

15. A Submarine Fault Line found near Awashima after the Japan Sea Earthquake on June 16, 1964.

By Fuyuhiko KISHINOUE, University of Tokyo,

and

Heihachiro KOBAYASHI, Earthquake Research Institute.

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On the occasion of the Hyūganada Earthquake of 1961 fissures on a river bed under the water drew attention of the senior writer.¹⁾ At the time of the earthquake of the Japan Sea on June 16, 1964, tsunamis were observed along the coast in Yamagata and Niigata prefectures, such tsunamis being considered as a consequence of deformations of the sea bed. The junior writer experienced a dive with equipments called SCUBA, following which the writers went together to see changes of the sea bottom with the equipments.

On August 2, 1964, they started from Iwafune, about 40 km NE of Niigata and about 30 km SSE of Awashima in a small chartered motor boat. Awashima is an island about 7 km long in NS, 2 km wide in EW and the highest place 265 m above sea level. The island was near the epicentre, and after the earthquake the coast heaved up about 1 m. The fishing village of Kamaya,²⁾ SW of the island, was set as a base for the survey by the writers with several members of the Niigata Amateur Divers Club.

From the senior writer's experiences of looking for earthquake faults in Japan, he inspected rock-falls and landslides on the island from the boat while it cruised along the coast, and plotted positions of landslides on a map (Fig. 1). Observing features of the landslides, a fault line was supposed on the east side of the island. Then the boat was steered among reefs under Yagahana Cliff, south-eastern end of the island. Yagahana means "arrow cape" in Japanese (Figs. 2 and 3). A long but narrow fissure was found in underwater rock bed by the writers on board,

1) S. KOMAKI and F. KISHINOUE, *Bull. Earthq. Res. Inst.*, 42 (1964), 251.

2) The senior writer has had many experiences of feeling aftershocks in Japan and early on Aug. 3, he felt several aftershocks at Kamaya. The shocks were as usual quick vibrations in short time, but superposed by slow vibrations which might be peculiar.

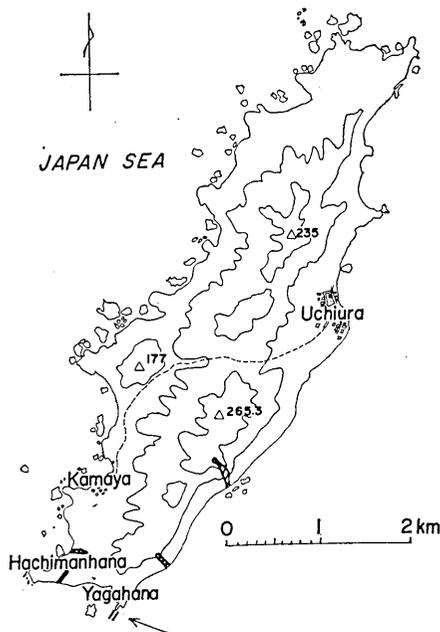


Fig. 1. Awashima

Arrow shows the position of the underwater fault, narrow hatched area shows land slides.

consideration about the mussels. Their results agreed that the island upheaved instantly and the mussels died. The observations were superficially on the sea bottom. Fig. 4 shows that rock about 3 m in height was broken at a depth of 15 m, and extension of the fissures were traced over 50 m long from the cliff. But the depth of the bottom increased so sharply from there that the divers could not go down more than 30 m deep. In the west side fissure, or the inner side of the reef, no shells were found.

After the expedition, other researchers³⁾ found faults on the bottom of the Japan Sea with a submarine and other instruments. The faults were found parallel to the azimuth of the fissures in this paper. So the fissures might be regarded as parts of a fault system accompanying the earthquake.

In order to compare the observation of the fissures, another underwater survey was carried out the following day at the sea under Hachi-

and the divers jumped in the water to search for changes of the sea bed due to the earthquake. Soon two long straight fissures were found on the extension of the landslides on the east coast and Yagahana, in azimuth about NE-SW. The fissures were also parallel to the line of reef of Yagahana on both sides of the line. At the east side fissure, many shells of sea mussel were piled at its bottom (Figs. 4~6). Although the inside of the shell was empty, it was not broken. The mussels would have been killed by the abrupt change of their living conditions due to the sudden upheaval of the island. The writers brought the shells to the Tōkai District Fishery Research Institute, Fishery Agency, Ministry of Agriculture and Forestry, in Tokyo, to hear expert opinion of the writers'

3) R. MORIMOTO, T. MATSUDA and I. NAKAMURA, Read Monthly Meeting Earthq. Res. Inst. September (1964).



Fig. 2. Yagahana (Photo from E).



Fig. 3. Reef of Yagahana. White parts of rocks show the amount of upheaval of the island.

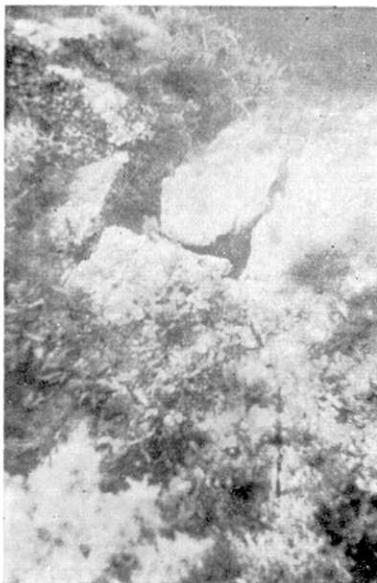


Fig. 4. Crack of underwater rock.



Fig. 5. Crack of sea bottom pointed by the diver.



Fig. 6. Sea mussel shells in the fissure.

man-hana, about 1000 m west of Yagahana, where large rocks had fallen into the sea. The divers saw quite different features of the sea bed from those in Yagahana.

The writers wish to express their thanks for the kindness of Norio Kojima, Hiroshi Sugai and other members of the Niigata Divers Club who went with them to Awashima and helped in the observation.

15. 1964年6月16日日本海の地震によつてできた粟島の海面下の断層

東京大学 岸上冬彦
地震研究所 小林平八郎

表題の地震のときに津波があつたので、海面下にも変動があつたと考えられた。一般にアクアラングといわれている装置をつかつて、粟島の南端の岩礁の東西両側の海底に、長さ50 m以上の岩の割目を見出した。それ以上は深く潜水できなかつたのであるが、他の研究者が潜水艇その他を使つて、この割目と平行な断層を見出しているの、ここに報告した割目も地震断層の一部と考えた。