

An overview of volcanic rocks from submarine Kikai Caldera

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Kikai Caldera to the south of Kyushu is known as a submarine volcano that made a catastrophic eruption at ~7300 years ago. The traces of repeated Plinian eruption and a subsequent caldera-forming event are recorded in the subaerially deposited pyroclastic materials and ignimbrites on the proximal islands, Satsuma-Iwojima and Take-shima, on the caldera rim and the distal places such as the southern Kyushu mainland, Tanega-shima, and Yaku-shima. This eruption was followed by post-caldera volcanic activities that have intermittently occurred in and around the caldera up to date. Because most part of the caldera volcano exists underwater, volcanic activities during and after the caldera-forming event are poorly understood.

Recent submarine surveys with T/S Fukae-Maru have explored topographic characteristics of the caldera, including double caldera walls, intrusive bodies along the walls, and a large and several small lava domes in the caldera. In 2019, we conducted dredge hauls to sample submarine volcanic rocks from the places with these volcanic characteristics during the cruises with R/V Shinsei-maru (KS-19-17) and R/V Kairei (KR19-11). The seafloor was monitored during the dredge using a deep-sea camera placed above the dredge.

We made eight dredge hauls near the inner and outer caldera walls in total during the two cruises. Variety of volcanic rocks were collected, including white, dark-colored, and banded lavas with varying vesicularity together with tuffaceous rocks. Note that dense dark-colored rocks and porphyritic rocks were recovered near the caldera walls at five sites out of eight. Because these types of rocks have not been found on the proximal islands or the distal land places, they may represent the materials that consist of the caldera rims. We had seven dredge hauls on the slope of lava domes inside the caldera. The rocks from the lava domes are mostly rhyolitic with varying mineral assemblages and modes. Banded pumice and rhyolitic rocks with enclaves are occasionally observed. These rocks tend to be less vesiculated than the rocks collected near the caldera rims. Some of those have cooling joints, as observed by the deep-sea camera for the rocks on the lava domes. The submarine rocks collected by the two cruises will be compared with the subaerially deposited pyroclastic rocks and post-caldera volcanic rocks in terms of texture, mineral modes, and chemical composition.

Keywords: Kikai caldera, Submarine volcano, Dredge