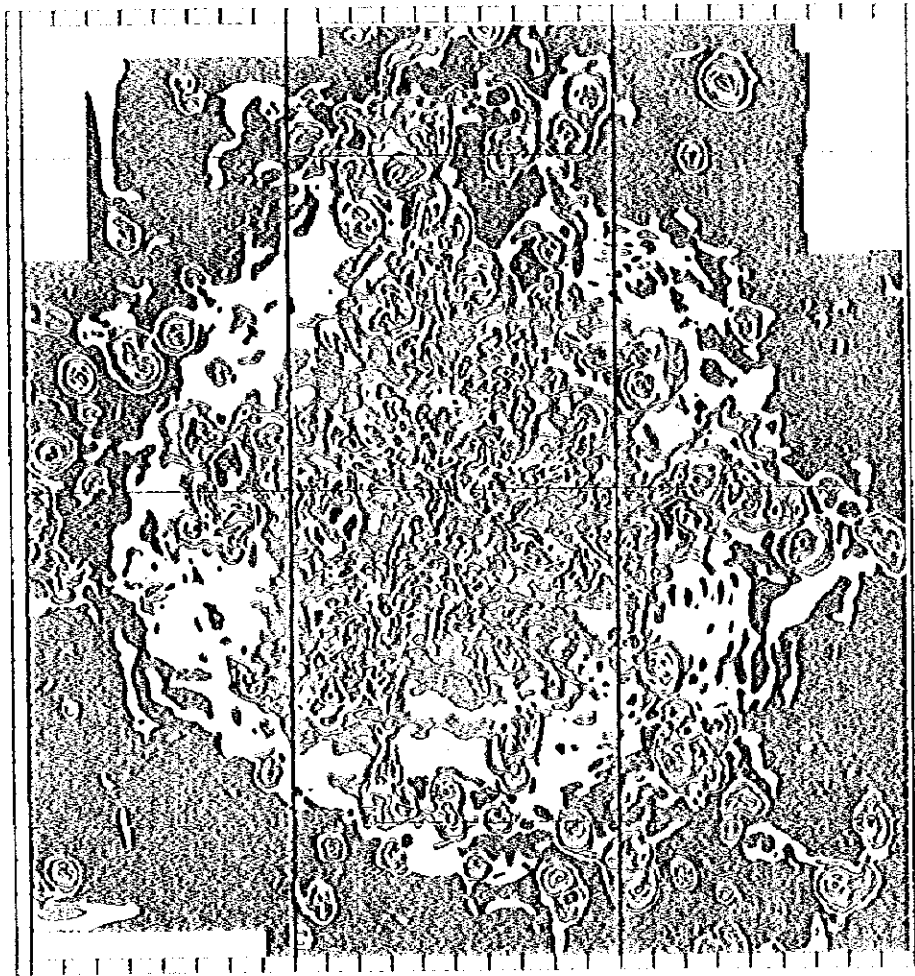


0.00                      20.00                      40.00 km

Legend  
(degree)

Darkstippled	Above 35
Medium-darkstippled	30 - 35
Mediumstippled	25 - 30
Lightstippled	20 - 25
White	15 - 20
Medium-lightstippled	10 - 15
Lightstippled	5 - 10
Darkstippled	Below 5

Fig. 3-1-3 (5) Topographic gradient map based on MBES of seamount MS05.  
Contour interval is 5 degrees.



