The rift Caves in Japan

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Abstract: In Japan, on the volcanic line from Mt. Fuji to Hachijou Isl. in Pacific, we can see the many fissure erupted craters.

The fissure eruption hasn't always left the rift caves.

Recentury I am investigated this erea and recognized the rift caves, at Mt. Fuji 4, Miyake Isl. 3, Hachijou Isl. 3.

The time of fissure eruption in Miyake Isl. make the long crack and gush the lava flow.

But, we can see the rift caves only in the caldera.

In the rift caves, we can see the thin coated lava on the scoria wall of the cavity and not only the side ways to extend by gasic pressure, on the surface of the earth.

It is tow type rift caves.

1) The gas run to the side direction and built the cavities and after blow out the ground.
2) The gas built the cavity and then blow out the earth.

I think that the thick scoria layers the most important facter and indispensable condition to built the rift caves.

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Rift caves are recognized at Mt. Fuji, Hachijou Island and Mt. Oyama in Miyake Island of Japans.

Common conditions to the above rift caves are found through our reserach, of wich summary we'll report below.

Mt. Fuji

In this volcano, there are five lines of fissure eruption craters, two of which has four rift caves.

1) Ice fissure crater cave. : Hyouketsu

This is situated at an alutitude of 1,440m north -east of Mt. Fuji.

In this area, (plan No. 1) the fissure eruption craters stand in a line about one kilometer. The scoria was erupted from Yumiizuka volcano, and thick layre is formed at Kooriike, Hakudairyuoo, volcano. From the crater of latter, a little quantity of lava flow (^{14}C 1230± 30 BP) is erupted.

Rift cave which was made through the eruption in this area has a big cavity at its bottom. Crust lava attached to scoria layer Which are peeled off from ceiling and both sides of this rift cave. On the flow some scoria are fomed in layer. (plan No. 2)

2) Komitake Rift Caves No. 1～No. 3

Komitake-Fuuketsu Lava Flow (Hyo). Kenmarubi Lava Flow (Ken). Oonagare-maruyama Lava Flow (Ona) erupted at the same period.

As shown in the plan No. 3, Lava Flow of (Hyo) is small in quantity, but fissure eruption craters are found therein, there are three rift caves at 2063m～1980 m from the sea level. We can not afforded get into No. 1 Cave since it is frozen from the entrance to the end. No. 2 and No. 3 Caves (plan No. 4) are also freezd at their deepest point therefore no investigation can be made. Scoria layer of side rift caves, as same as in other, are slightly coated by lava as we have seen in other cases above. Such lava is formed to peel off. At the lower part, a scoria layer in red color is also found. Same phenomena are recognized in other Japanese rift caves.

There exist thick layer scoria from here to upper area. The layer has been carried through melting snow to the lower part where the caves are created.

Hachijou Island

3) Eigou No. 1 Rift Cave

This rift cave is located in the northern foot of Mt. Hachijoufuji (855. 4m) in Hachijou Island.

These rift caves are found in the fissure eruption craters, which are formed along the beach (Plan No. 5).

Among these, a rift cave at the lowest level has a deep shaft (Plan No. 6) and has the same appearance inside as other rift caves. (Fig. No. 1)

This rift cave is one of the most complicated cases in the world because cavities are drilled vertically and get intertwineded each other. We can not easily approach because the walls peeling off often. However the original condition of the rift cave has been maintained.

4) Eigou No. 2 Rift Cave

The entrance of small shaft is found just above the circle road of island. No investigation has been made.

5) Eigou No. 3 Rift Cave (Plan No. 7)

This rift cave is located at the highest level and extended to both side. Horizontal part these of are narrow and the cavity is expanded vertically. This is similar to the No. 5 Rift Cave in Miyake Island. (Fig. No. 2)

Becouse of some constraction works, surface of these rift caves are exposed. Its thickness is over 20 metres. As we have seen other rift caves, scoria layer are formed with much thickness.

Miyake Island

Fissure eluption in 1940 didn't created rift caves. Fissure eruption in 1983 which was expanded over 4. 3 Kilometres, created a rift cave only in its caldera. Cuevas Negras in Tenerife Island of Canaria Islands are built on 1949 eruption

in Las Canadas caldera through the same process as Miyake Island. Some conditions involved in the caldera can be considered as the important factors to the creation of such rift caves (Plan No. 8, 8').

6) A-3 Rift Cave

This rift cave (plan No. 9) has the shaft of 33 meters. The lower part there of is horizontally extended to two directions (Fig. 3).

This one was made by the gas moved to sides at the eruption. Some part to its end is narrow with wideth of 30cm. The cavity is formed at the narrower part therein and extended to the horizontal direction.

7) B-5 Rift Cave

This rift cave (Plan No. 10) is similar to Cuevas Negras, Komitake No. 3, 4 rift cave and Eigou No. 3 rift cave.

This cave has the cavity only extended to the horizontal direction.

In the nearer part of entrance, we can see the portion penetrated by the gas like the hall (Fig. No. 4). Because of the narrowness of its end, we can not get into it. Fine ash accumulate on the wall and floor as a result of blow up from lower end of cave. The common factors given in all rift caves are as follows.

— Lava was painted slightly on the surface of scoria layer and forming the crust which can be easily peeled away.

— Scoria layers are exposed out becouse of the peel off at many part in the cave.

8) B-9 Rift Cave (Plan No. 11)

This rift cave is very narrow. Therefor no one can get in without helmet. Howevere the lower part is a little bit wide (60cm).

Further end of it's cave, there are two shafts like a pipe, but no one can get into.

Conclusion

Through the above exploration, we have found the common condition that rift caves in Japan. That is rift caves are created only in the thick scoria layer.

Pyroclastic flow occurred at Mt. Unzen in 1991, which was accompanied by the glowing avalanche.

When lava dome broke off, the gas violently emitted out making the glowing avalanche with the high temperature of lava.

A greater scale of this glowing avalanche caused Mr. & Mrs. Krafft to pass away.

The cause of such glowing avalanche is considered that lava dome can keep the gas inside and emitted out it's gas most rapidly in falling down.

The scoria can be keeping the water excel than the lava, therefor at the eruption after it was heated, water therein was heated and quickly turned into gas and expanded gradually making part heated. As same as the lava cave, lava painted on it's scoria create a crust. The crust will beeasily peel off from the scoria side, because of vaporization of water inside of scoria and gas pressure. The crust is made from the peel off scoria walls, which take place frequently. therefor, we can see often the crust just peeling off from the surface of rift cave's wall.

