

## II. SUBMARINE TOPOGRAPHY OF THE AREA NORTHEAST OF HACHIJOJIMA ISLAND IN THE NORTHERN PART OF THE SHICHITO RIDGE

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The surveyed area, which lies within the latitudes 33°–00' to 34°–10'N and the longitudes 139°–40' to 140°–40'E, occupies the northern part of the Shichito Ridge, and was investigated geologically and geophysically during cruise GH80–4 of the R/V Hakurei-maru in July and August, 1980. Bathymetric records of the area were made along all tracks of the geophysical survey with a 12 kHz echo sounder of the NS16-type made by the N.E.C. Co., Ltd. The topography of the area, based on the bathymetric records, is shown in Figures II-1 and II-2 a-b, and the characteristics of the topography are explained briefly here.

### **Topographic units**

The surveyed area can be divided into three topographic units: that is, a swell (elevation) in the central part of the area, a row of volcanic islands in the western part of the area, and the continental slope in the eastern part.

#### *The Central Swell*

The swell in the central part of the area is the most remarkable topographic feature. It extends in a north-south direction, has broad, flat tops at water depths of 150 to 400 m, and is associated with steep, short slopes with inclinations of 7 to 17 degrees on the east and west flanks.

The swell is made up of three banks, the Kitakurose, Nakanokurose and Shinkurose Banks, which are separated by shallow depressions. Although the tops of the banks are almost flat and smooth, they incline at about 0.3 degree toward the north (Fig. II-3). The different depths of the tops of the banks may be due to tilting of the swell.

The steep eastern and western slopes of the banks trend north-south. West of the Kitakurose and Shinkurose Banks are a row of small knolls and the smaller bank—the Nakanokurose Bank. These are separated from the former banks by a narrow depression which trends with north-south or NNE-SSW. The Nakanokurose Bank seems to be a southward extension of the row of knolls. The western slopes of the Nakanokurose Bank and the knolls are steep and undulating, and extend to the western flank of the Kurose Bank.

On the eastern half of the southern slope of the Shinkurose Bank there are small-scale north-south trending channels and ridges, one of which is the Takunanayama Knoll. Similar topographic features trending in the same direction also

