Study of a high activity eruption sequence of Kadovar volcano, Papua New Guinea, using data recorded by the CTBT International Monitoring System

Hiroyuki Matsumoto¹, Mario Zampolli², Georgios Haralabus², Jerry Stanley², James Robertson², and Nurcan Meral Özel²

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

The analysis of hydroacoustic signals originating from marine volcanic activity recorded by a remote hydroacoustic (HA) station, HA11 at Wake Island, of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) International Monitoring System (IMS) is presented in this study. The events studied pertain to an eruption series at Kadovar Island, Papua New Guinea during the period January to February 2018. Local visual observations determined that the Kadovar volcano began to erupt at the summit of the island, and then created new vent spots near the coast. The events included the collapse of a lava dome on 9 February 2018. Directions-of-arrivals of the hydroacoustic signals detected at HA11 were evaluated using a cross-correlation technique, this allowed discrimination between hydroacoustics signals originating from the Kadovar volcanic activity and other numerous hydroacoustic signals generated by general seismic activity in the Pacific. Discrimination between volcanic activity and seismicity was achieved by examining the time-frequency characteristics of the hydroacoustic signals, i.e. associating short duration broadband bursts with volcanic eruptions, in line with criteria generally applied for such events. Episodes of high volcanic activity with as many as 80 detections per hour were identified on two occasions, separated by a one-month period of relative quiet. Some of the hydroacoustic signals were characterized by broadband frequency content and high received levels (i.e. ca. 30 dB higher than the ocean microseismic background). It was found that corresponding non-hydroacoustic signals could not be identified by other regional IMS stations, this providing an indication of the likely submarine origin of these events. Long duration bursts recorded on the day when the lava dome collapsed have been identified and characterized in time-frequency space. This study provides a further example of the added value of CTBT IMS hydroacoustic station remote monitoring of marine volcanic events.