Also the welded tuff cave, gas collects behind the crust and make the smallcavities like the pockmarkers.

Refernces

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Figure 1: Georogical Map of Hyouketsu area

Figure 4: Georogical Map of Komitake Rift Caves area

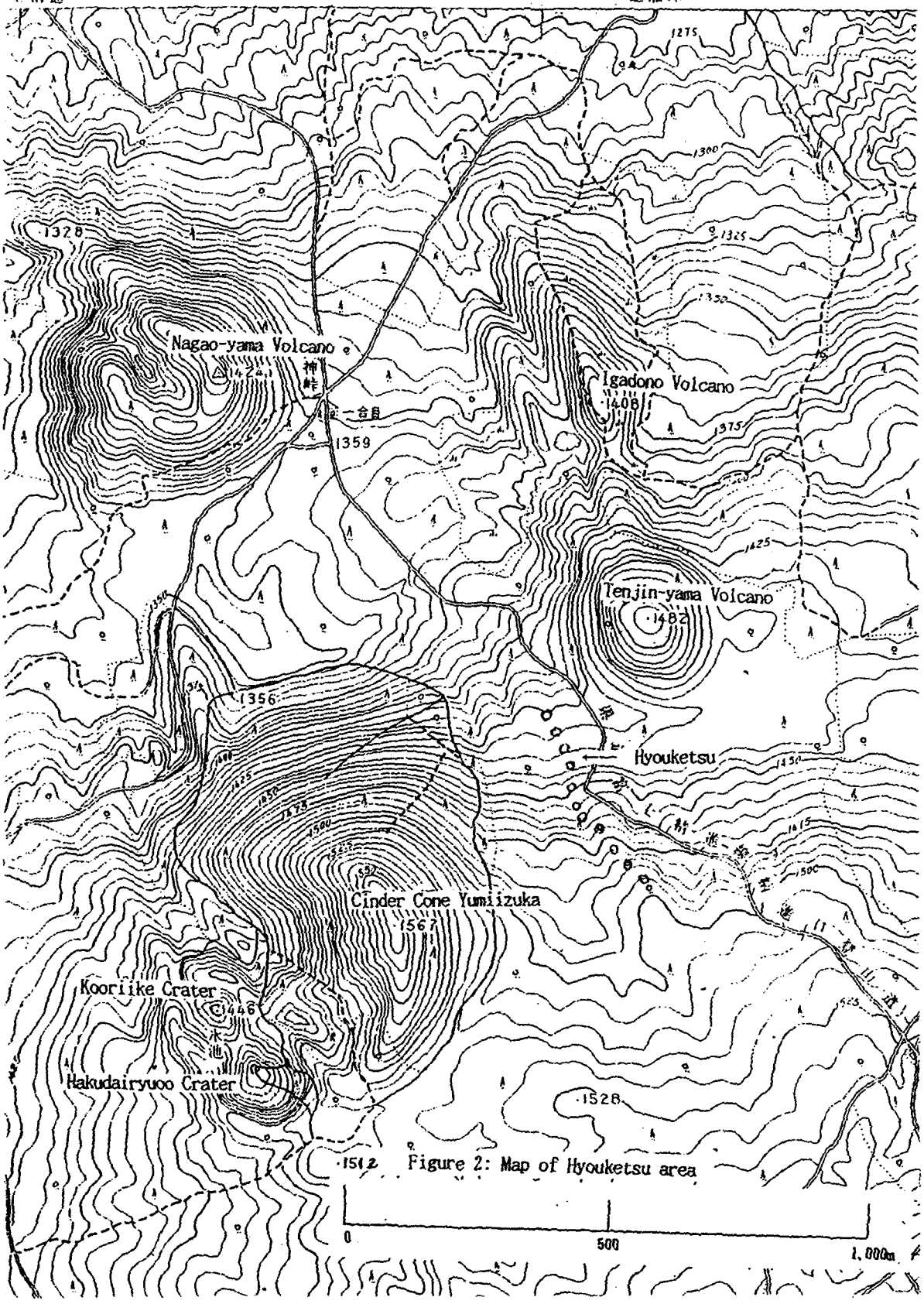
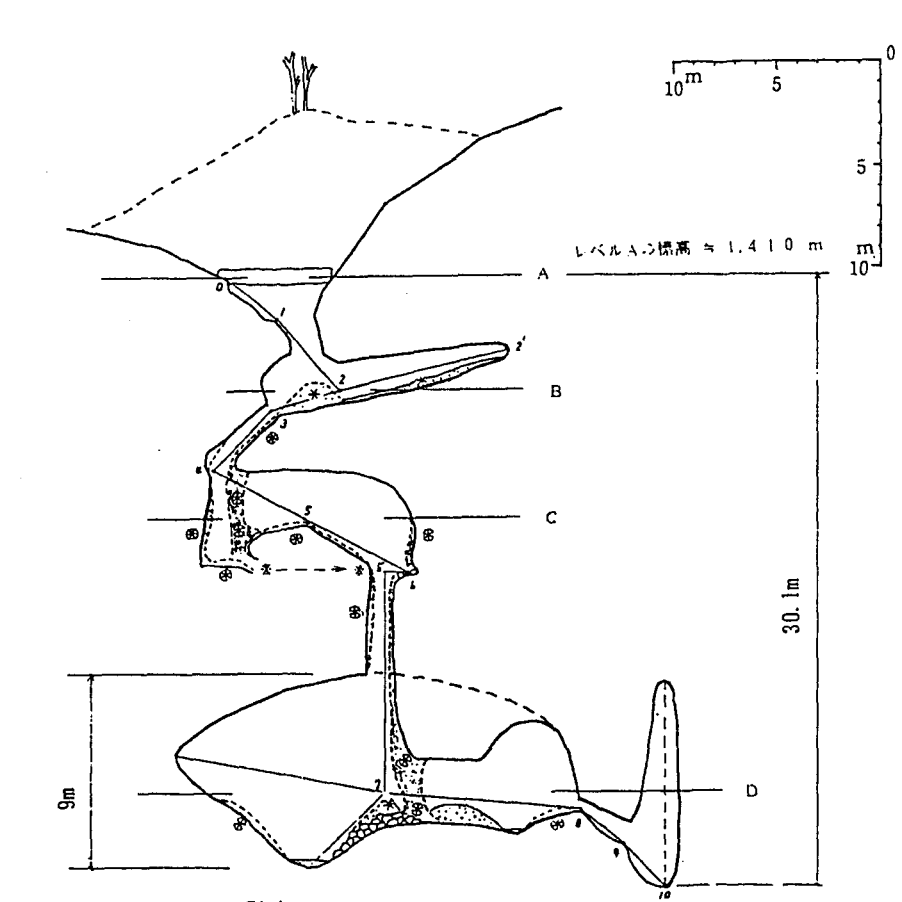


