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# The Rift Caves in Japan

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## Abstract

In Japan many craters erupted from fissures can be seen on the volcanic line from Mt Fuji to Hachijou Island in the Pacific Ocean. But fissure eruptions have not always left rift caves. Recently I have investigated this area and recognized four rift caves at Mt Fuji, three on Miyake Island, and three on Hachijou Island. On Miyake Island, a long crack and outpouring of lava occurred at the time of the fissure eruption. It is possible to see rift caves only in the caldera.

In rift caves, thinly coated lava may be seen on the scoriaceous wall of the cavity and also sideways extensions by gas pressure on the surface of the earth. I have identified two types of rift caves:

- gas extends laterally and causes cavitation with subsequent blowout;
- gas formed the cavity with subsequent blowout.

## Introduction

Rift caves are recognized at Mt Fuji, Hachijou Island, and Mt Oyama on Miyake Island, Japan. In the course of our research we found common characteristics as indicated below.

### Mt Fuji

In this volcano are five lines of fissure eruption craters. Four rift caves are located in two of these lines.

#### 1. Ice Fissure Crater Cave, Hyouketsu

This cave is located at an altitude of 1,440 meters, northeast of Mt Fuji. In this area (Figure 1) fissure eruption craters are located in a line about one kilometer long. Scoria was erupted from Yumiizuka volcano, and a thick layer was formed at Kooriike, Hakudairyuoo Volcano. From the crater of the latter, a small lava flow erupted ( $^{14}\text{C}$  1,230  $\pm$  30 BP). The rift cave formed in this eruption (Figure 3) has a large cavity at its bottom. Lava crust attached to the scoria layer has peeled off from the ceiling and both sides of this rift cave. On the flow some scoria is incorporated in the layer.

#### 2. Komitake Rift Caves No. 1, No. 2, and No. 3

Komitake-Fuketsu Lava Flow (Hyo), Kenmarubi Lava Flow (Ken). Oonagaremaruyama Lava Flow (Ona) erupted during the same period.

As shown in Figure 1, the Hyo lava flow is small but contains fissure eruption craters. Three rift caves are present at 2,063 to 1,980 meters above sea level. We were unable to enter Cave No. 1 because it is filled with solid ice from end to end. No. 2 and No. 3 Caves (Figure 5) are also ice-filled at their bottoms which thus cannot be investigated. In these caves (as in the others) the scoria wall layers are slightly coated by lava, some of which peels off. In the lower parts of the caves, a red scoria layer is present. This also occurs in other rift caves in Japan.

A thick scoria layer exists from here to the upper area. Snow melt has carried this layer to the lower area where the caves were created.

### Hachijou Island

#### 3. Eigou No. 1 Rift Cave

This rift cave is located at the northern foot of Mt Hachijoufuji (855.4 meters) on Hachijou Island. Rift caves here are found in fissure erup-





