

CTBT IMS hydroacoustic signal detections from the Ioto volcanic island in the northwest Pacific Ocean

*Hiroyuki Matsumoto^{1,2}, Mario Zampoli¹, Georgios Haralabus¹, Jerry Stanley¹, James Mattila¹, Nurcan Meral Ozel¹

1. Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), 2. Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

In-situ observation in terms of seismicity suggested that the volcanic activity of Ioto (formerly Iwojima), a volcanic island offshore Japan in the northwest Pacific Ocean increased in early September in 2018. Discolored waters and a splash were confirmed in the nearshore by a local flyover observation. Although these visual signs evidenced a connection between undersea eruptions and recorded seismic activity, there still remained uncertainty as to what portion of the *in-situ* recorded seismic activity was associated with volcanic tremors vs. undersea eruptive events.

During the same period, a large number of underwater acoustic (hydroacoustic) signals were recorded by the Comprehensive Nuclear-Test-Ban Treaty's (CTBT) International Monitoring System (IMS) hydroacoustic (HA) station HA11 Wake Island. A set of three hydrophone sensors forming a triplet makes it possible to compute the back-azimuth uniquely for wave packets with a good signal-to-noise ratio. We analyzed the data of the IMS hydrophone triplets during the month of September 2018 and compared them with *in-situ* seismic observations in Ioto for the same period.

The IMS hydrophone triplet data made it possible to discriminate the hydroacoustic signals associated with the Ioto volcanic activity. The direction-of-arrival (DOA) was estimated during the entire period of relatively high volcanic activity using cross-correlation analysis. The arrivals from Ioto at the IMS HA station and the *in-situ* observations showed good correlation. The present study suggests that two-thirds of the arrivals of hydroacoustic signals were associated with volcanic tremors and one-third with the undersea eruptions.

Keywords: International Monitoring System (IMS), Hydrophone triplet, Ioto