Figure 2: Map of Hyouketsu area



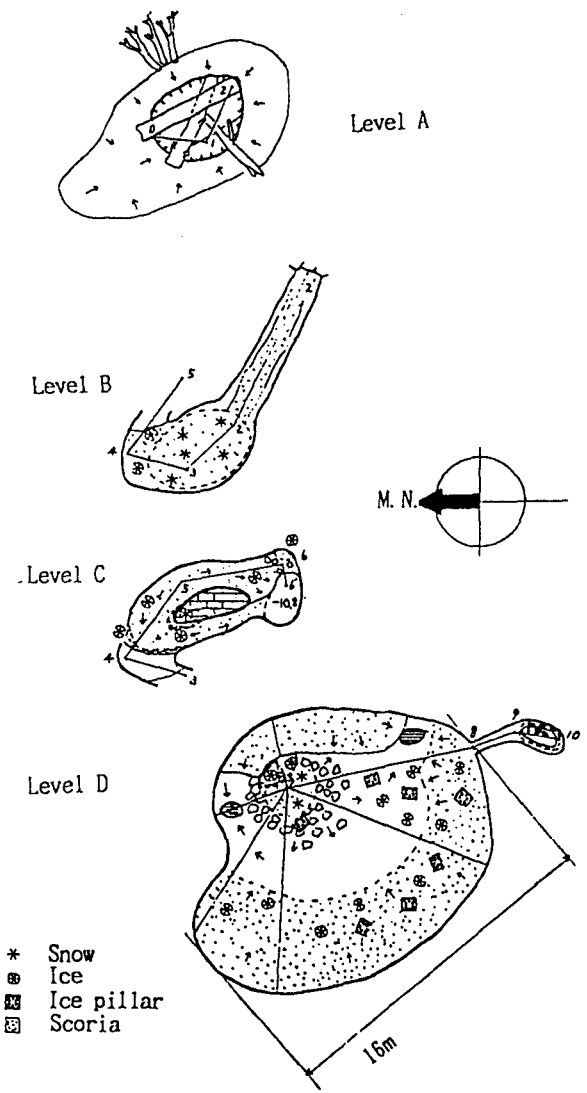


Figure 3: Hyouketsu

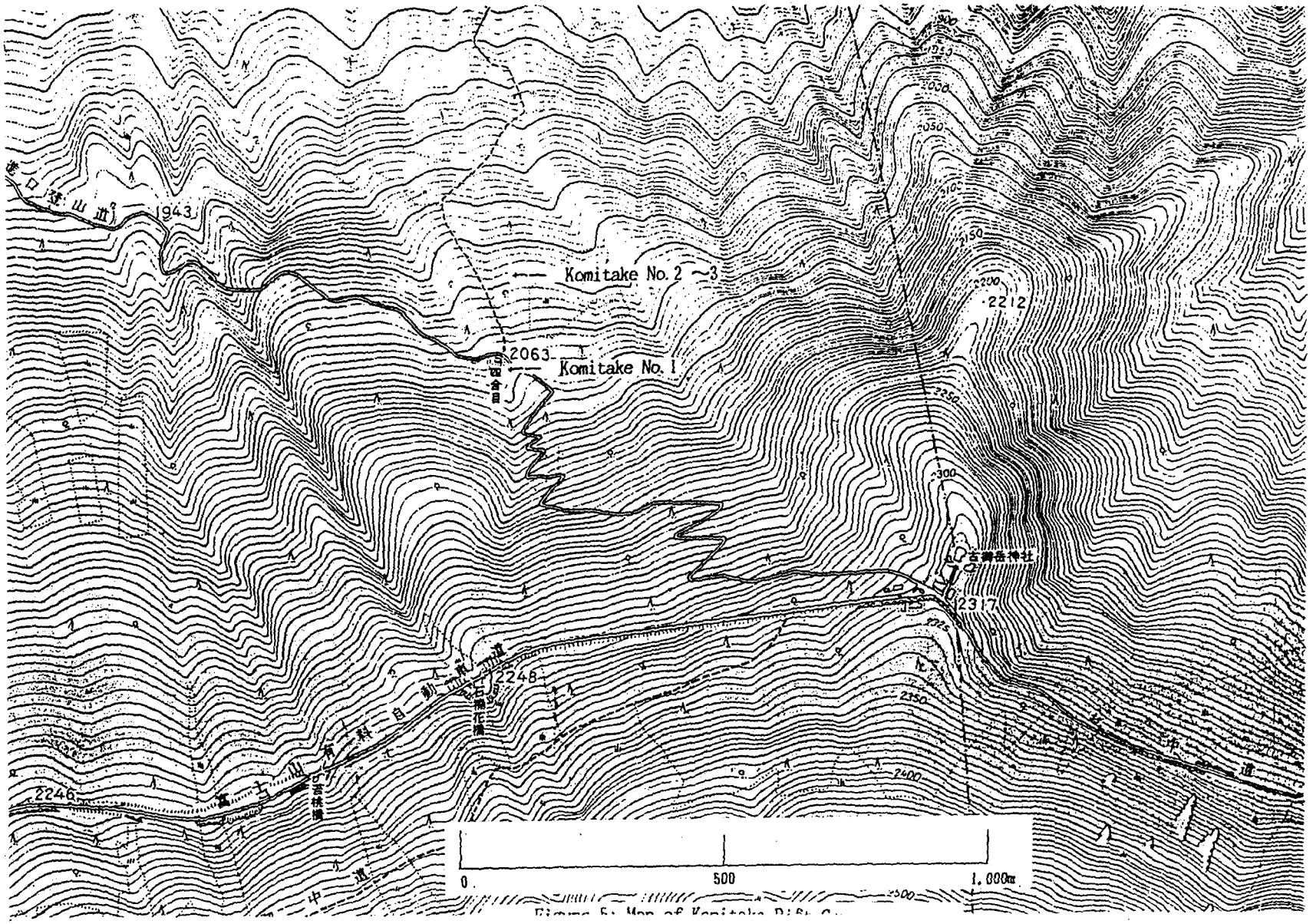


Figure 5: Map of Komitake Rift C...