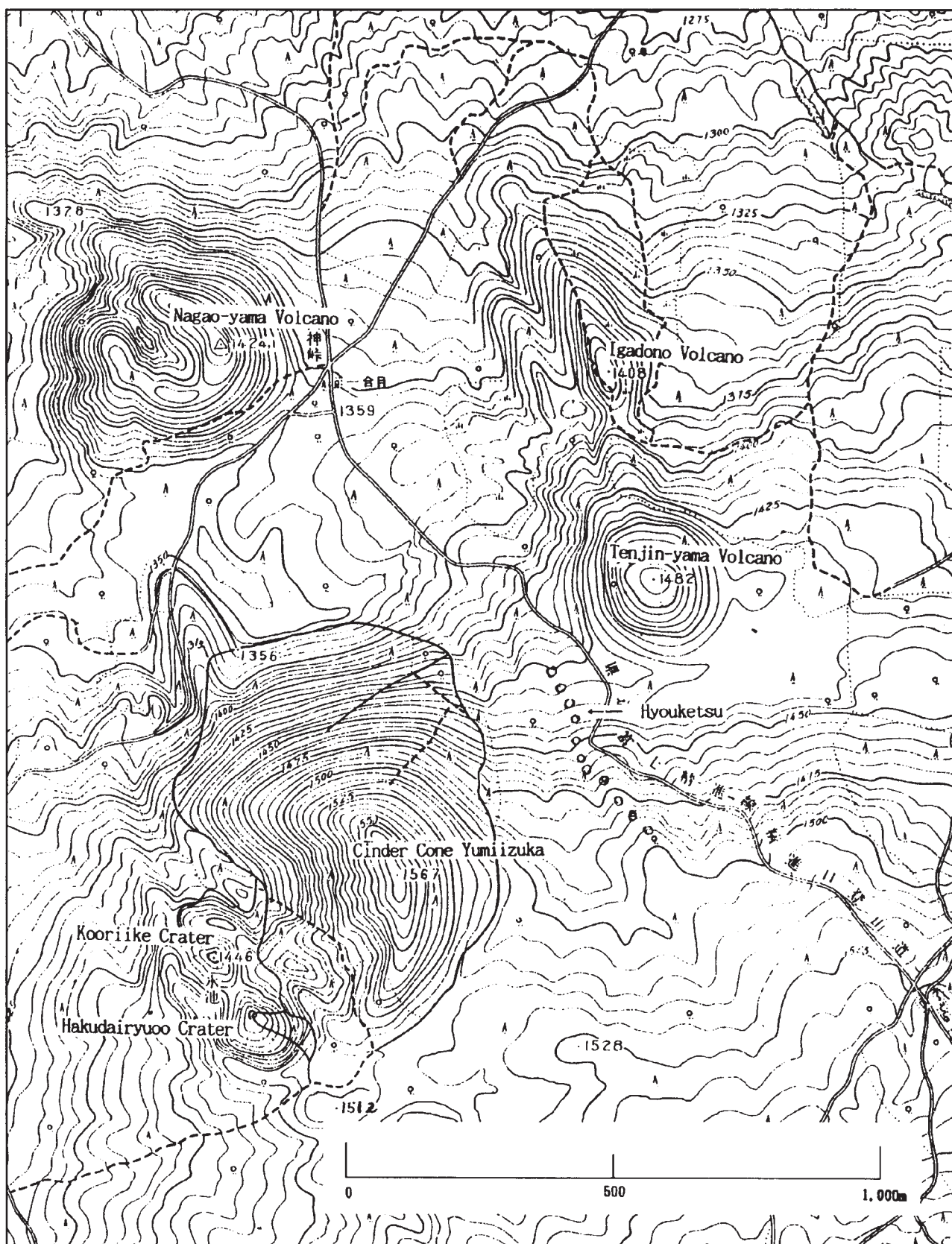


Figure 2—Map of Hyouketsu area.

