Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SCG67-11 会場:106 時間:5 月 22 日 17:15-17:30

フレンチポリネシア海域の海底火山探索
Exploring submarine lava fields in the French Polynesian region

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The initial phases of a hotspot volcano and/or submarine tiny volcano must be complemented by sampling of present-day submarine volcanic activity. The large number of small and active volcanoes suggests that many volcanic systems are initiated prior to large or subaerial volcanoes at hotspots, which has been carried out at the Loihi Seamount of the Hawaiian chain (e.g. Moore et al., 1979), the Macdonald Seamount of the Austral chain (e.g. Johnson, 1970), the Adams Seamount of the Pitcairn chain (Devey et al., 2003), and on the Vailulu'u Seamount of the Samoan chain (e.g. Hart et al., 2000). Although the submarine samplings and their dating have often complicated the simple hotspot model, the distribution of submarine volcano is critical to recognize the hotspot and seamount chain. It is not only about hotspot, but unexpected submarine volcanoes, petit-spot volcanoes and arch lavas were newly found by the shipboard acoustic surveys off the NE Japan on the subducting Pacific Plate and at the flexural Hawaiian arch 300?500 km off the Hawaiian Islands, respectively (Hirano et al., 2006; Holcomb et al., 1988). The shipboard multibeam surveys, therefore, are necessary to find the submarine volcanisms and to know submarine portion around a volcanic island, expecting their future sampling.

The shipboard multibeam data for the French Polynesian region were obtained by two research cruises. The R/V Mirai cruise, MR08?06 Leg1, transited from south of the Tuamotsu Islands to the eastern Austral Islands in the southern Pacific Ocean by JAMSTEC (http://www.jamstec.go.jp/e/database/). The data near the Marquesas Islands, northern French Plynesia, from R/V Melville's PANR06MV and WEST13MV cruises, are supplied from the Geological Data Center, Scripps Institution of Oceanography (http://gdc.ucsd.edu/).

Some potential young volcanoes and lavas are newly found on the southern/eastern offshore of Marquesas hotspot, the north of western tip of Pukapuka Islands, and the southeastern offshore of Macdonald seamount. The sidescan imagery of some volcanic edifices shows high reflectivity because these young lavas are covered with only a thin layer of soft pelagic sediment, much thinner than the surrounding pelagic layer on the Pacific Plate. These data show more than three times as high as the reflective values of surrounding abyssal plain excluding the portions of steep slope (Hirano et al., 2008). Some of them do not build apparent edifices in spite of showing a high acoustic reflectivity, which the high reflective portion sparsely distribute to avoid the terraces and knolls. Some of volcanic clusters are found as young volcanic cones. Newly found potential young lavas might correspond to the portion above low velocity part of the shallow mantle (Suetsugu et al., 2009). Otherwise, they may be the submarine tiny volcano related to a stress field on the moving plate (i.e. petit-spot volcano) (Hirano et al., 2006). Understanding of volcanic distribution and future rock samplings will provide us the information about the stress field of the "hot" Pacific Plate on the plume, and the geochemical structure of Southern Pacific Superplume, awaiting future discovery.

キーワード: 海底火山, ポリネシア, マントル・プルーム, 太平洋プレート, プチスポット
Keywords: submarine volcano, polynesia, mantle plume, Pacific plate, petit-spot