1000  
 800  
 600  
 400  
 200  
 0  
 -200  
 -400  
 -600  
 -800  
 -1000

1000	1000
800	800
600	600
400	400
200	200
0	0
-200	-200
-400	-400
-600	-600
-800	-800
-1000	-1000

Fig 3.1.3(b) Topographic gradient map based on MLI S of scanout MS05  
Contour interval is 5 degrees

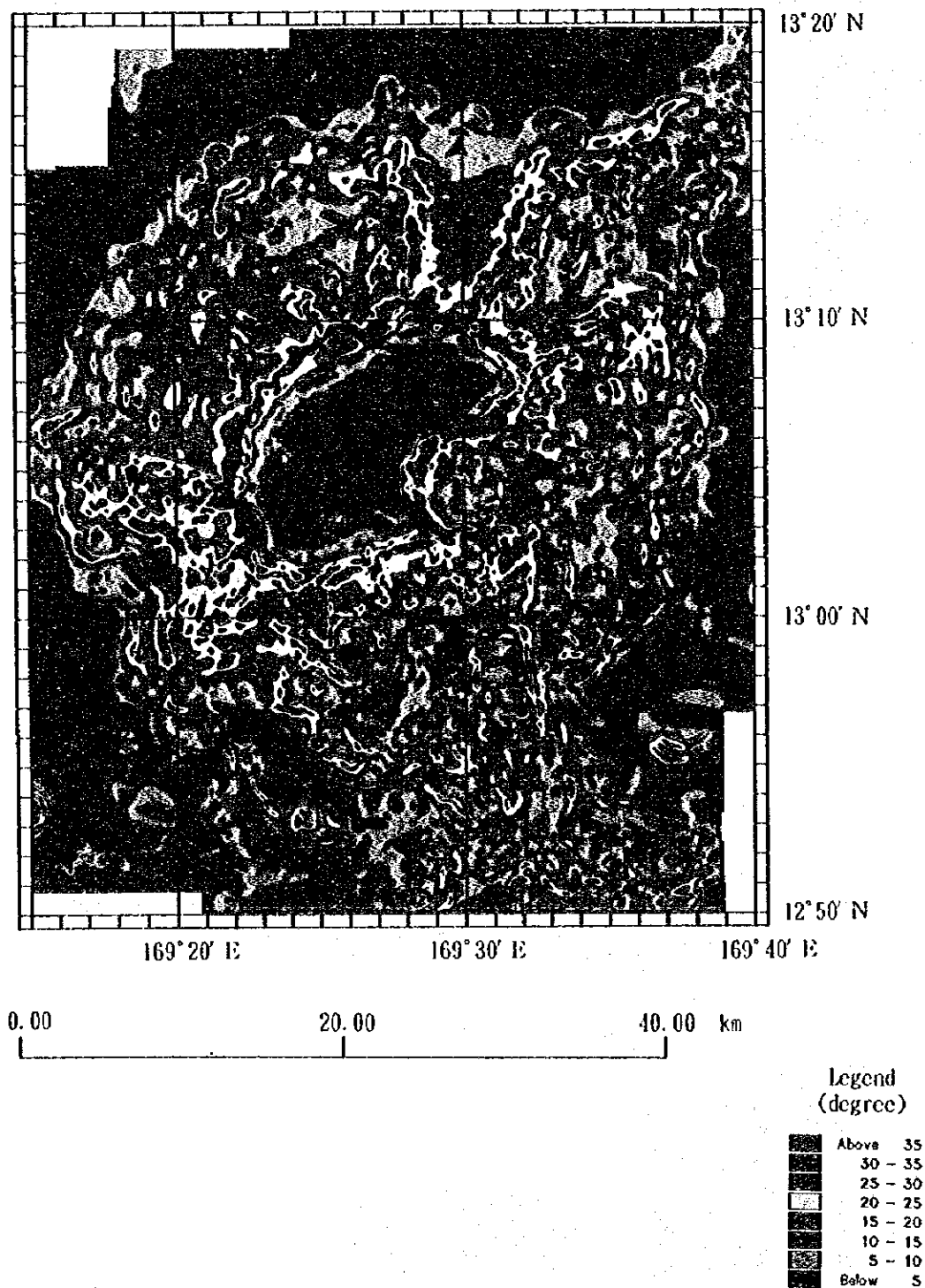
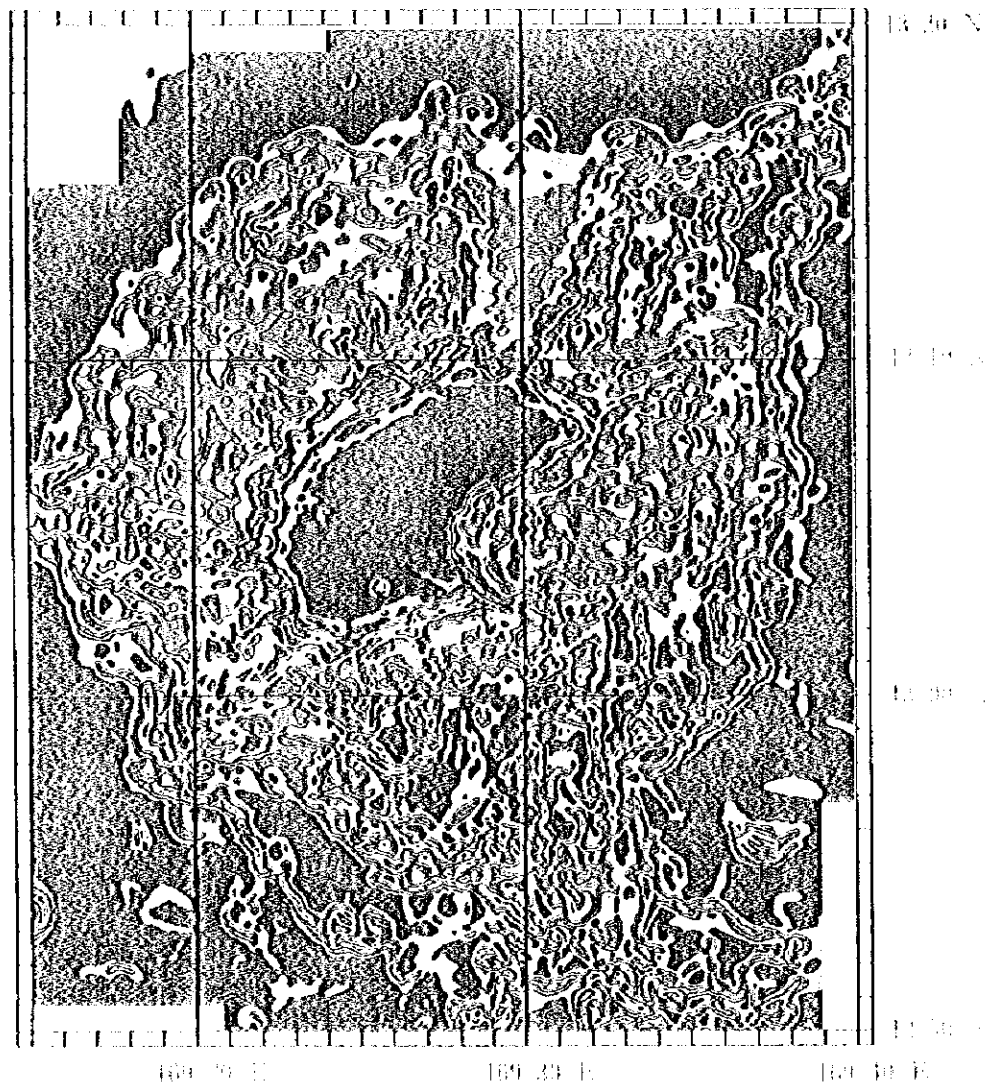


Fig. 3-1-3 (6) Topographic gradient map based on MBES of seamount MS06.  
Contour interval is 5 degrees.





Legend  
degrees

████████	Above 35
████████	30 - 35
████████	25 - 30
████████	20 - 25
████████	15 - 20
████████	10 - 15
████████	5 - 10
████████	Below 5

Fig 3 1-3 (6) Topographic gradient map based on MBES of seamount MS06. Contour interval is 5 degrees