

## II. MORPHOLOGICAL SETTING OF THE OGASAWARA ARC

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The Ogasawara Arc is approximately 1,100 km long with a N-S trend from latitude 35°N to 25°N within the longitude 139°E to 145°E. The dominant ridge in the Arc is the Shichito (Iwojima) Ridge which is a volcanic ridge extending along the whole length of the Arc. The Ogasawara (Bonin) Trench which also extends along the whole length of the Arc, is interrupted by the Ogasawara Plateau at the southern end. The trench to the south of the Plateau is the Mariana Trench. Almost the entire bottom of the Ogasawara Trench has a depth of more than 9,000 m, with steep walls on the inner trench slope and relatively gentle slopes on the outer trench slope. The ridged structure of the outer trench slope may suggest horsts and grabens as observed in other trenches.

The Ogasawara Ridge, associated with the Ogasawara Trough on the west side is limited to the southern half of the forearc region. The Izu Ridge to the west of the Shichito Ridge is indistinct throughout the Arc. It shows some highs on the mid-slope of the western flank of the Shichito Ridge in the northern area and small irregular highs decreasing in occurrence to the south, in the southern area.

Several terms have been proposed for the topographical features of the Ogasawara Arc System. The term Izu-Ogasawara was used for the arc, trench and forearc ridge (MOGI, 1972). The term Bonin has been used for the same arc, trench, and forearc ridge (KARIG and MOORE, 1975). The term Shichito-Iwoto Ridge (MOGI, 1972) or Iwoto Ridge (KARIG and MOORE, 1975) was used for the volcanic ridge in the central part of the arc. The Nishi-Shichito Ridge was used for the ridge to the west of the volcanic ridge (MOGI, 1972).

Here, we use the terms Ogasawara (Bonin) Arc, Ogasawara (Bonin) Trench, and Ogasawara (Bonin) Ridge for the arc, trench and forearc ridge respectively, Ogasawara (Bonin) Trough for the forearc trough, instead of the terms Izu-Ogasawara Arc, Trench, Ridge and Trough, respectively. Shichito (Iwojima) Ridge is used for the volcanic ridge and Izu Ridge instead of Nishi-shichito Ridge for the ridge to west of the Shichito Ridge (Fig. II-1). A new designation, Nishinoshima Trough, is used for a trough between the Shichito Ridge and the Izu Ridge.

On the basis of forearc morphology, two morphological provinces are distinguished in the Ogasawara Arc System, one to the north and one to the south.

### 1. The northern Ogasawara Arc

The Shichito Ridge is the only dominant morphological high in the northern arc (Fig. II-2). No distinct high is observable in the forearc area. Small, indistinct highs are observed on the trench slope break. More small, indistinct highs make-up the Izu Ridge which shows as highs on the western flank of the Shichito Ridge,