Figure 6: Komitake Rift Cave No.2 ,No.3

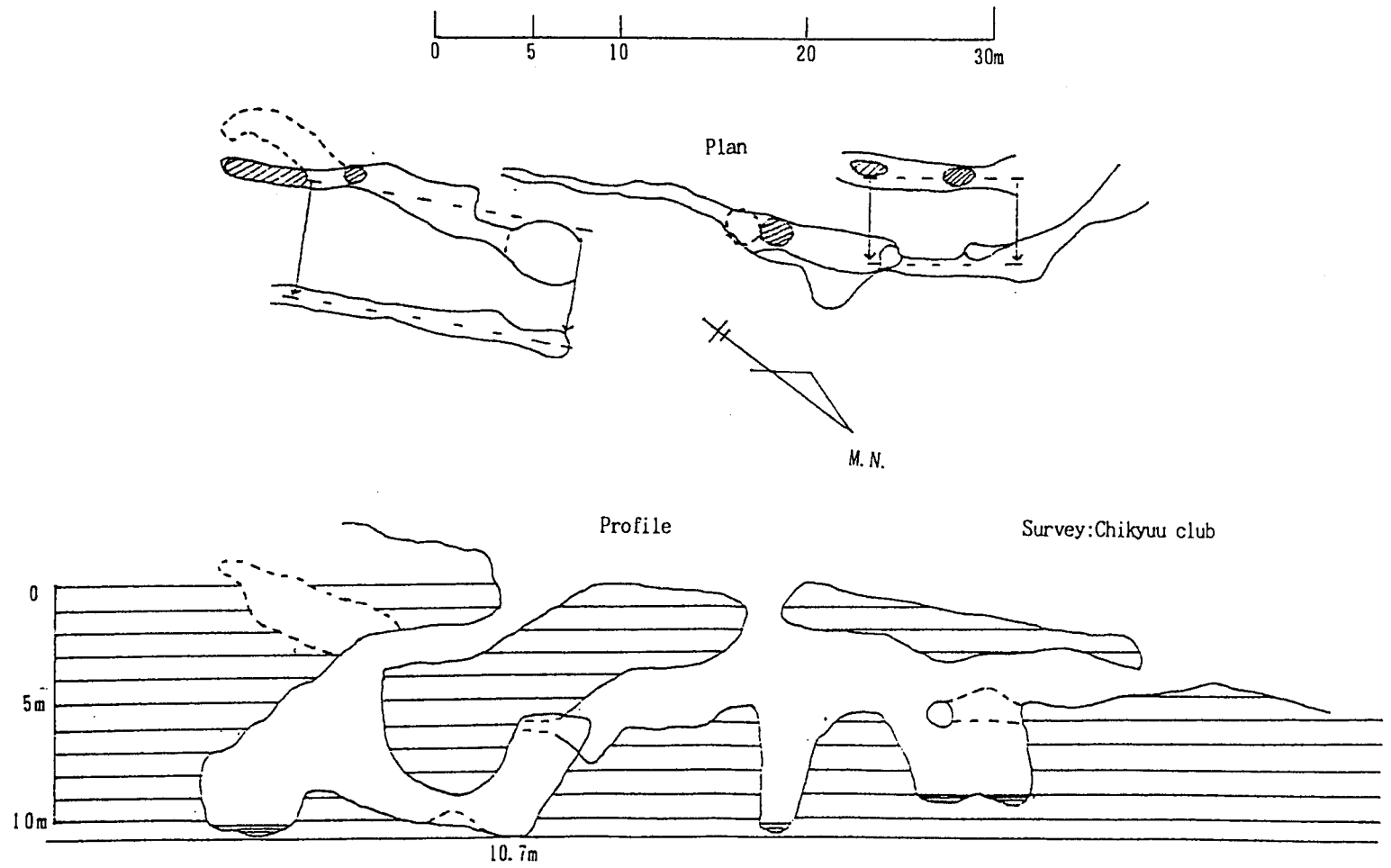


Fig. 5: The map of rift caves