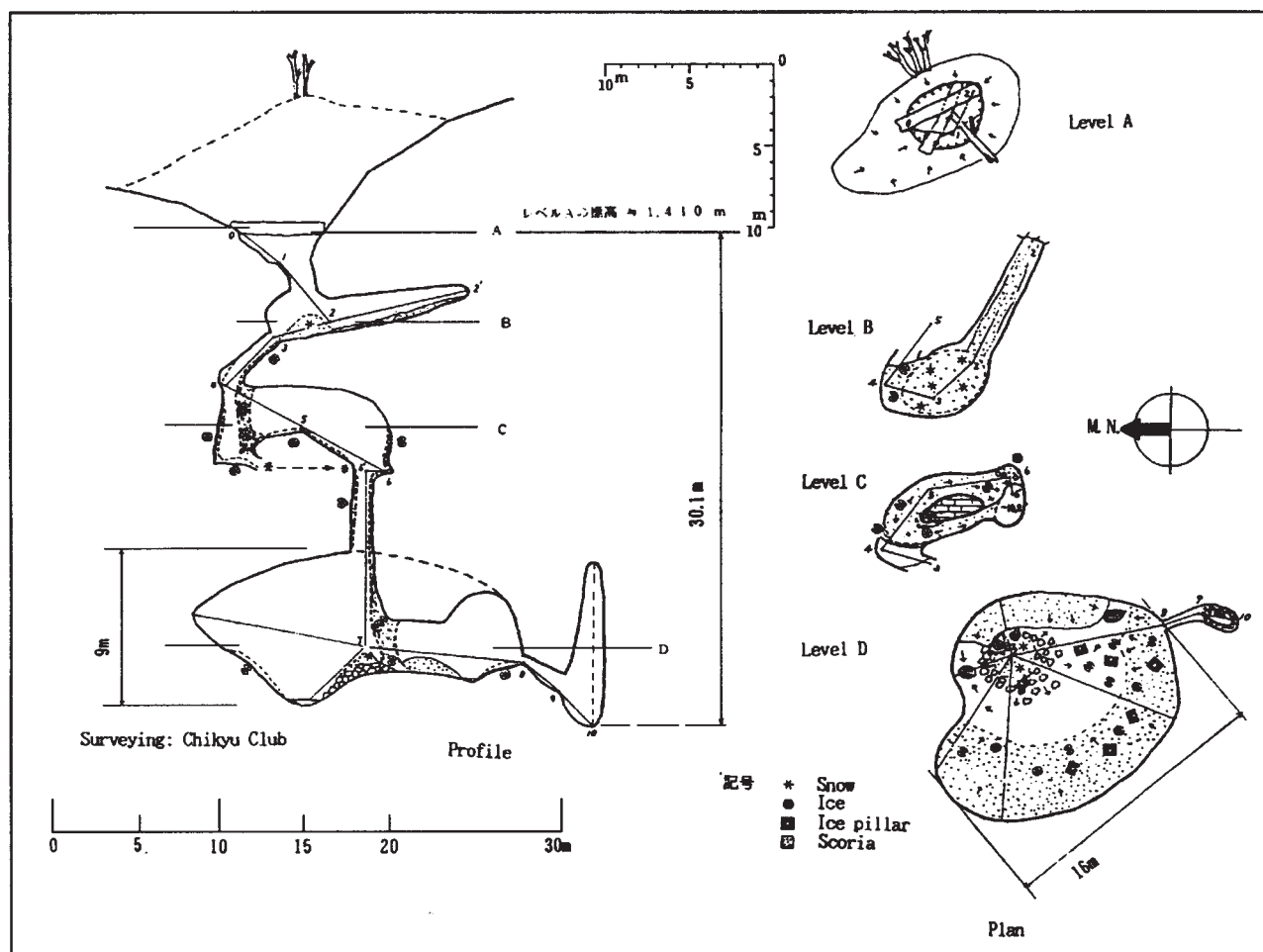


Figure 3—Hyouketsu Ice Fissure Crater Cave.

tion craters formed near the beach (Figure 6). Among these, the rift cave at the lowest level has a deep shaft (Figure 7) and has the same internal appearance as other rift caves (Figure 5). This rift cave is one of the world's most complex examples because cavities extend vertically and are intertwined. Approach is difficult because of frequent peeling of the walls. However the original condition of the rift cave has been maintained.

#### 4. Eigou No. 2 Rift Cave

The entrance of this small shaft is located just above the road which circles the island. It has not been investigated.

#### 5. Eigou No. 3 Rift Cave

This is the uppermost rift cave in Hachijou Island (Figure 6). It extends in two directions.

The horizontal part is narrow and the cavity extends vertically (Figure 8). This is similar to the No. 5 Rift Cave on Miyake Island (Figure 11). Because of some construction work, the overburden of this rift cave is exposed. Its thickness is over 20 meters. As we have seen at other rift caves, a very thick scoria layer is present.

### Miyake Island

The 1940 fissure eruption on Mikake Island did not create rift caves. The 1983 fissure eruption, which extended more than 4.3 kilometers, created a rift cave only in its caldera. Cuevas Negras on Tenerife, Canary Islands, were formed through the same process by the 1949 eruption in Las Canadas caldera. Some condi-