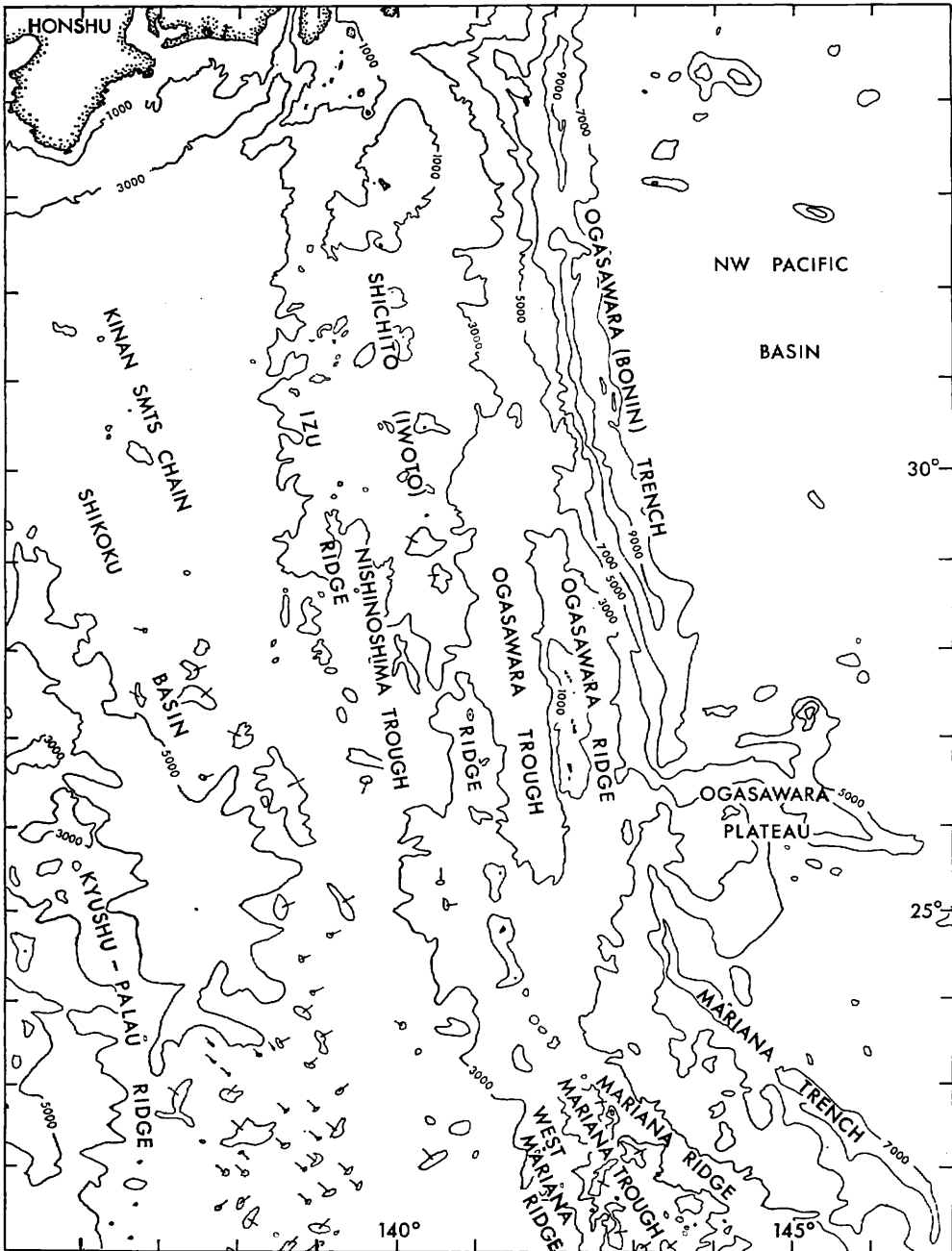


Fig. II-1 Bathymetry of the Ogasawara and the northern Mariana Arc Systems.

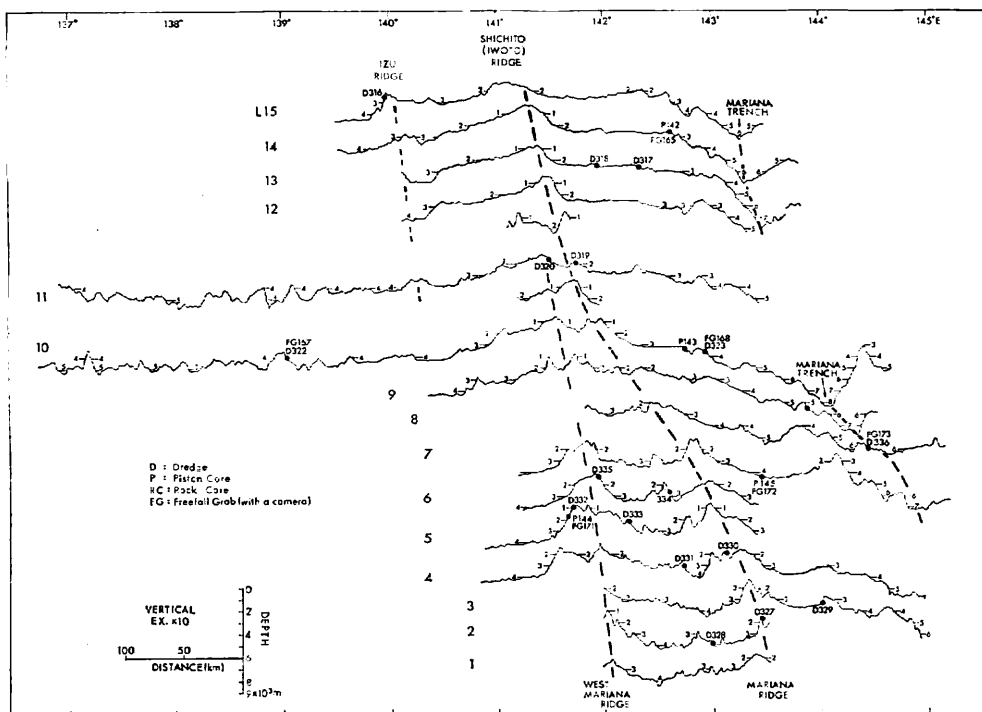


Fig. II-2 Topographical profiles along the tracks of GH79-2 cruise.

the dominant ridge in the area.