area in Hachijou Island

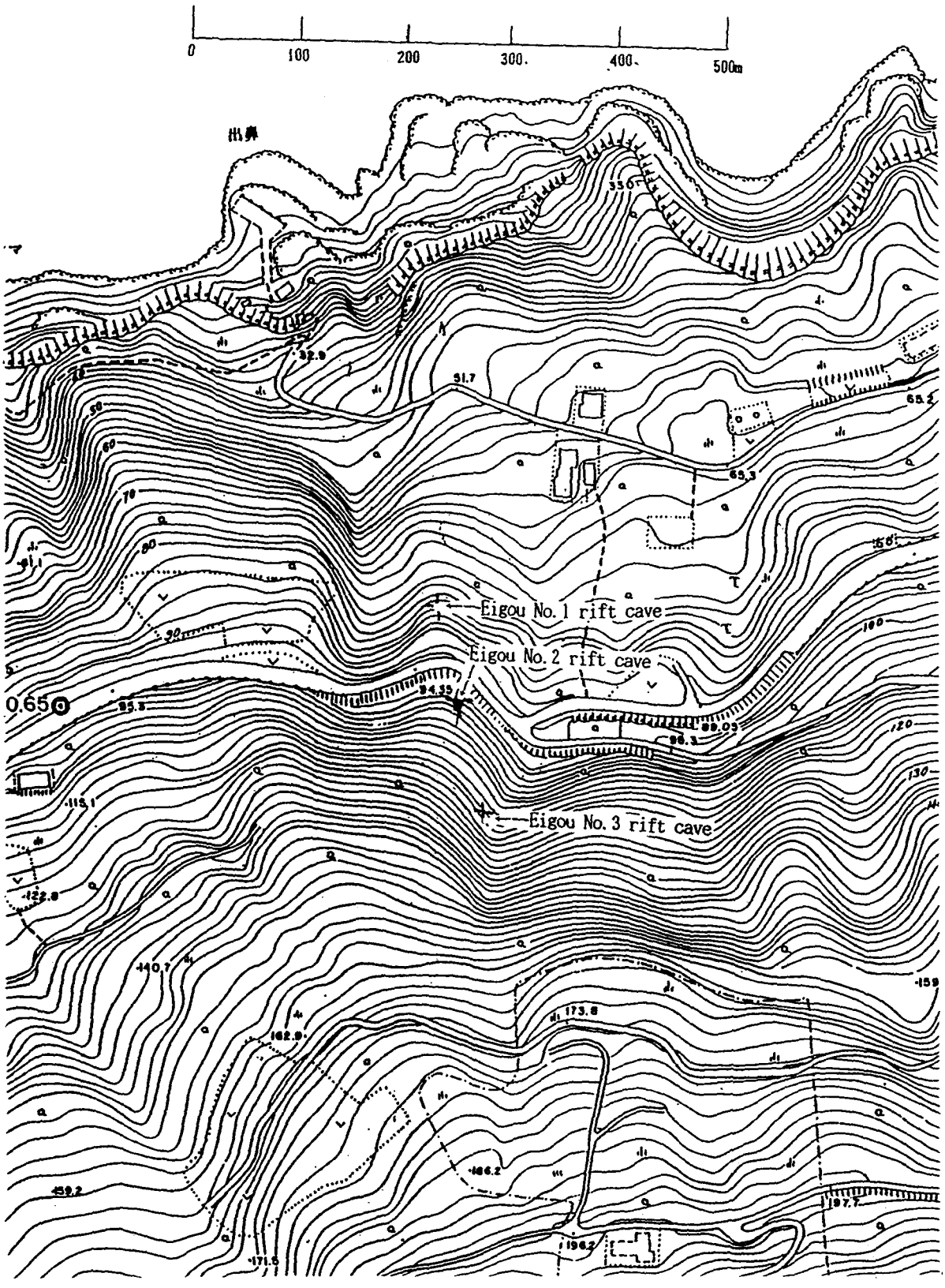
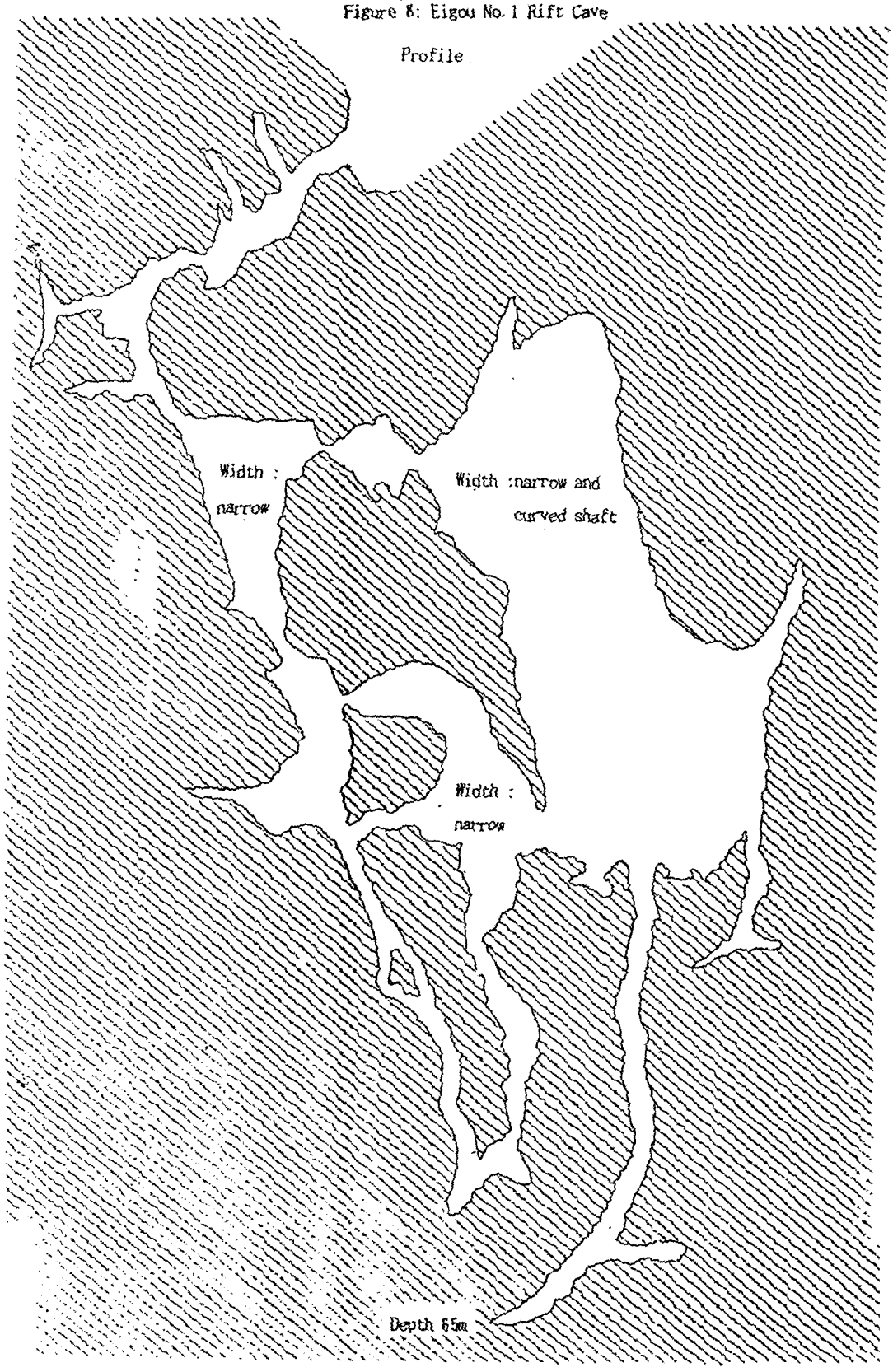


