

## Shallow Seismic Structure at Nishinoshima Volcano

\*Chiaki Okada<sup>1</sup>, Azusa Nishizawa<sup>1</sup>, Mitsuhiro Oikawa<sup>1</sup>

1. Hydrographic and Oceanographic Department, Japan Coast Guard

Nishinoshima island is located at about 1000 km southward from Tokyo, belonging in the volcanic front of the Izu-Ogasawara (Bonin) arc-trench system. Since an eruption resumed at southeast side of the Nishinoshima mainland in November 2013, for the first time in the almost 40 years, the area of Nishinoshima expands taking in Nishinoshima mainland with a large amount of volcanic lava. Although volcanic activity calms down gradually as of January 2016, it still continues.

Investigating underground structure around Nishinoshima becomes important to understand the volcanic activity of Nishinoshima. The information of underground structure of volcanoes can be expected to elucidate the transfer systems of magma and volcanic fluids accompanied by volcanic activity. Also, we can determine the location of volcanic earthquake more precisely using estimated seismic velocity structure.

Seismic explorations have been done such as Fuji volcano, Aso volcano and Kuchinoerabujima volcano. The seismic exploration results, for example at Aso volcano, revealed the existence of high seismic velocity body centered on the volcanic crater. Additionally Japan Coast Guard (JCG) carried out several ocean bottom seismographic observation at submarine volcanoes such as Myojin-sho and Fukutoku-okanoba. The results of survey at Fukutoku-okanoba showed there is the material which attenuates seismic waves under the volcanic body. However there is not so much detailed information about seismic velocity structure of Nishinoshima volcano.

JCG carried out overall geological and geophysical surveys to elucidate the present volcanic activity in detail using S/V *Shoyo* during June to July 2015. The survey includes seismic refraction measurements, using Ocean Bottom Seismograph (OBS) and airgun system, and the seismic reflection measurements using a single channel seismic streamer. The purpose of this measurement is to estimate preliminary shallow crustal seismic velocity structure around Nishinoshima. In this report, we show the results of fan shooting and seismic refraction measurement around Nishinoshima volcano.

In this survey, we shot totally 11 survey lines which went along right over OBSs deployed by JCG, Earthquake Research Institute (ERI) and Meteorological Research Institute (MRI). There are 2 or 3 OBSs in every survey line and the survey line lengths are almost 20 km. Total airgun volume is 3000 (1500x2) inch<sup>3</sup> (about 49 L) and shot interval is 40 seconds.

Based on the results of fan shooting used each OBS's record section, we found the area where the amplitude of seismic waves attenuate depending on the direction of traveling waves. This area might exist just under the volcanic body of Nishinoshima volcano.

In the seismic refraction measurements, the first arrivals of refracted seismic wave of about 4 km/s were observed in each record section at epicentral distances between 3 to 8 km. Many seismograms recorded the first refracted arrivals at the epicentral distances over 10 km. In some record sections, we also found the later phases of around 2 km/s which can be interpreted as reflected seismic signals. According to the preliminary P-wave velocity model obtained by the 2-D ray tracing method, a layer of 2 km/s as the topmost layer has a thickness of around 1.5 km. We could explain observed travel times if the P-wave velocity of the underlying layer will be around 4.5 km/s.

Keywords: Nishinoshima, Shallow crustal structure, Seismic refraction measurement