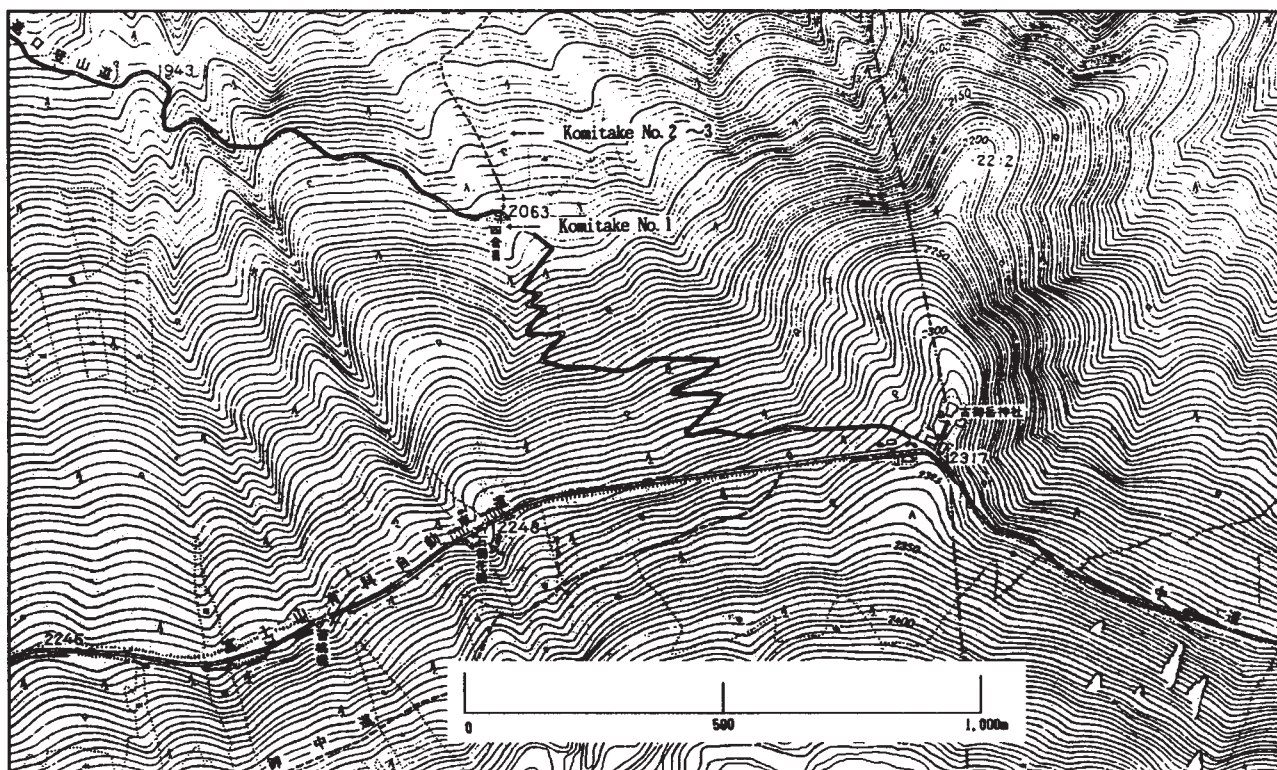


Figure 4—Map of Komitake Rift Caves area.

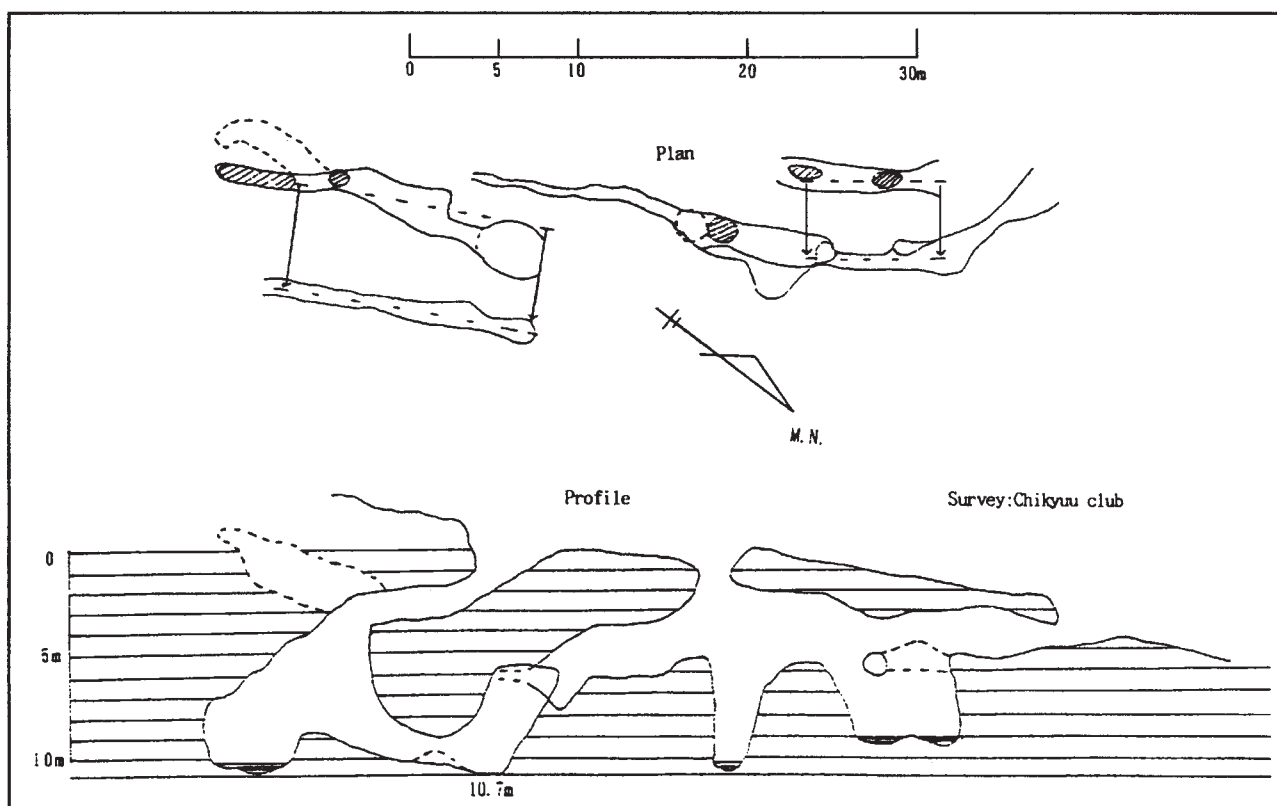


Figure 5—Komitake Rift Cave No. 2 and No. 3.