Figure 8: Eigou No. 1 Rift Cave



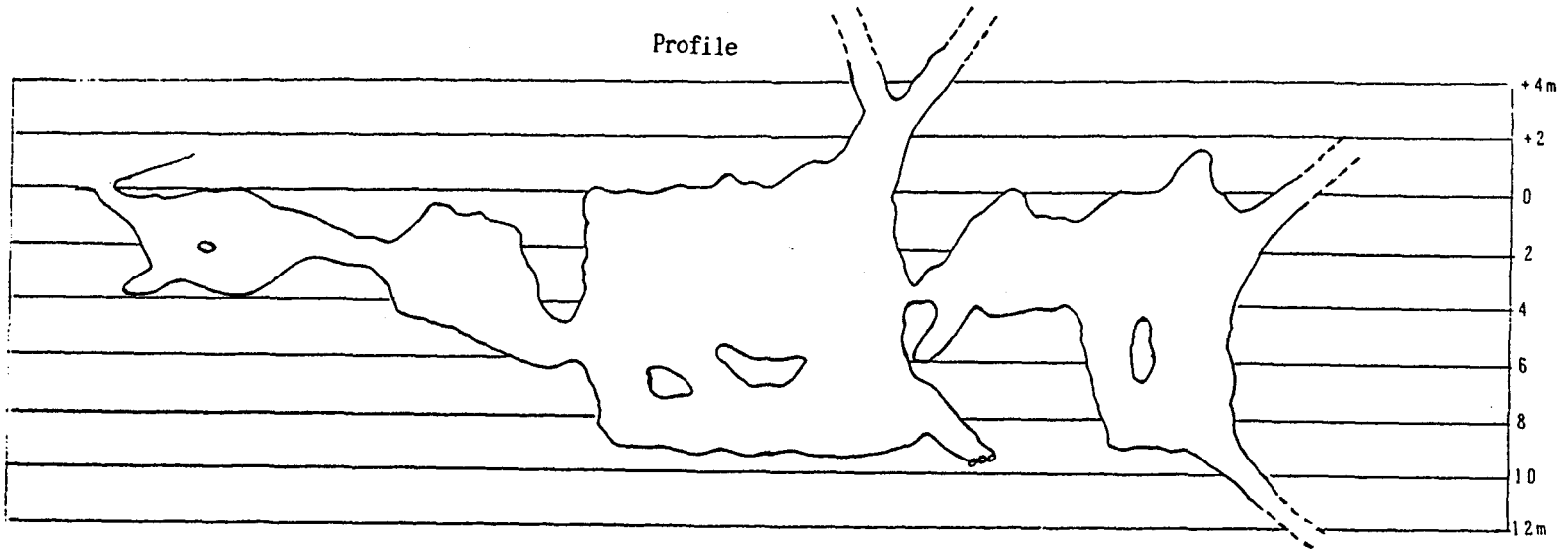
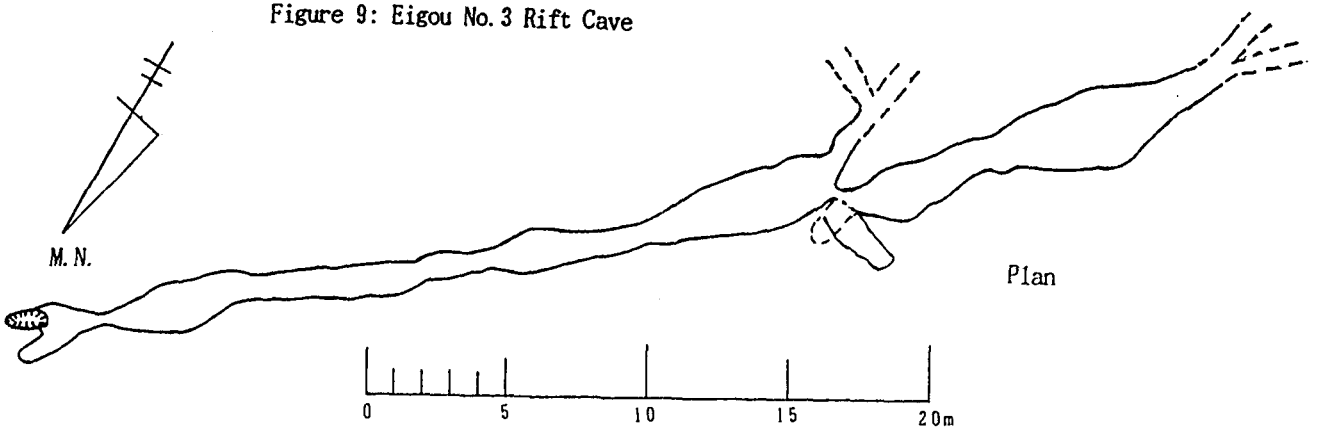
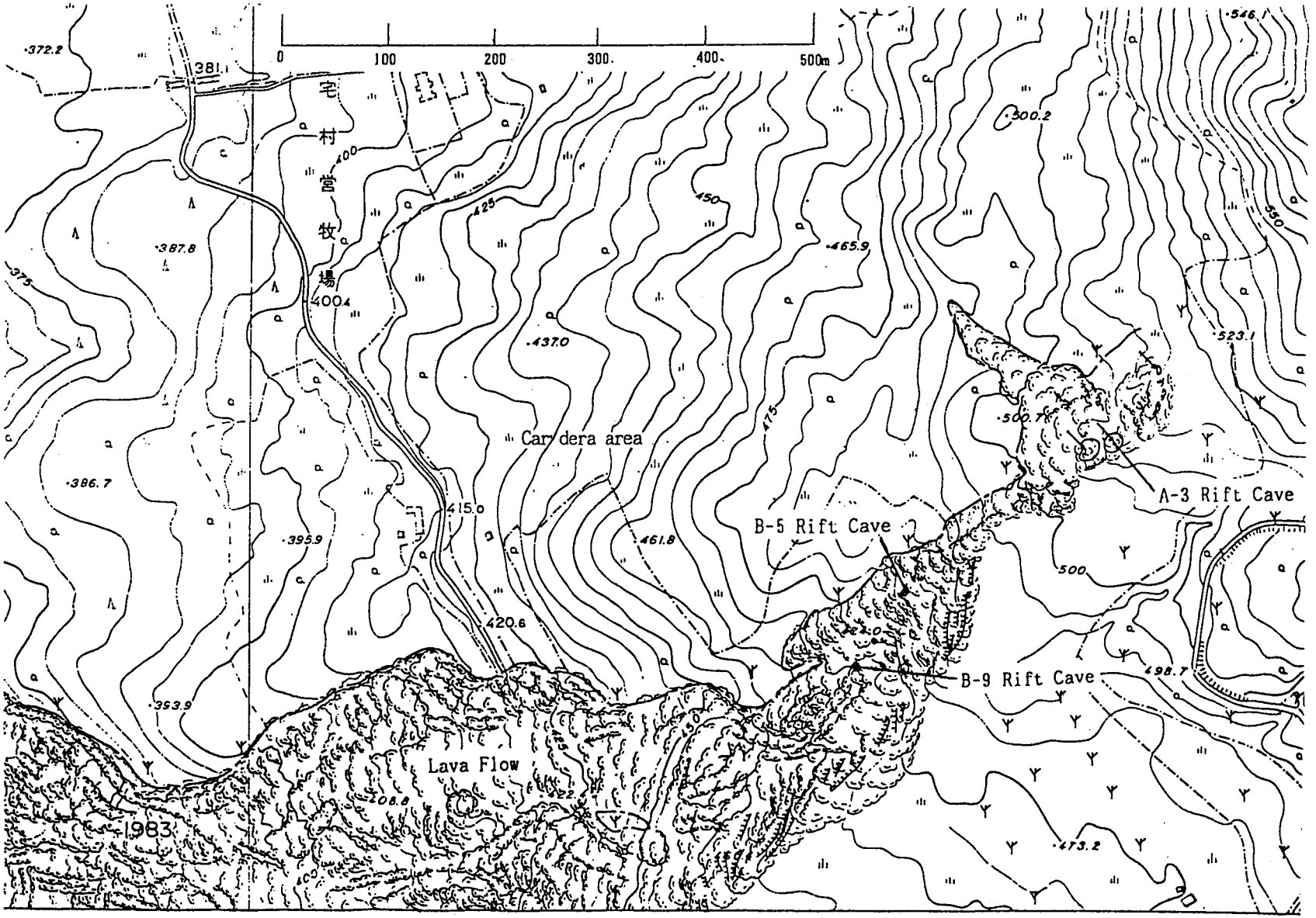


