

Seismic observation in the uninhabited island, Io-Torishima

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Io-Torishima is volcanic island which is 60 km west away from Tokunoshima Island. By second edition of 'Nihon Katsukazan Soran' (Catalog of Japanese Active Volcanoes) printed by Japan Meteorological agency, there is a volcanic crater in the north part of island. This crater erupted repeatedly from 15th century. Inhabitants who lived in south part of island took refuge from Io-Torishima by 1959 eruption. Sulfur miners refuge from this island by 1967 eruption. Since 1967, Io-Torishima has been an uninhabited island.

Around Io-Torishima, islands such as Amami-Oshima, Tokunoshima and Okinawa aligne in a straight line. So, seismic network aligne in the straight line too. This network is not suitable for determining hypocenters and the three dimensional velocity structure. Io-Torishima is located off this straight line. Therefore, we decided to deploy a seismometer temporally in Io-Torishima to improve the seismic network and conducted the plan last year. We will report the observational system and characteristic events that are observed so far.

There is no electric power supply and no telephone line in Io-Torishima. So, we supply power by using solar cells and batteries and send waveform data through a satellite. We use 1Hz seismometer made by Markproducts Co. and LS-7000XT made by Hakusan Co. for a digitizer. As for the satellite communication, we use SAO serviced by SNET (Satellite Network Inc.) and VSAT with the 60cm diameter antenna.

In summer and autumn, Io-Torishima often suffers strong wind by typhoon. We fix solar cells and a parabolic antenna on the roof of the abandoned concrete house with bolts. We put solar cells on the level because of strong wind at the cost of solar power generation efficiency. We could have a plan to put a wind power generator. But, we did not adopt it, because we hate noise from propeller vibrations and getting destroyed by typhoon strong wind.

We set up seismic observation system on June 30 and July 1, 2004. Since July 1, we have been receiving waveform data. Strong typhoon passed near Io-Torishima several times, but we have no trouble with the system except large noisy waveforms by wind. After the last ten days of December 2004, the telemetering system sometimes stops sending waveform data, when Io-Torishima is cloudy.

When we check seismic waveforms observed at Io-Torishima, we notice that volcanic earthquakes and tremors occur frequently. These activities are swarm like and occur only a few hours in a day. Takagi et.al. found the relationship between these activity and earth tide and presented it at the 2004 autumn meeting of the Volcanological Society of Japan.

From October 1 to October 10, 2004, an earthquake swarm occurred 20km north-west away from Io-Torishima. The maximum JMA magnitude was 5.3. We get records of many earthquake waveforms by this swarm and have recalculated the hypocenters of those events by adding the onset time of P and S at Io-Torishima to existing data.