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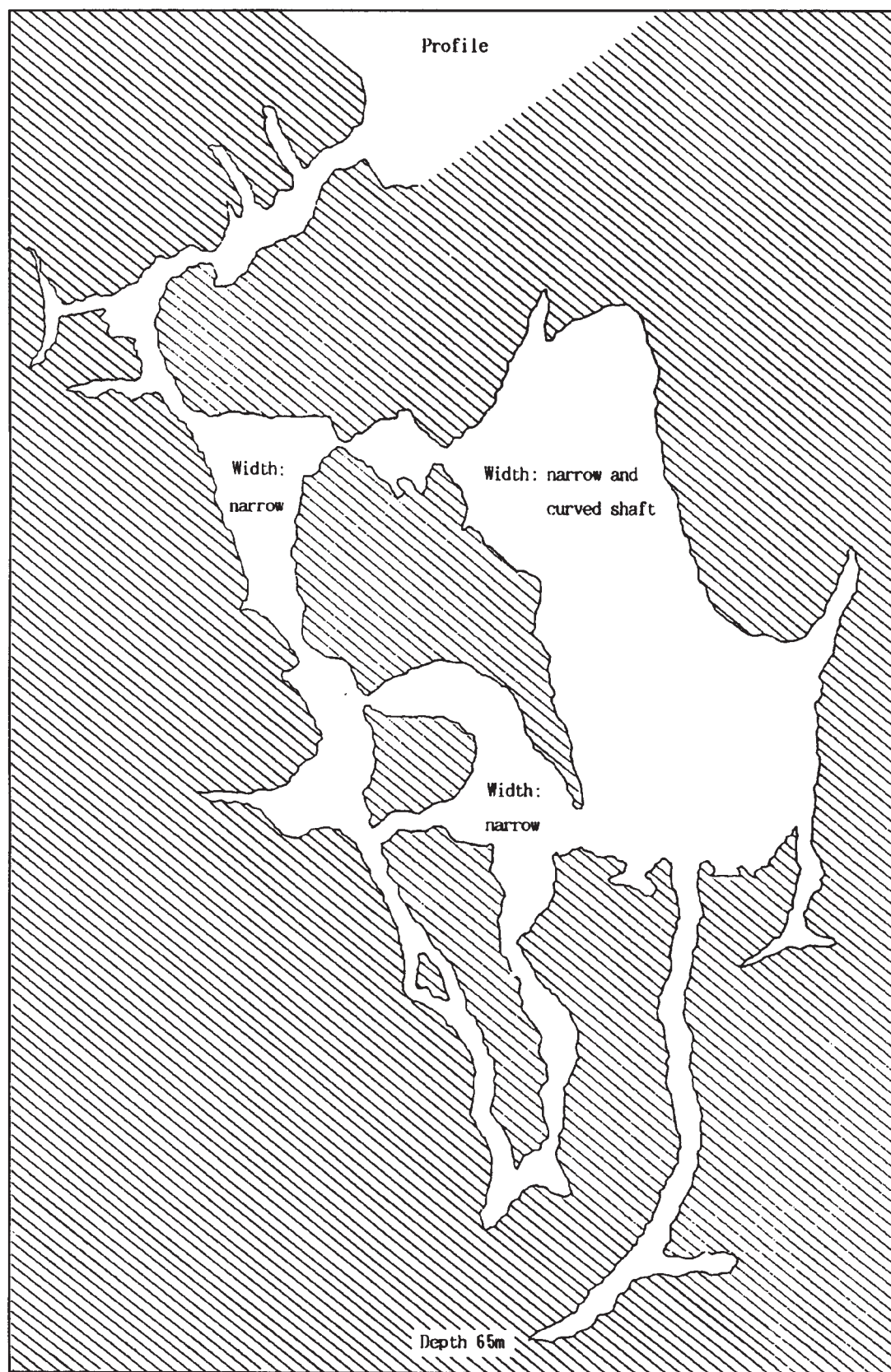


Figure 7—Eigou No. 1 Rift Cave.