Figure 9: Eigou No. 3 Rift Cave




0
100
200
300
400
500m
宮牧場
Caldera area
A-3 Rift Cave
B-5 Rift Cave
B-9 Rift Cave
Lava Flow
1983
372.2
381
387.8
386.7
395.9
353.9
400.4
415.0
420.6
437.0
461.8
465.9
473.2
498.7
500.7
523.1
546
300.2

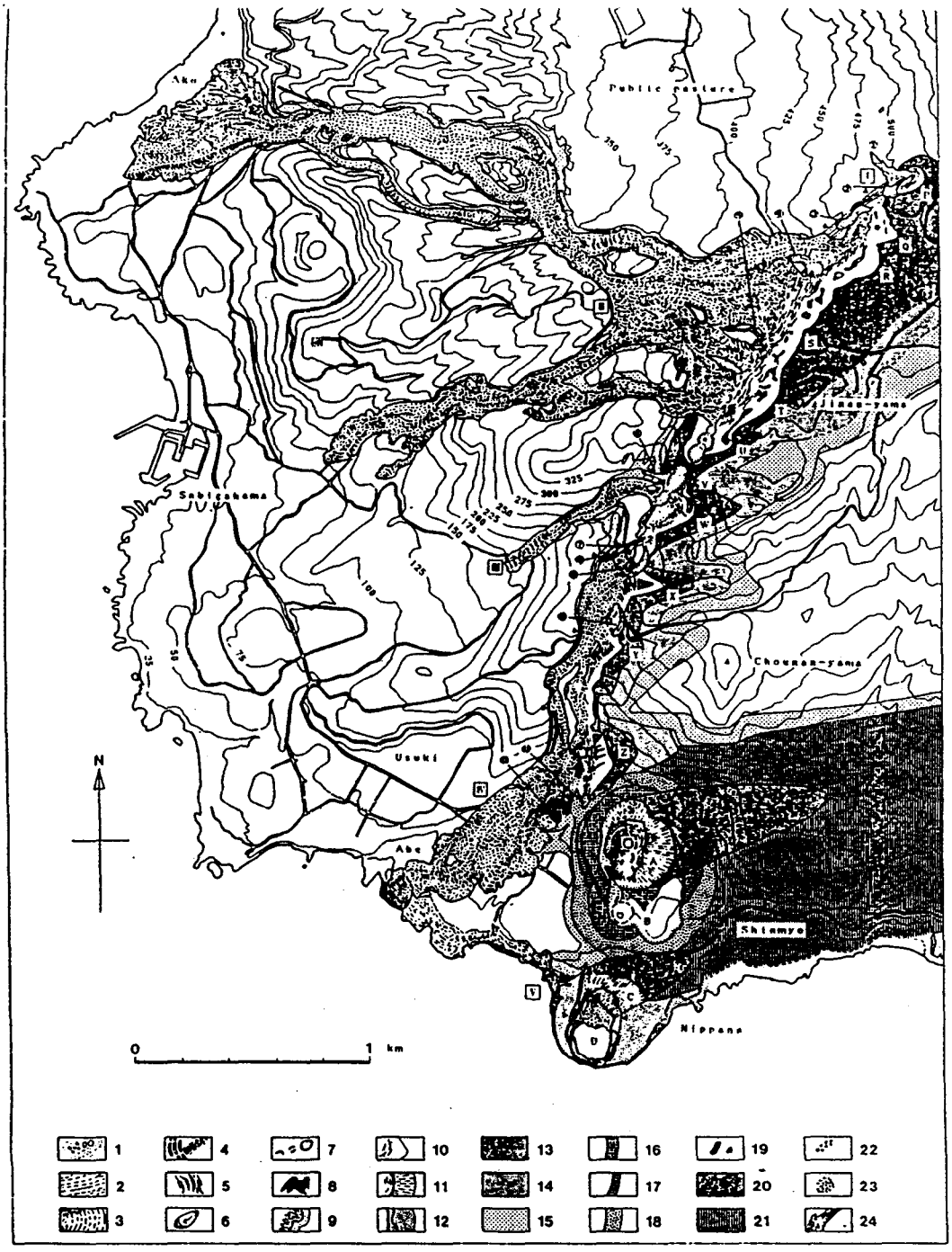


Fig. 8. Geological and hazard map of the 1983 Miyake-jima Eruption based mainly on the photo-interpretation. (Coastline around the Shinmyo area is that of Oct. 7.) (after Endo et. al)

