A pumice cone hypothesis of Myojin-knoll caldera -verification from multichannel seismic reflection study-

Ayumi Okuda[1]; Tetsuro Tsuru[2]; Tetsuo No[3]; Kensaku Tamaki[4]

[1] Geosys; [2] IFREE, JAMSTEC; [3] IFREE,JAMSTEC; [4] ORI,Univ of Tokyo

Myojin-knoll is a submarine volcano, which is located on the present volcanic front of the Izu-ogasawara arc, and has a caldera whose surface is mainly covered by pumice. As for the well-known bimodal volcanic activity at the Izu-ogasawara arc, the Myojin-knoll belongs to the volcano formed by ryolitic magma. The caldera is 6-7 km in diameter and 500-900 m in height at the outer rim, size of which is smaller than that of the Hakone volcano with about 11km diameter. The Myojin-knoll has been well studied by gravity, magnetics, single-channel seismic reflection, seafloor observation and dredge surveys, and is famous after the discovery of a huge sulfide deposit named the Sunrise ore deposit [Iizasa, 1999] at the caldera wall in 1999. Concerning formation process of the Myojin-knoll caldera, although Yuasa [1991, 1995] and Murakami [1997] proposed a theory of pumice cone, it is still controversial [e.g., Fiske et al., 1995, 2001] because subsurface structures directly beneath the caldera floor has not be clarified yet. We conducted a structural analysis using multi-channel seismic reflection data that have been collected in 2004, and divided the caldera body into some structural units based on the seismic stratigraphic manner. As a result, almost all of the units show stratified internal-layers and have considerably low P-wave velocity of 1550-1750m/s. Comparing the results of ODP Leg 126 [Taylor, Fujioka, Shipboard Scientific Party, 1990] and the seafloor observations [Naka et al., 1995], these units correspond to pumice-rich volcanic breccia in lithology. Furthermore, a funnel-shaped unit has been figured out directly beneath the caldera floor, having P-wave velocity significantly higher than that of the pumice-rich units. In this paper, we would like to demonstrate tectonic geometry and velocity structure of the Myojin-knoll caldera mainly using multi-channel seismic reflection data, and then report on the validity of the pumice cone hypothesis and its formation process.