琉球弧硫黄鳥島周辺海域における火成活動の地球物理学的特徴

Magmatic activity around Iotori-shima Island in the Central Ryukyu, based on geophysical characteristics

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The Ryukyu Arc extends approximately 1,200 km between the islands of Kyushu and Taiwan, where the Philippine Sea Plate subducts northwestward under the Eurasian Plate. From east to west, the arc consists of the Ryukyu Trench, the Ryukyu Islands, the volcanic front (Tokara Islands), and the Okinawa Trough. Volcanic front and the Okinawa Trough are the main volcanic active area in the Ryukyu arc. It is widely considered that these two magmatic activities are separated in the North Ryukyu, but toward to the Central Ryukyu, these convergent with Okinawa Trough [e.g., Geshi and Ishizuka, 2007]. We conducted marine geophysical surveys around Iotori-shima Bank in the Central Ryukyu. The Iotori-shima Bank is a huge volcanic construction located west of Iotori-shima Island [Ishizuka et al., 2014], but the detail is still unclear. Based on the seafloor morphology, magnetic anomaly, and gravity anomaly, we will describe magmatic and tectonic activities of the Central Ryukyu around Iotori-shima Bank.
Many submarine volcanoes are identified in the southwest of Iotori-shima Island. The extension of volcanic front southwest of Iotori-shima Island is already pointed out [Sato et al., 2014] and this implies that the two kinds of magmatic activities in the volcanic front and Okinawa Trough do not necessarily converge at the Central Okinawa Trough. In addition, submarine volcanoes which would belong to the ancient volcanic front [Sato et al., 2014] are also observed just north of Igyo-Sone Bank. This suggests that the ancient volcanic front is limited in the southern part of Central Ryukyu.
West of the volcanic front, many submarine volcanoes including Iotori-shima Bank are identified. Southwest of Iotori-shima Bank, ENE-SSW trending many seafloor lineaments are observed. These would be normal faults caused by back arc tectonic activity, but are not observed in the Iotori-shima Bank. Higher Bouguer anomaly is observed at where lineaments are observed; therefore, this gravity anomaly would imply crustal thinning caused by back arc rifting, although the main back-arc rifting is centered far west of the survey area. Iotori-shima Bank is characterized by a caldera structure and many submarine volcanic knolls. Dipole magnetic anomalies are observed on relatively-small submarine knolls, on the other hand, the largest submarine knoll located southwestern part of the caldera is not accompanied by dipole magnetic anomaly. The relatively low magnetization intensity inside the caldera suggests that collapse of volcanic knoll, destruction of magnetic minerals, and/or originally low magnetization. Upward-continued Bouguer anomaly shows NE facing transition over the Iotori-shima Bank. This suggests that the Bank is under the influence of back-arc rifting, however, seafloor lineaments are not observed on its surface.

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