1-9: micro-topography of lava flow

10-12: type of cone

13-15: grade in damage for vegetation around spatter cones

16-18: grade in damage for vegetation around explosion craters

20-21: grade in damage for vegetation by scoria or ash fall

1: blocky lava, 2: flow liniation on lava surface, 3: extention crack on lava surface, 4: pressure ridge, 5: open cracks and graben-like depression along spatter rampart and cone, 6: landslide of lava, 7: explosion or pit crater, 8: rootless spatter cone, 9: marginal features of lava and damaged tree zone, 10: spatter cone, 11: scoria cone, 12: tuff cone, 13: zone of downed tree whose foot was burnt by spatter or scoria fall, 14: zone of stripped tree by spatter or scoria fall, 15: zone of leafless tree by spatter or scoria fall, 16: zone covered by breccia, 17: zone of damaged tree by breccia fall and fire scorching, 18: zone of damaged tree by breccia, 19: summit of cone with sublimate, 20: stripped tree zone covered by heavy scoria fall, 21: zone of tree coated with muddy ash, 22: secondary scoria mound, 23: spatter or driblet covering explosion crater, 24: coast. P-Z, A-D: name of grouped cones (rampart) or craters, those boundaries are shown by a pair of solid triangle. I-V: lava flow. 1-12: minor lava flow, secondary flow or rootless spatter cone.

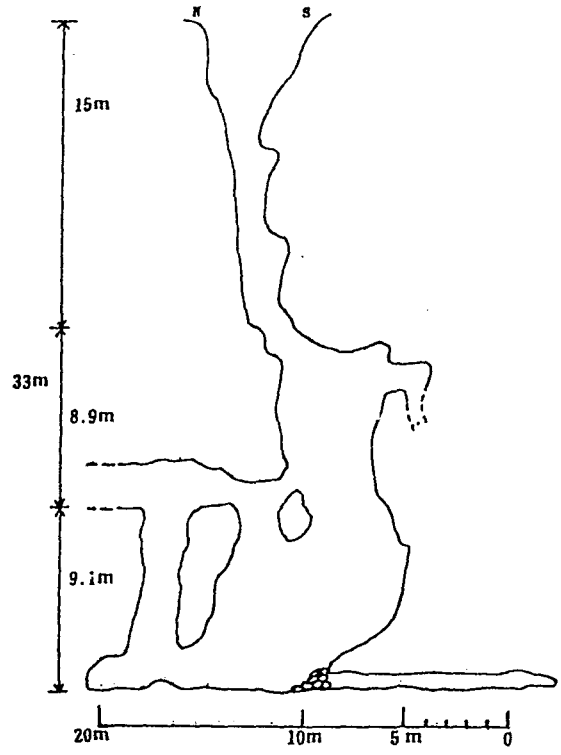


Figure 10:A-3 Rift Cave·Profile

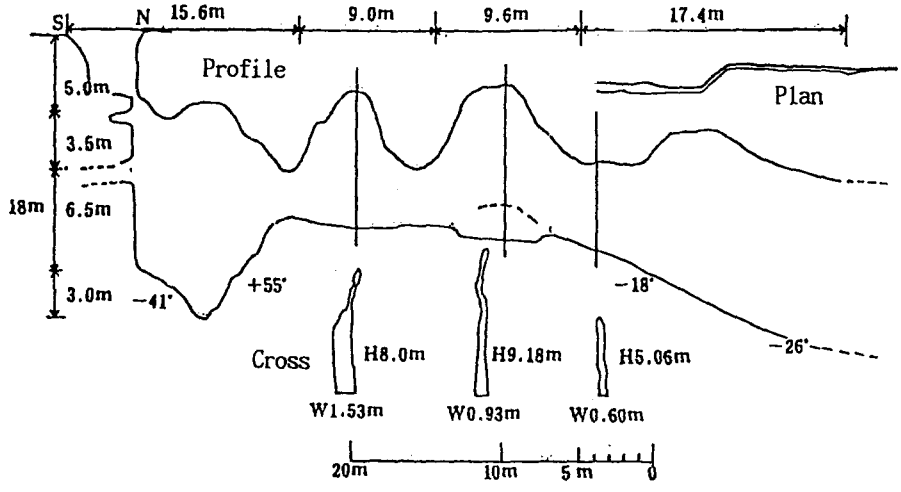


Figure 11: B-5 Rift Cave

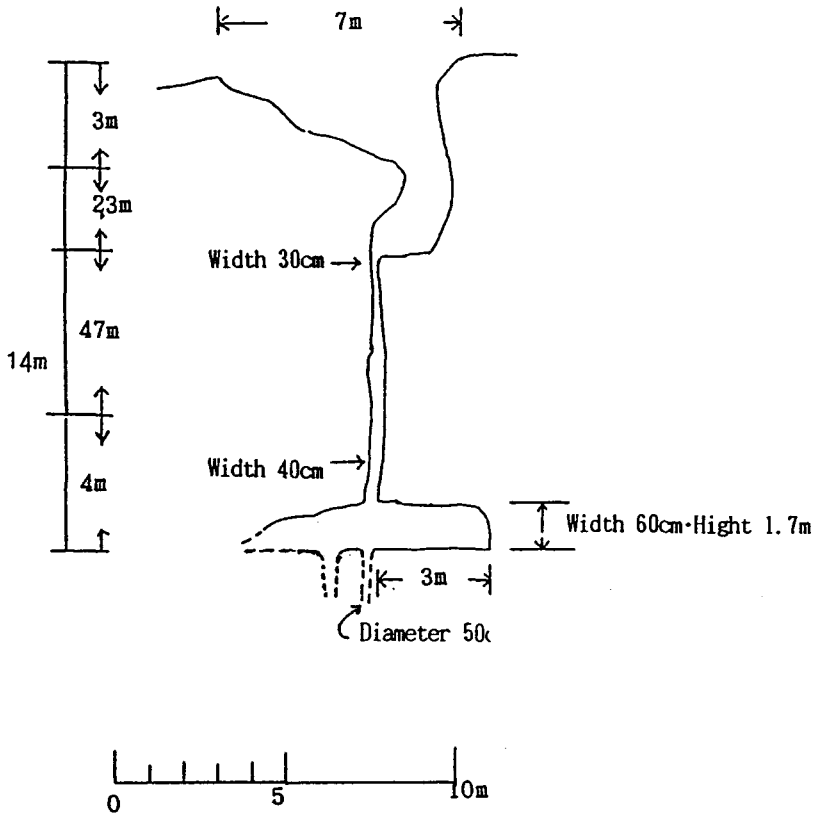


Figure 12: B-9 Rift Cave Profile