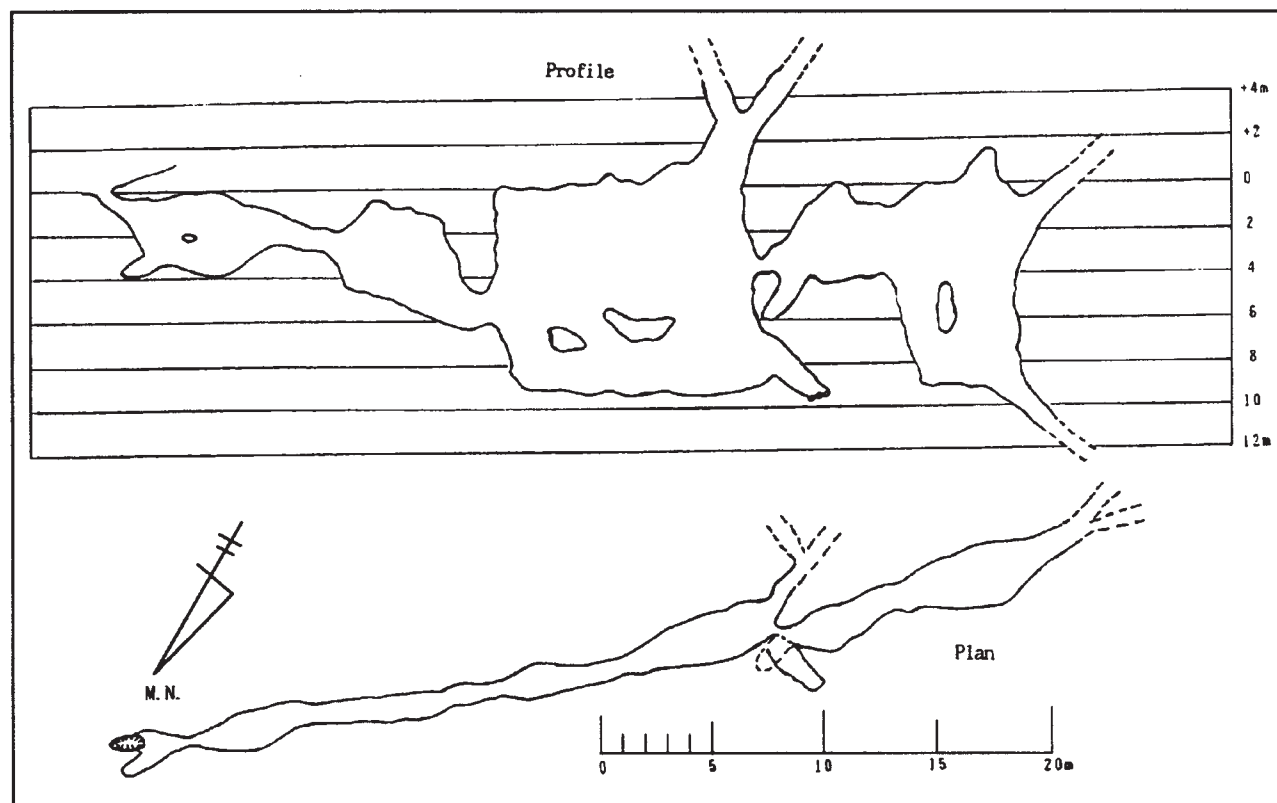


Figure 8—Eigou No. 3 Rift Cave.

