THE SURVEY OF MYOJIN-SHO, THE SUBMARINE VOLCANO BY UNMANNED RADIO OPERATING BOAT “MANBOU II”

Kunio YASHIMA, Azuza NISHIZAWA and Yasyio OOTANI, Japan

Key words: Manbou, Myojin-Sho, Caldera, Unmanned radio operating survey boat.

ABSTRACT

Myojin-Sho is a submarine volcano located about 450 kilometers south of Tokyo on the Izu-Ogasawara Ridge. It was 1869 when a volcanic eruption was first observed. Within the 130 years that followed, it has repeated more than ten volcanic activities of eruption and the appearance and disappearance of a new island.

The volcanic eruption from 1952 to 1953 was one of its biggest activities on record with the repetitious appearance and disappearance of an island. The island grew to more than several ten meters high at a certain point, but it disappeared with severe volcanic explosion in September 1953. The name Myojin-Sho derives from a fishing boat, "No.11 MYOJIN-MARU " of Yaizu City, Shizuoka Prefecture, the crew of which first witnessed the major volcanic eruption of 1952. On September 24, 1953, a survey vessel, "No. 5 KAIYO-MARU" of the Hydrographic Department of the Maritime Safety Agency, met with disaster, costing thirty-one persons including those of nine scientists. This is the biggest disaster in the history of Japanese oceanographic research and an unforgettable tragedy for the Hydrographic Department. Determined to learn a lesson from this tragedy, the Hydrographic Department developed "MANBOU" (meaning Sunfish) an unmanned radio operating survey boat, and has used it for the research of dangerous sea areas such as submarine volcanoes, etc.

In 1998 and 1999, the Hydrography Department conducted comprehensive sea bottom surveys around Myojin-Sho, using the state-of-the-art survey vessel, "SHOYO" (3,000 tons) and "MANBOU II" , the second generation "MANBOU". As a result of these surveys, a detailed and general picture of the sea bottom topography around Myojin-Sho was made clear for the first time. This is the report of the summary of the survey and the sea bottom topography.

"MANBOU II" conducted the survey of the sea area within a radius of 3 nautical miles (about 5.4 kilometers) of Myojin-Sho. "SHOYO" conducted the survey of the sea area within a radius of about 10 nautical miles (about 18.5 kilometers) but farther than the area of the radius of 3 nautical miles. "MANBOU II" works by the order of preprogrammed instructions and measures depth and water temperature. Bathymetric survey of "MANBOU II" was carried out by using the "PRD-601" echo sounder at intervals of 0.2 nautical miles (about 370 meters). "SHOYO" conducted a comprehensive survey including the geological and geophysical surveys of sea bottom. Bathymetric survey of "SHOYO" was carried out by using "SEABEAM 2112" echo sounder at intervals of 0.5 nautical miles (about 930 meters).

Previously, Myojin-Sho was considered to be the central cone of a double volcano with the Bayonnaise Rocks (rocks of 9.9 meters in height above the sea level) as a portion of the somma (MITA, 1949). As a result of the survey, however, the authors found that both Myojin-Sho and the Bayonnaise Rocks are cones on the somma of a double volcano. The foot of this double volcano lies 1,400 to 1,500 meters in depth and the size is about 30x25 kilometers east-west, north-south. The somma is almost a circle in the diameter of 7x9 kilometers and the height is 1,000 – 1,400meters.

The diameter of the caldera floor is 5.6 kilometers and about 1,100 meters in depth. The central cone is a high formerly known as Takane-Sho, height is 770 meters with the shallowest depth 328 meters.

Myojin-Sho is a post caldera cone formed in the northeastern part of the somma of the double volcano. It is the single conical cone and the height is 550 meters with the shallowest depth 50 meters. A record that suggests a gushing of bubbles near the summit was obtained and the micro earthquake were observed near the Myojin-Sho. Therefore, the authors consider that the Myojin-Sho continues to be active now although the level of the activity seems low.

CONTACT

Kunio Yashima
Hydrographic Department, Japan Coast Guard
3-1, Tsukiji 5-chome, Chuo-ku
Tokyo 104-0045
JAPAN
Tel. + 81 3 3541 3813
Fax + 81 3 3541 3813
Email: yashima@cue.jhd.go.jp

Azusa Nishizawa
Hydrographic Department, Japan Coast Guard
3-1, Tsukiji 5-chome, Chuo-ku
Tokyo 104-0045
JAPAN
Tel. + 81 3 3541 4387
Fax + 81 3 3541 3870
E-mail: nisizawa@cue.jhd.go.jp

Yasuo Ootani
Hydrographic Department, Japan Coast Guard
3-1, Tsukiji 5-chome, Chuo-ku
Tokyo 104-0045
JAPAN
Tel. + 81 3 3541 4473
Fax + 81 3 3541 0723
Email: yasuo-ootani@kaiho.mlit.go.jp