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A Study on the Magnetic and Submarine Geology Structure of TA22 Seamount in Lau Basin, Tonga

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Abstract : We performed the marine magnetic, bathymetry and seismic survey at the TA22 seamount (in the Lau basin, SW Pacific) for finding the submarine hydrothermal deposits in October 2009. We acquired magnetic and bathymetry data sets by suing Overhouser Proton Magnetometer SeaSPY (Marine Magnetics Co.), Multi-beam Echo Sounder EM120 (Kongsberg Co.). We conducted the data processing to obtain detailed seabed topography, magnetic anomaly, reduction to the pole (RTP) and magnetization. Based on the magnetic properties result, we analyzed submarine geology structure of TA22 seamount with post-processed seismic profile. The detailed bathymetry of the TA22 seamount showed the left and right crest parts that have caldera features in each crest central part. The magnetic anomaly distribution of the TA22 seamount regionally displayed high magnetic anomalies in northern part and the low magnetic anomalies in southern part around the caldera features. The RTP magnetic anomaly distribution of the TA22 seamount presented commonly high magnetic anomalies in the each caldera central part. Also, it represented strong anomalies at the inside of caldera rather than outside flank of the caldera. The magnetization distribution of the TA22 seamount showed the low magnetization zone in the center of each caldera, high magnetization zone in the southern and northern east part. From analyzed the seismic profile map, The TA22 seamount area is showed for the inferred small mounds inside each caldera central part and it assumes to make possibility of sills by the magma in cases of the right caldera. Taking into account all results of this study (bathymetry, magnetic anomaly, RTP, magnetization, seismic profile) with rock samples at the left caldera area in 2009 survey, we suppose the possibility of hydrothermal deposits at mounds in each caldera central part and at outside flank of the caldera representing the low magnetization zone. We expect to have the better results by combined modeling from this study data with the other geological data (ex. detailed gravity, 3D seismic, petrologic study results and etc).

Keywords : detailed bathymetry, magnetic anomaly, seamounts, seismic profile, SW Pacific
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