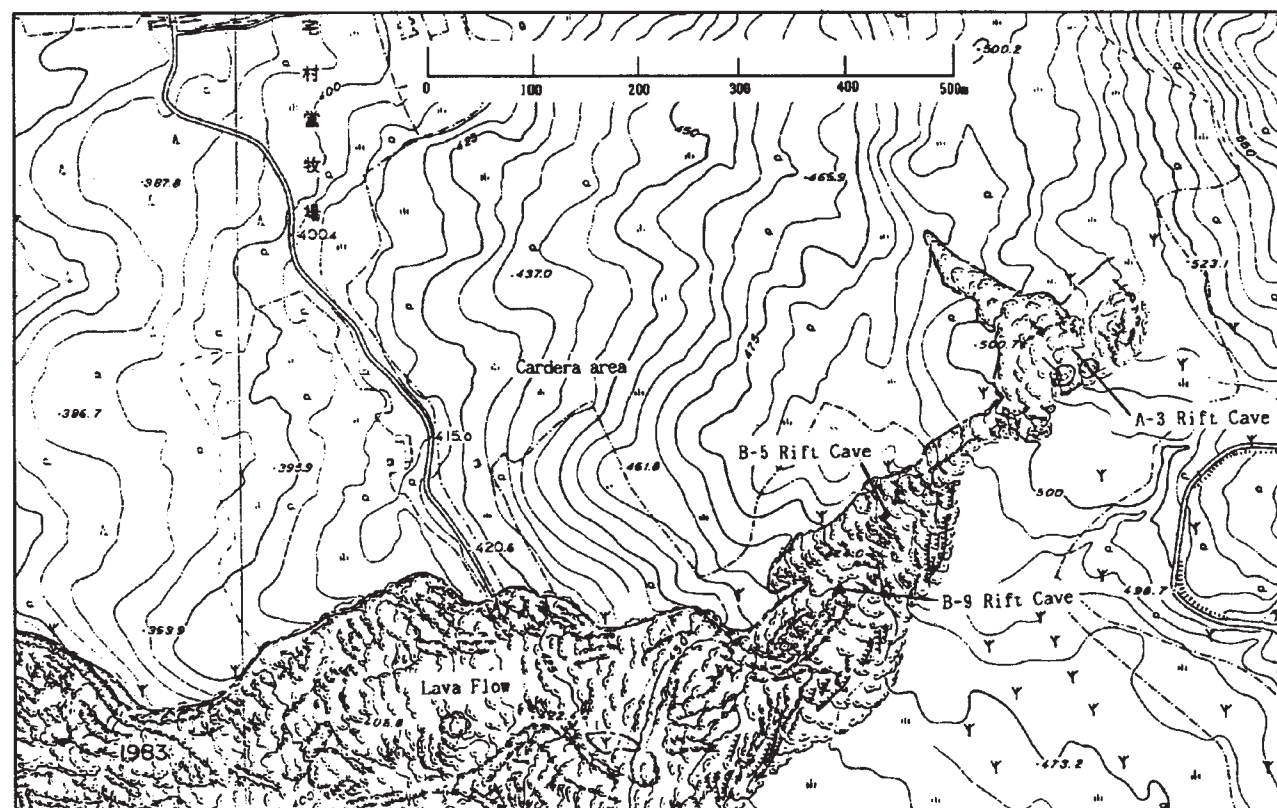


Figure 9—Position map of Rift Caves at Miyake Island.



