Oral | Symbol S (Solid Earth Sciences) | S-CG Complex & General

[S-CG67_2AM2]Ocean Floor Geoscience

Convener:*Kyoko Okino(Ocean Research Institute, University of Tokyo), Keiichi Tadokoro(Research Center for Seismology, Volcanology and Earthquake and Volcano Research Center, Nagoya University), Osamu Ishizuka(Institute of Geoscience, Geological Survey of Japan/AIST), Tomohiro Toki(Faculty of Science, University of the Ryukyus), Narumi Takahashi(Earthquake and Tsunami Research Project for Disaster Prevention, Japan Agency for Marine-Earth Science and Technology), Chair:Tomohiro Toki(Faculty of Science, University of the Ryukyus), Kyoko Okino(Ocean Research Institute, University of Tokyo)

Fri. May 2, 2014 11:00 AM - 12:45 PM 418 (4F)

Ocean Floor Geoscience session covers a broad range of research on seafloor such as mid-ocean ridge process, subduction dynamics, arc magmatism, hot spot and LIPs, crustal movement and structure etc. Every field of researches and every approaches are welcomed. The session aims to encourage discussion among scientists from different study fields and to integrate our understanding of ocean floor.

12:00 PM - 12:15 PM

[SCG67-P09_PG]Topography, geology, tectonics and ore deposit of the Bayonnaise knoll caldera, Izu-Ogasawara arc

3-min talk in an oral session

*Chie HONSHO[1], Tamaki URA[1], Akira ASADA[2], Kangsoo KIM[2], Kenji NAGAHASHI[2] (1.Atmosphere and Ocean Research Institute, The University of Tokyo, 2.Underwater Technology Research Center, Institute of Industrial Science, The University of Tokyo)

Keywords:hydrothermal deposit, Izu-Ogasawara rift, multibeam sonar, side scan sonar, GLCM, Kuroko deposit

Several hydrothermal sites have been discovered in the volcanic front of the Izu-Ogasawara arc: Myojin knoll caldera, Myojinsho caldera, Smith caldera, Suiyo seamount, and Kaikata seamount. The Hakurei hydrothermal site in the Bayonnaise knoll caldera is the only hydrothermal site discovered in the rift zone of the arc. We analyzed deep-sea multibeam and side scan sonar data obtained using autonomous underwater vehicle Urashima in the caldera and discussed the topography, geology, tectonics, and ore deposit of the caldera. The survey area ～3 km x ～2 km wide covers the southern half circle of the caldera. Major geomorphic elements are, from the outside to the inside, the knoll slope, the steep caldera wall, the flat caldera floor, the central cone with three peaks, and the central depression surrounded by the peaks. The high-resolution bathymetric map shows that large slope failures occurred in the southeastern caldera wall and that the Hakurei deposit is distributed over the failure area. Slope failure is also going on in the southwestern wall and a large collapse may shortly occur. The eastern hill, the main part of the central cone, seems to be a lava dome: it has a small flat surface on the top, convex slopes in the upper part, and rectilinear to concave slopes near the base. The northeastern slope of the dome is relatively flat from top to bottom, indicating that a slope failure occurred there. A series of depressions lying in a NW-SE direction in the western caldera floor would be a crater row, seeing that the terrain gently slopes down from the rim of the depressions. The direction of the crater row suggests that the caldera is under the extension stress in a NE-SW direction. Morphological and textural characteristics of the Hakurei site were determined by three kinds of analyses. The gray-level co-occurrence matrix was used to describe the texture of the side scan sonar image and to classify the seafloor using cluster analysis. The Hakurei area was distinctly classified to a group that was

characterized by high entropy and low homogeneity, and a broad area from the top to the northeast slope of the eastern lava dome was also classified to the group. Some areas belonging to the group were distributed around the top of the southern central cone, in the eastern caldera wall northeast of the Hakurei site, in the southwestern caldera wall, and around the crater row. A band-pass filtered topography was used to determine areas where short-wavelength topographic features like chimneys and mounds observed in the Hakurei site dominate. The band-pass filtering was also performed on the multibeam backscattering intensity data to detect similar patterns to numerous spots of strong backscattering from chimneys observed in the Hakurei area. These results commonly show that areas of similar characteristics to the Hakurei site are distributed in a zone crossing the caldera in a NW-SE direction, from the Hakurei site to the crater row through the central cone. The Izu-Ogasawara rift zone is separated to many segments ranging in a N-S direction. The Bayonnaise knoll caldera is located on the northeastern margin of an oval depression called the North Myojin rift, which has a longer N-S axis of ～20 km. It appears that the direction of the crater row, the distributions of hydrothermal or volcanic features, and the distribution of slope failures are along the rim of the North Myojin rift going through the caldera. The North Myojin rift is surrounded by seven knolls including the Bayonnaise knoll. Although hydrothermal activity has been discovered only in the Bayonnaise knoll so far, the geological settings that volcanoes of acidic rocks lying along a circular fault of a depression host ore deposits closely resembles that of the Hokuroku Kuroko region in northern Akita. It is suggested that the Hakurei site is the present field of the Kuroko ore formation.