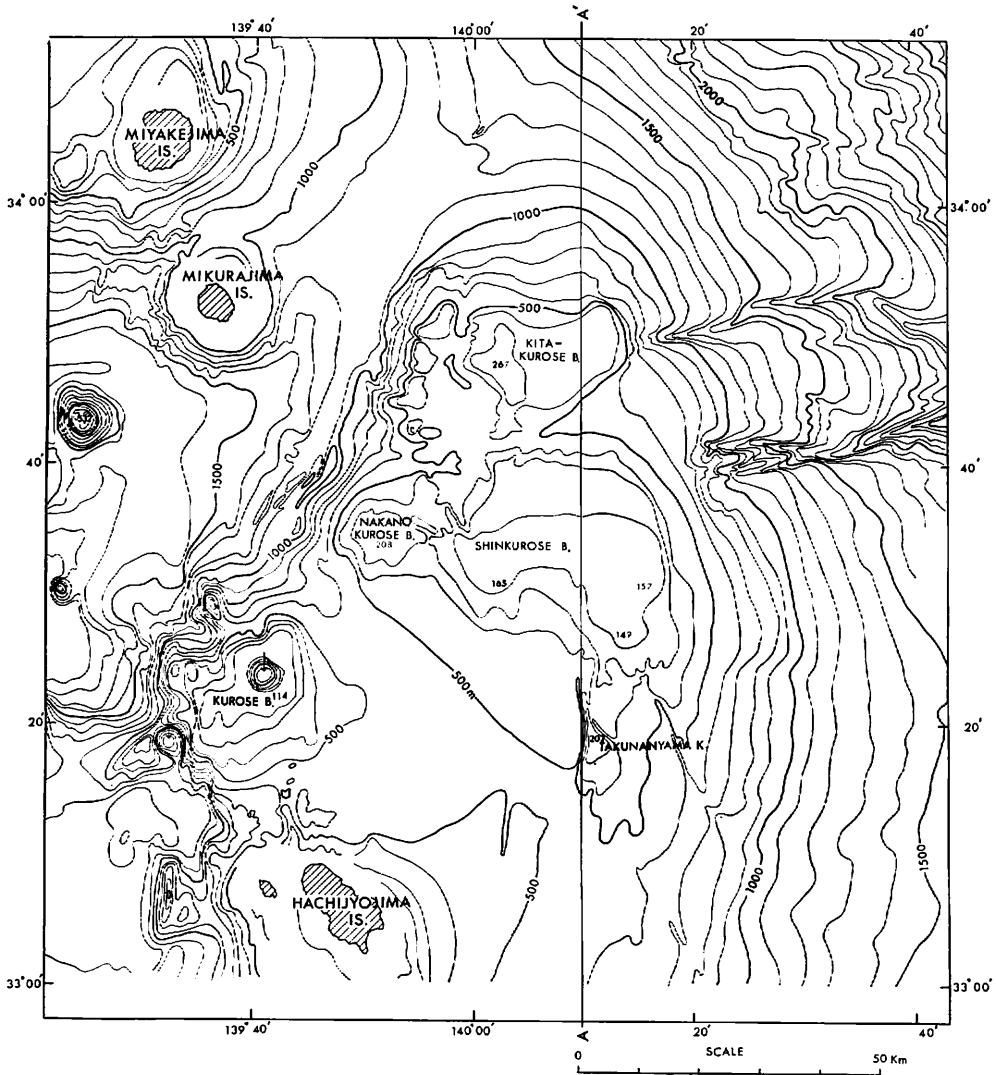


Fig. II-1 Topography of the area surveyed during cruise GH80-4.

exist on the northern slope of the Kitakurose Bank. These features seem to be formed by faults trending north-south.

#### *The Continental Slope*

The continental slope inclines at about 2 degrees from the base of the steep slope of the swell and extends down to the trench wall. The northern part of the unit is incised by two valleys running parallel and straight with an east-west trend. There is no valley in the southern part of the unit. The valleys begin

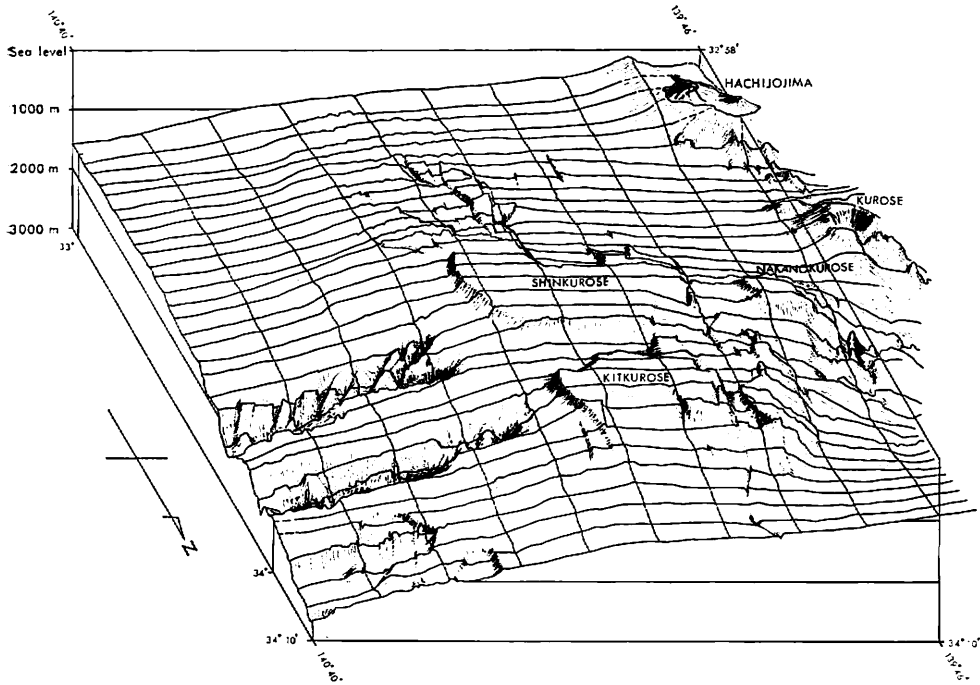


Fig. 11-2a An elevated view of the submarine topography from north to south.