The area between the Shichito Ridge and the Izu Ridge is ridged with many small highs. The rather smooth bottom at the foot of the Izu Ridge on the west is the eastern margin of Shikoku Basin.

## 2. The southern Ogasawara Arc

Two morphological features which are not observable in the northern province, are distinguishable in the forearc region of the southern Ogasawara Arc. They are Ogasawara Ridge and the Ogasawara Trough. The Ogasawara Ridge, which has a steep slope on the west side and a gentle slope on the east side, extends to the indistinct high on the trench slope break of the northern arc. The Ogasawara Trough, which has a smooth bottom, extends to the relatively smooth and gentle continental slope of the northern arc. The Ogasawara Trench has a deformed feature which forms shallow trench bottom along the western margin of the Ogasawara Plateau and extends to the arc.

A narrow, deep depression is remarkable along part of the central high, on Shichito Ridge, but is not always apparent throughout the profile in Fig. II-3.

## 3. The northern Margin of the Mariana Arc

Some different morphological features are observed in the Mariana Arc as compared with those in the southern Ogasawara Arc. A distinct ridge (The west

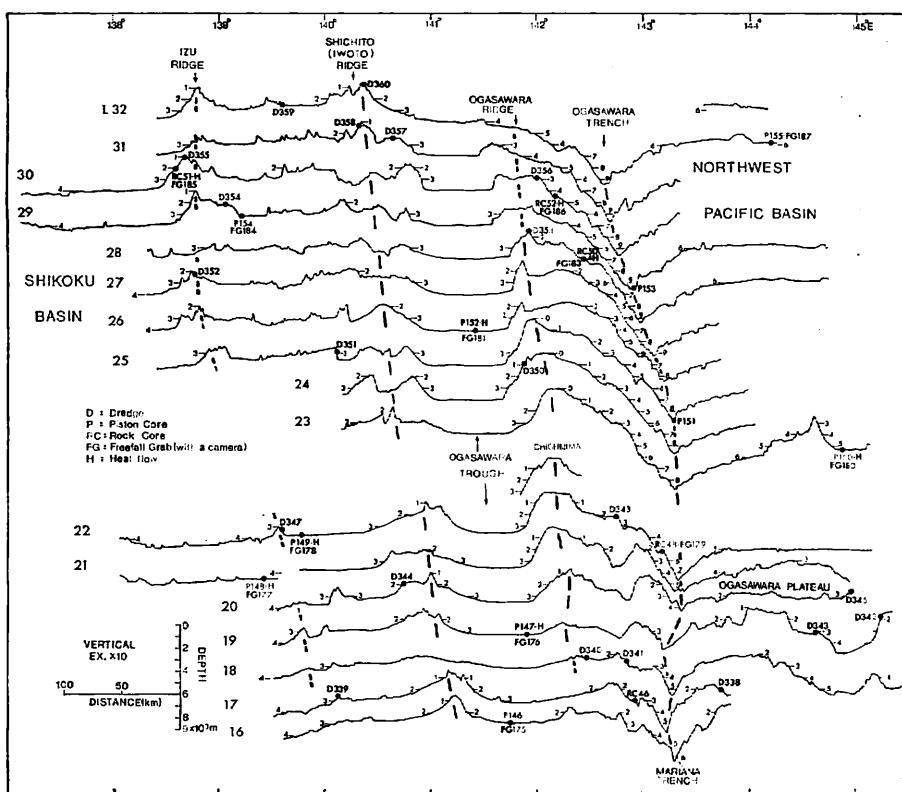


Fig. II-3 Topographical profiles along the tracks of cruise GH79-3.

