HYDROTHERMAL ALTERATION OF THE ACTIVE SEAMOUNTS IN TONGA VOLCANIC ARC, SOUTHERN LAU BASIN, SOUTHWESTERN PACIFIC

CHO, H.G.[1]* & CHOI, H.[2]
[1] Department of Earth and Environmental Sciences and Research Institute of Natural Science, Gyeongsang National University, Jinju 660-701, Korea
[2] Petroleum & Marine Research Division, Korea Institute of Geosciences & Mineral Resources, Daejeon 305-350, Korea
* E-mail: hgcho@gsnu.ac.kr

The Lau Basin in the south-western Pacific is an active back-arc and relatively shallow water depth (2,000~3,000 m) basin located in a subduction zone between the Pacific plate and Indo-Australian plate. The Tonga Volcanic Arc in southern Lau Basin is an interesting place where a back-arc spreading center closely approaches an active volcanic front (MARTINEZ & TAYLOR, 2003). In the last few decades, many active seamounts were found, and some of them have hydrothermal vents (DE RONDE *et al.,* 2001, 2005; STOFFERES *et al.,* 2003, 2006; ARCULUS, 2005). The hydrothermal vent fluids may produce massive sulfide deposits on the seafloor (MASSOTH *et al.,* 2007).

In this study, we interpret hydrothermal alteration around seamounts in the Tonga Arc using X-ray diffraction for clay fraction. We used two core samples from two seamounts (TA 12 and TA 26) and 19 TV guided grab samples (GTV) from five seamounts (TA 12, TA 19, TA 22, TA 25, and TA 26). Based on the downcore variation of mineral assemblages, TA 12 core can be divided into 3 zones; upper gypsum zone, middle smectite zone, and lower smectite + kaolinite + talc zone. TA 25 core can be divided into 5 zones from top to bottom; gypsum zone, smectite zone, smectite + kaolinite zone, smectite + talc zone, and smectite + kaolinite + talc zone. Most zones except gypsum zone correspond to argillic alteration zone. GTV samples are mostly composed of smectite in TA 12 and TA 25, kaolinite in TA 26, and smectite + kaolinite + illite in TA 22. These clay mineral assemblages correspond to argillic alteration. This study suggests that argillic hydrothermal alteration occurred and a high probability of massive sulfide deposits in the seafloor of the studied seamounts.

References

ARCULUS, R.J. (2005): New Zealand Minerals Conferences Proceedings: 45–50.

DE RONDE, C.E.J., BAKER, E.T., MASSOTH, G.J., LUPTON, J.E., WRIGHT, I.C., FEELY, R.A. & GREENE, R.R. (2001): Earth and Planetary Science Letters, 193: 359–369.

DE RONDE, C.E.J., HANNINGTON, M.D., STOFFERS, P., WRIGHT, I.C., DITCHBURN, R.G., REYES, A.G., BAKER, E.T., MASSOTH, G.J., LUPTON, J.E., WALKER, S.L., GREENE, R.R., SOONG, C.W.R., ISHIBASHI, J., LEBON, G.T., BRAY, C.J. & RESING, J.A. (2005): Economic Geology, 100: 1097–1134.

MARTINEZ, F. & TAYLOR, B. (2003): Geological Society of London Special Publication, 219: 19–54.

MASSOTH, G., BAKER, E., WORTHINGTON, T., LUPTON, J., DE RONDE, C., ARCULUS, R., WALKER, S., NAKAMURA, K., ISHIBASHI, J., STOFFERS, P., RESING, J., GREENE, R. & LEBON, G. (2007): Geochemistry Geophysics Geosystems, 8, Q11008: 26 pp.

STOFFERS, P., WORTHINGTON, T.J. & SHIPBOARD SCIENTIFIC PARTY (2003): Cruise Report Sonne, 167: 276 pp.

STOFFERS, P., WORTHINGTON, T.J., SCHWARZ-SCHAMPERA, U., HANNINGTON, M.D., MASSOTH, G.J., HEKINIAN, R., SCHMIDT, M., LUNDSTEN, L.J., EVANS, L.J., VAIOMO'UNGA, R. & KERBY, T. (2006): Geology, 34: 453–456.