

MAGNETIC AND TOPOGRAPHIC STUDIES ON THE MAIN CRATER LAKE OF TAAL VOLCANO, PHILIPPINES

Makoto Harada 1, YOICHI SASAI 2, Julio P. Sabit 3, Juan M. Cordon Jr. 3, Jacques Zlotnicki 4, Jaime Sincioco 4, Yoshikazu Tanaka 5, Toshiyasu Nagao 1

1. Institute of Oceanic Research and Development, Tokai University, Japan
2. Disaster Prevention Division, Tokyo Metropolitan Government, Japan
3. Philippine Institute of Volcanology and Seismology, Philippines
4. CNRS, Observatoire de Physique du Globe de Clermont-Ferrand, France
5. Aso Volcanological Laboratory, Kyoto University, Japan

We have carried out electromagnetic (EM) monitoring of Taal Volcano, Philippines. Taal is a basaltic-andesite volcano which has had 33 eruptions in the historic times and is located close to Metro Manila. On Taal, various geophysical and geochemical observations have been conducted, but not the EM monitoring. A cooperative project for EM studies between PHIVOLCS and EMSEV/IUGG has recently been started. Measurements of total magnetic field (TMF), self-potential (SP), ground temperature and CO₂ degassing were made during the first survey in January 2005. Distinct anomalies in TMF and SP were found in the geothermal areas in the North-eastern shore of the Main Crater Lake (MCL) and northern flank of Volcano Island.

In order to identify the center of the geothermal activity, we conducted measurements of the lake topography, TMF, surface water temperature as well as CO₂ concentrations on the surface of MCL in March, 2008. The Overhauser magnetometer (GSM-19, GEM systems) and depth sounder (GPSmap278, GARMIN) were used for the measurements. These equipments were set on a small banca boat which is made of FRP. The sample intervals were set to 5 seconds for magnetic survey and about 15 meters for the depth sounding. Our measurements covered almost whole area of MCL.

The result of depth sounding generally resembles to the previous study in 1986. However, the depth in the central part seems to be decreased. This may be caused by the inflows from the lake shore. In addition, we found out very clear bathymetric change in the northern part of MCL. The iso-bathymetric line of 40 m warps toward south in the 2008 study. This topographic high may be a kind of mound composed of some geochemical materials such as sulfide and/or chloride. This mound is non-magnetic and coincides with the position of thermal anomaly emerged during the volcanic crisis in the early 2005. This area could be the outlet of magmatic fluids, which is connected to the vent from the magma reservoir.

electromagnetic method, hydrothermal activity, thermal demagnetization

Makoto Harada, Institute of Oceanic Research and Development, Tokai University, 3-20-1, Orido, Shimizu-ku, Shizuoka, 424-8610 Japan, Tel; +81-54-337-0946, Fax: +81-54-336-0920, E-mail: mharada@scc.u-tokai.ac.jp

Yoichi Sasai, Disaster Prevention Division, Tokyo Metropolitan Government, 2-8-1, Nishi-Shinjuku, Shinjuku-ku, Tokyo, 163-8001 Japan, E-mail: yosasai@zag.att.ne.jp