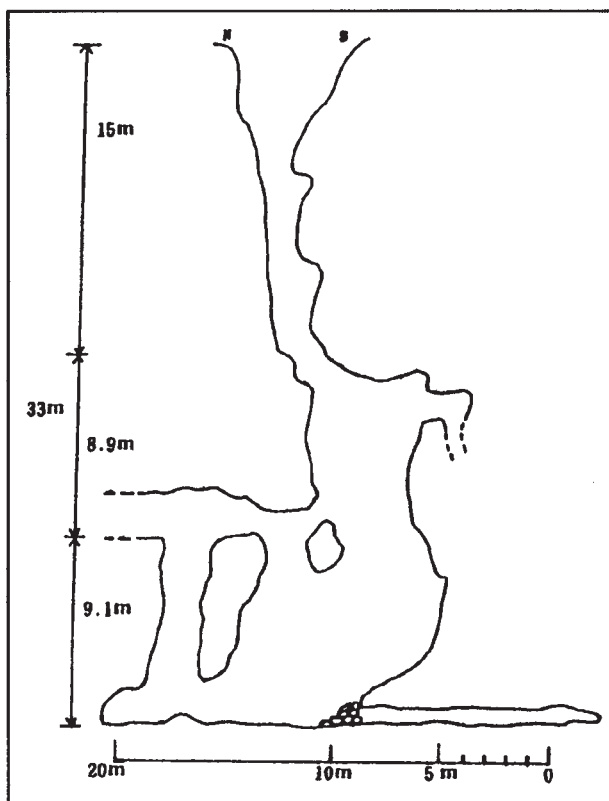


Figure 10—A-3 Rift Cave Profile

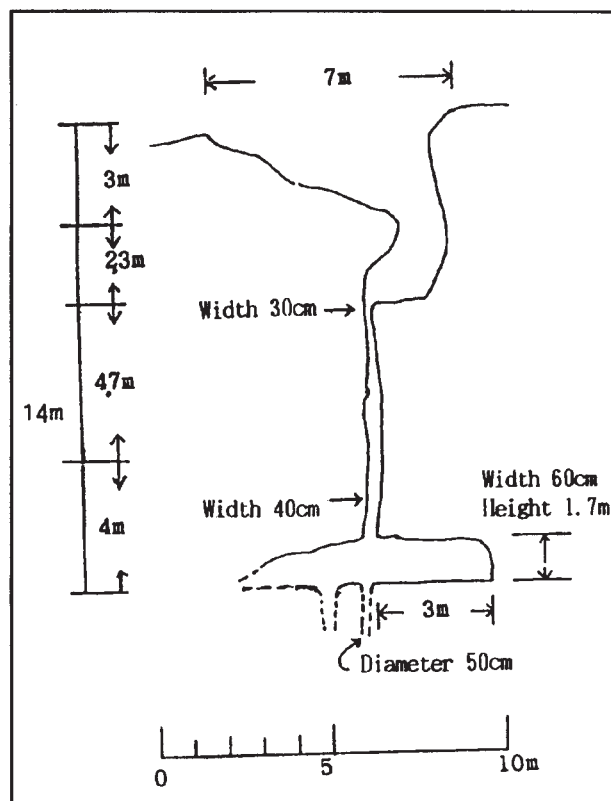


Figure 12—B-9 Rift Cave Profile

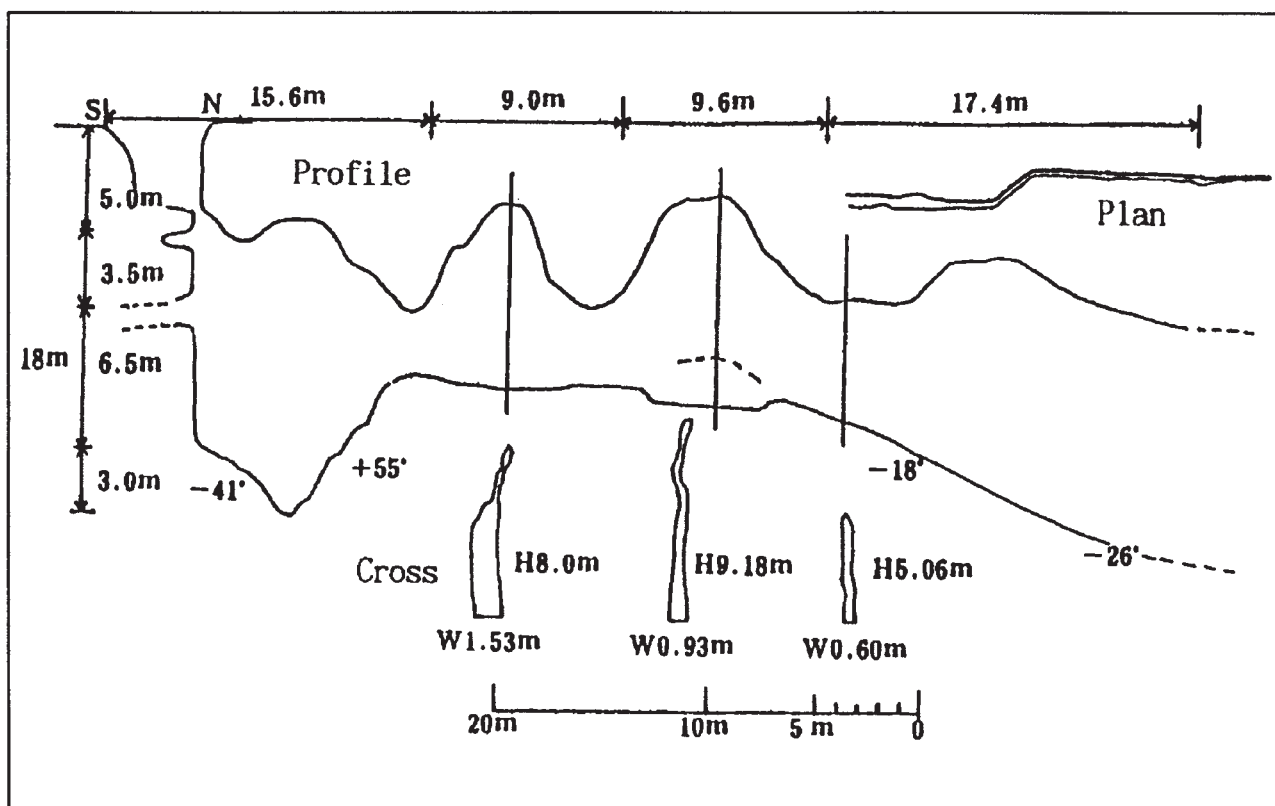


Figure 11—B-5 Rift Cave.

tions of the caldera can be considered important factors in the creation of such rift caves.

### 6. A-3 Rift Cave

This rift cave (Figure 10) has a 33-meter shaft. Its lower part extends in two directions. This cave was formed by gas moving laterally at the time of eruption. Some of its terminal portion is narrow, with a width of 30 centimeters. The cavity is formed at the narrower part and extended horizontally.

### 7. B-5 Rift Cave

This rift cave (Figure 11) is similar to Cuevas Negras (Tenerife, Canary Islands), Komitake Rift Caves No. 3 and 4, and Eigou No. 3 rift cave. Its cavity extends only horizontally. In the nearer part of the entrance we can see the portion penetrated by gas like a hall. Because of the narrowness of its end, we can not enter it.

Fine ash has accumulated on the wall and floor as a result of its blowing up from the lower end of the cave. Factors common to all rift caves seen here are as follows:

- Lava was painted slightly on the surface of the scoria layer and formed a crust which can easily be peeled away.
- Scoria layers are exposed in many parts of the cave because of the peeling off of the crust.

### 8. B-9 Rift Cave

This rift cave is very narrow but the lower part is a little wider (60 centimeters) (Figure 12). At its far end are two pipe-like shafts, but it is not possible to enter.

## Conclusion

Through these explorations we have found conditions common to rift caves in Japan. Rift caves are created only in thick scoria.

Scoria may hold more water than lava and this water becomes gaseous during an eruption. Just as in lava tube caves, lava painted on scoria creates a crust which easily peels off from the scoria side because of water vapor in the scoria. Also in welded tuff caves, gas collects behind the crust and makes small cavities like pockmarks.

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