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SCG66-P04 Room:Convention Hall Time:May 22 15:30-17:00

Geological and petrological studies in the southern Mariana margin, –R/V Thomas G.Thompson TN273 Cruise quick report–

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TN273 aboard R/V Thomas G. Thompson (about 3000 ton, 80 m long; operated by the University of Washington, Seattle) was a 32-day cruise from 22 (Thu.) Dec. 2011 ? 22 (Sun.) Jan. 2012, departing and returning to Guam (Apra Harbor). Fernando Martinez and Katherine A. Kelley served as co-chief scientists aboard Thompson. The project was titled: The Southeast Mariana Forearc Rifts and Southernmost Mariana Trough Spreading Center: New Insights into the Tectonics and Magmatism of Intraoceanic Arcs. In this area of the southern Mariana margin, magmatically robust back-arc spreading transitions to rifting of the margin with broadly distributed volcanic and tectonic activity. This allows an investigation of supra-subduction zone magmatism and tectonic deformation with varying distance from the trench and subducting slab.

Research areas: (A) the southern end of the Mariana spreading center, the Malano-Gadao ridge, (B) the southeastern Mariana forearc rifts (SEMFR) zone including the Fina Nagu Volcanic Chain to the southeast of the backarc ridge, and (C) the Shinkai Seep Field (SSF) discovered in 2010 by the Shinkai 6500 at the dive site #6K1234 (observer T. Ishii) in the southern Mariana trench inner wall, about 5625 m deep, located about 80 km northeast of the Challenger Deep (see Ohara et al, 2012).

Survey methods: (a) deep-towed sidescan sonar mapping with the 30 kHz IMI-30 sonar, (b) wax core for collecting fresh glasses from Malanao-Gadao neovolcanic zone, (c) chain bag dredge for collecting igneous rocks, (d) underway bathymetry mapping by the multibeam Simrad EM302, underway gravity measurements, towed magnetometer measurements, (e) Miniature Autonomous Plume Recorders (MAPRs) for measuring pressure, temperature, optical backscatter in the water column and oxidation-reduction potential (Eh), to search for hydrothermal signatures.

Research results: (a) All areas were successfully mapped with the deep-towed sidescan sonar (b) wax coring was operated at 6 sites, which were selected using sidescan sonar maps, with recovery of fresh glasses from the Malano-Gadao neovolcanic zone, (c) chain bag dredge was operated at 45 sites, which were selected using sidescan sonar maps, also with recovery of igneous samples from the SEMFR, Malano Gadao ridge, and Fina Nagu Volcanic Chain (d) underway bathymetry mapping by the multibeam Simrad EM302, underway gravity measurements and towed magnetometer measurements were achieved successfully, (e) Miniature Autonomous Plume Recorders (MAPRs) recorded some new hydrothermal plume signatures.

The R/V Thomas G. Thompson is a very capable and attractive research vessel ably supported by 20 crew members. The cruise successfully mapped and sampled the target areas which, together with scientific and technical legacy data (including low-tech dredging and wax coring) that we have inherited from our previous investigators and onshore processing of images and geophysical data and laboratory studies of collected samples, will lead to a better understanding of the tectonic and magmatic activity in this unique subduction area.

References

Y. Ohara, M. K. Reagan, K. Fujikura, H. Watanabe, K. Michibayashi, T. Ishii, R. J. Stern, I. Pujana, F. Martinez, G. Girard, J. Ribeiro, M. Brounce, N. Komori, M. Kino (2012), A serpentinite-hosted ecosystem in the Southern Mariana Forearc, *Proceedings of the National Academy of Sciences, 109*(8), 2831-2835.

Keywords: R/V Thomas G. Thompson, the southern Marian forearc, the Shinkai Seep Field (SSF), deep-towed sidescan sonar IMI-30, TN273 Cruise