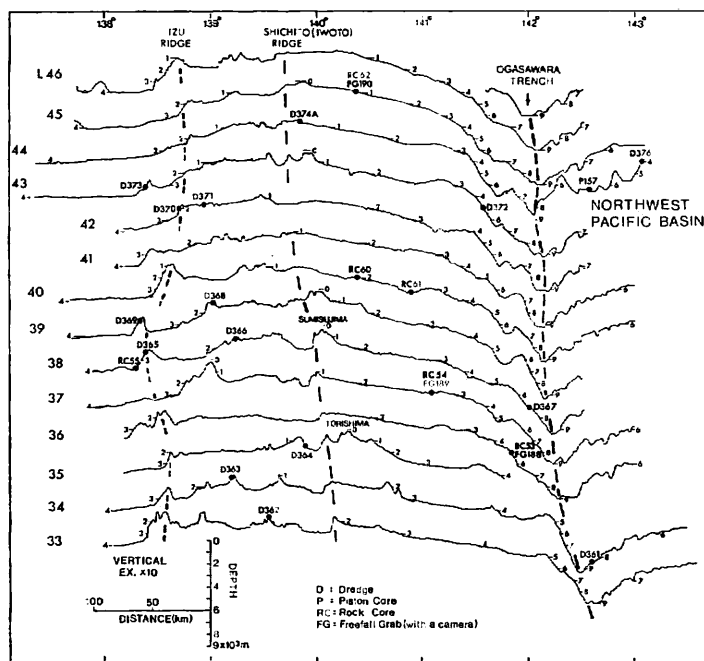


Fig. II-4 Topographical profiles along the tracks of cruise GH79-4.

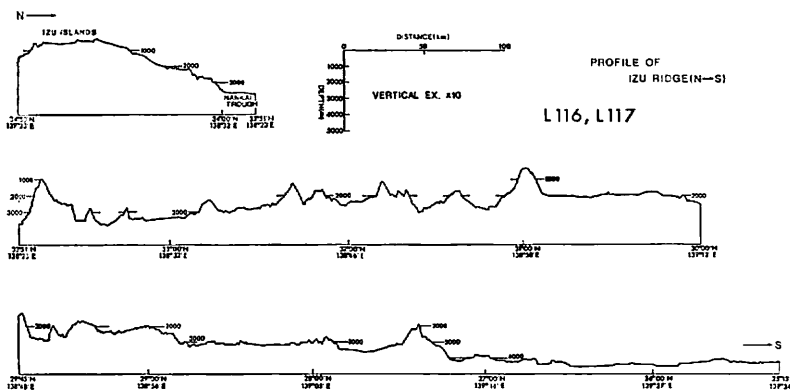
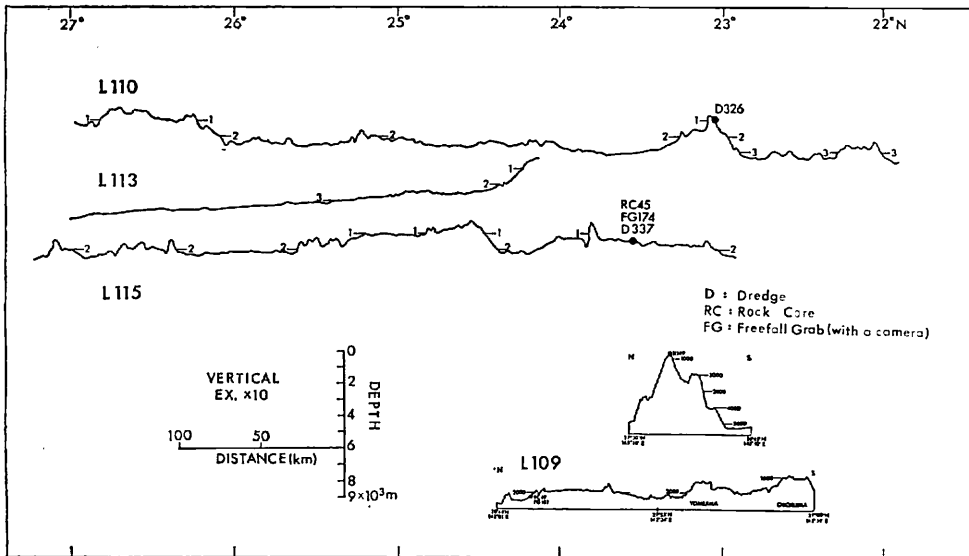


Fig. II-5 Topographical profiles along the longitudinal tracks of the Ogasawara Arc.

Mariana Ridge) lies to the west of the volcanic ridge (The Mariana Ridge) and separated from it by a trough (The Mariana Trough) (Figs. II-4 and II-5). The forearc morphology of the Mariana Ridge and the Mariana Trench is convex toward the east. The West Mariana Ridge is rather straight and trends N-S. The Mariana Trough is ridged with small highs and lows. The Izu Ridge disappears beneath the smooth bottom of the Parece Vela Basin which is the southern extension of Shikoku Basin. The West Mariana Ridge is not the southern extension of the Izu Ridge, but is joined to the Mariana or Shichito Ridge at the boundary of the two Arcs.

### References Cited

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- MOGI, A. (1972) Bathymetry of the Kuroshio region, in YOSHIDA, K., (ed.), *Kuroshio-Its physical Aspects-*, Tokyo Univ. Press, p. 53–80.