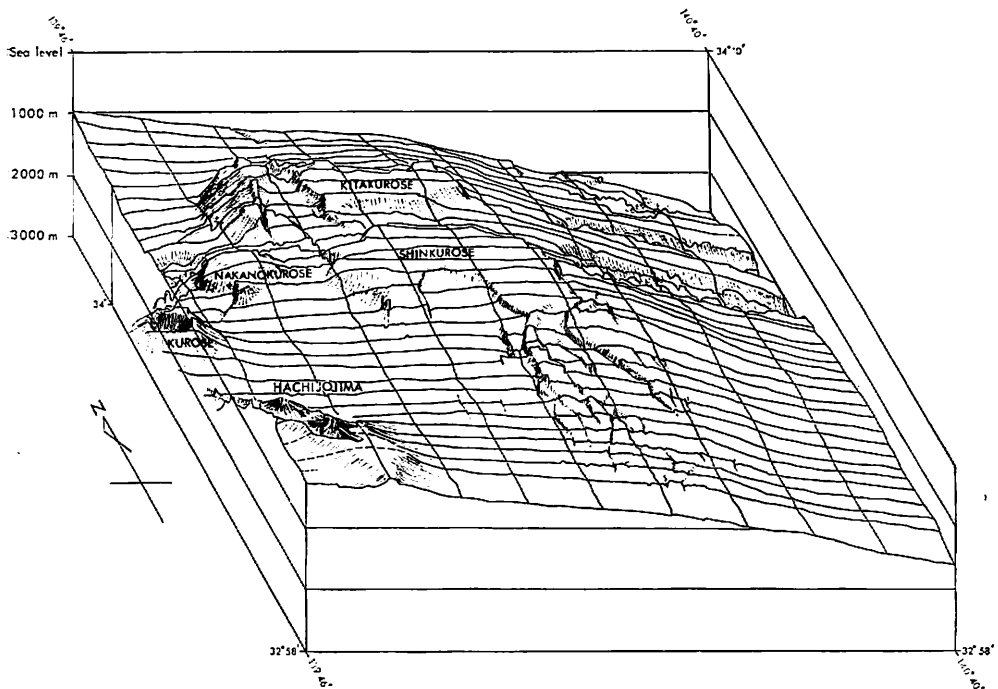


Fig. 11-2b An elevated view of the submarine topography from south to north.

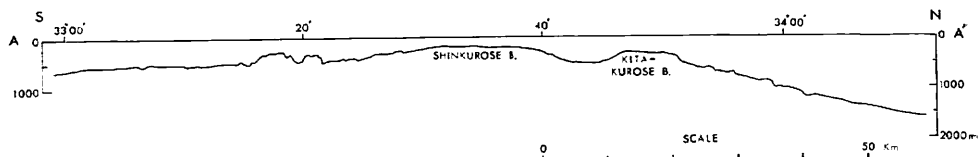


Fig. II-3 A profile across the Shinkurose and Kitakurose Banks in a north-south direction.

at the base of the steep slopes of the banks at water depths of 720 to 1000 m, and can be traced to water depths of 6000 m. The western extension of the southern valley seems to join a shallow depression which separates the Kitakurose Bank from the Shinkurose Bank. This depression might be one of the structural lineaments of the area.

#### *The row of volcanic islands*

A N-S trending row of volcanic islands, Miyakejima, Mikurajima and Hachijojima Islands, is situated in the western part of the area, and the Kurose Bank, having caldera-like topography, is situated in this row. A deep and broad depression trending north-northeast to south-southwest, and having water depths of 1400 to 1500 m lies between the bank and Mikurajima. The bank is also located on the southwestern extension of the Nakanokurose and Kitakurose Banks.

The Kurose Bank is 460 m high, has a crater 2.7 km in diameter and 500 m in depth. Judging from the tuff breccia and pumice obtained from the wall of the crater and from its morphological character, the bank seems to be a submarine caldera.

#### **Summary and conclusions**

The area surveyed is divided topographically into three units, namely, a swell unit consisting of flat topped banks, the continental slope having submarine valleys, and a row of volcanic islands including a submarine caldera. From these topographic features it is suggested that the area surveyed has a complicated tectonic history including N-S, NE-SW and E-W faulting and associated volcanic activity, that the E-W trending faults seem to be youngest, and that the E-W trending faults which border the swell might have developed after a large paleo-volcanic island had appeared above sea-level and subsequently sunk. The flat tops of the banks may be the result of wave erosion. The slight northward tilting of the tops of the banks is considered to be the youngest tectonic event.