

Volcanic chain of the western Okinawa Trough margin: Discovery of a Quaternary shoshonitic rock

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Abundant fresh volcanic rocks were recovered from sea floor about 100 km west of Yokogan Sone, where is located on the western Okinawa Trough (OT) margin, using beam trawling, during a sea floor biological survey of Nagasaki-maru 295 cruise. We will report the petrological characteristics and tectonic meanings of the samples.

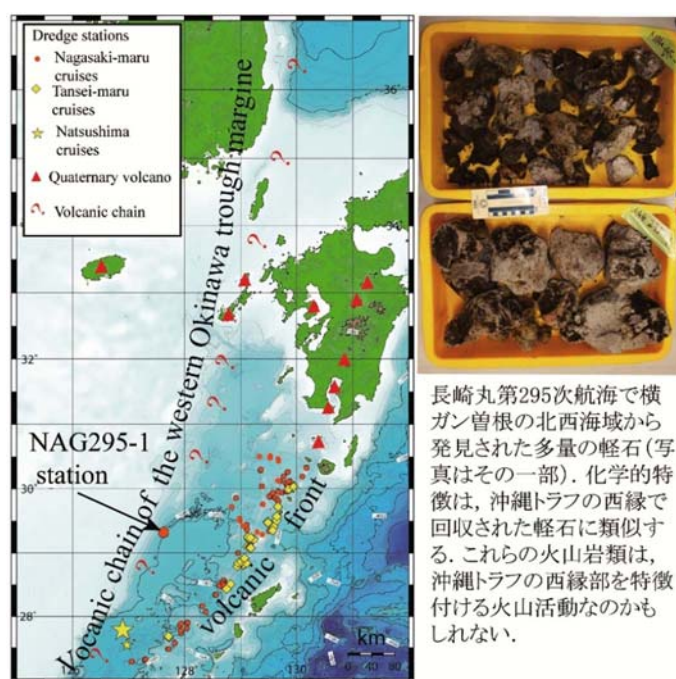
Abundant fresh pumice fragments and a shoshonitic lava fragment were recovered from a bottom of continental shelf (29_19N, 127_37E; 29_20N, 127_38E; 1044 m in depth) and. The pumices are monolithologic, white to pale gray, angular to sub-angular fragments (< 40cm in diameter) and the total amount is exceeded in 60 kg. Rounded pumice and pumices with Fe-Mn oxide crust are not observed. The occurrence suggests that

the rhyolitic pumices were not submerged drifted pumice but in situ volcanic fragments. The occurrences of pumices are similar to the submarine pumices in the submarine region of Tokara Islands (Yokose et al., 2010).

Opx, Pl, and Mt are observed as phenocrystic minerals in the pumices under the microscope. Groundmass is composed of sponge clear volcanic glass. One tiny shoshonitic lava fragment (~ 40g) also discovered and shows a part of knobby pillow. The lava fragment is made of aphyric black volcanic glass. Radially elongated quenched crystals are observed in the glass under the microscope. The groundmass glass is also completely fresh.

Recovered pumice is classified into rhyolite (SiO₂=71wt. %, K₂O=2wt. %), while lava fragment is shoshonite (SiO₂=55wt. %, K₂O=3wt. %). HREE abundances of both rocks are 30 times condrite. LREE pattern of shoshonite is more enriched (ca. 200 times condrite) than those of the rhyolite. REE patterns of the both rock, indicate the genetical correlation between them. Shoshonite is strongly enriched in the other incompatible elements compared with the rocks of the northern and central Ryukyu volcanic front.

Mid-Pleistocene rhyolitic rocks have been reported from the submarine volcanic front of Ryukyu arc (Yokose et al., 2010). The REE abundance of NAG295 samples are twice as much as the rhyolites from volcanic front. Samples recovered from the western margin of the Iheya volcanic region, during NT9714 cruise, have similar geochemical characteristics to the samples of NAG 295.



長崎丸第295次航海で横ガン曾根の北西海域から発見された多量の軽石(写真は一部)。化学的特徴は、沖繩トラフの西縁で回収された軽石に類似する。これらの火山岩類は、沖繩トラフの西縁部を特徴付ける火山活動なのかもしれない。

Although many marine investigations were carried out vicinity of the Iheya volcanic region, the whole volcanic activity on the OT is remain controversial. The western margin of the Beppu-Shimabara graben is considered to be connected with the northern extension of the OT. However, there is no evidence of active volcano the southwest of Unzen volcano, but distribute submarine cones of basement rocks.

The station of NAG295 is located on the Tunghai shelf fault (Kimura, 1985). The topographical northern extension of the fault reaches the Quaternary volcanoes, Ojika-Jima and Fukue-Jima volcano groups in the Goto Islands. Our sampling station aligns with the Quaternary volcanoes of Goto Islands and small volcanic cones located on the western margin of the Iheya volcanic region along and are correspond to the eastern margin of Taiwan-Sinzi Belt (Hsu et al. , 2001). Our new location is not an isolated single volcano, but may form a volcanic chain of the western OT margin together with the other volcanoes.

Discovery of new volcanic rocks from such a flat sea floor in the bathymetric map is suggested the possibility of many inconspicuous small volcanic cones scattering on such a flat sea floor. If the volcanic chain of the western OT margin proposed in this paper is verified, they will be a important constraint on considering both the tectono-volcanic evolution of the central and northern OT and the subduction system .

<References>

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