

Itoigawa Geopark survey and disaster readiness education in response to the 2016 Niigata Yakeyama Eruption undertaken through strengthened cooperation with the Niigata Yakeyama Volcanic Disaster Council

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1. Fossa Magna Museum, Itoigawa City

Mt. Yakeyama (2400 m), located on the border of the cities of Myoko and Itoigawa in Niigata Prefecture, is the Fossa Magna's northernmost active volcano and is a subject of regular monitoring by the Japan Meteorological Agency. Disaster readiness with regard to Mt. Yakeyama is a major issue for the City of Itoigawa. Since becoming a Global Geopark in 2009, natural disaster-related disaster readiness and disaster education activities have been given great importance. The city government, fire department and Fossa Magna Museum (Part of the Itoigawa City Board of Education, hereafter 'the Museum') aim to act as an agency for disaster readiness, providing scientific information and disaster drills through cooperation with volunteer disaster organizations. The eruption in spring 2016 became an opportunity to test the Itoigawa Geopark's volcanic disaster readiness. In addition to lectures, exhibitions, interpretations, field excursions, river cloudiness inspections and eruption record preservation, efforts were made to support the activities with the Friends of the Museum Society through cooperation with the local Kamihayakawa and Shimohayakawa Regional Community Centers. Also, support was received from the Niigata Yakeyama Volcano Disaster Readiness Council (Hereafter 'the Council') organizational members (Since 2016 curators of the Museum have also served as Council members).

Lectures (2 performed): (1) Current State of Niigata Yakeyama & Examples of Responses to Other Eruptions, Jun Funazaki (Niigata Regional Meteorological Observatory Director), Niigata Yakeyama Disaster Readiness Response, Itoigawa City Fire Department Disaster Readiness Division Chief. Held at the Shimohayakawa Regional Community Center (October 8th) with 140 in attendance. (2) Prediction of Eruptions and Their Mechanisms -Considering Niigata Yakeyama's Future- Kazuhiro Ishikawa (Chairman, Volcano Disaster Readiness Promotion Organization & Kyoto University Professor Emeritus) Understanding Eruption Damage by Reading Volcano Disaster Readiness Maps, Hideyuki Ito (Iwate University Professor), Held at the Museum, October 23 with 83 in attendance.

Field Study of Volcanic Ejecta: This tour was held on November 20 for people living in the Kamihayakawa Region beneath Mt. Yakeyama so they could better understand the scale of eruptions, the size and length of lava and pyroclastic flows, and how the valleys had been filled with volcanic ash, along with a tour of the erosion control dams. The tour was supported by the Friends of the Museum Society and led by museum curators with 34 in attendance.

Special Exhibit 'Preparing for Niigata Yakeyama's Eruptions - Study Volcanos to Save Your Life': Held Oct 23 to Dec 4 at the Museum, this exhibit featured photographs of Mt. Yakeyama, locally sourced materials about volcanic disasters, map data of Yakeyama's caldera provided by the Geospatial Information Authority of Japan, as well as panels on loan from the the Science Museum of Map and Survey and the National Volcanic Museum Federation Council.

Gallery Talk (Exhibition Interpretation): 8 interactive discussions led by museum curators were held on Sundays and holidays featuring demonstrations of pyroclastic and lava flow and inspection of volcanic ash and lava. 70 were in attendance.

River Cloudiness Inspection: Niigata Prefecture and Itoigawa City (Including the Fire Department and the Museum) conducted two analyses of the water quality and source of cloudiness which determined that

the source was from a hot water spring located at an elevation of 1050 m. These findings were reported to local people at a special lecture.

Eruption record preservation: A physical record of the debris, debris flow and mudslide damage caused by the 1974 phreatic eruption handwritten by local resident Hirokichi Hara was discovered and digitized to ensure its preservation.

Through partnership between the Council and the Itoigawa Geopark, the following positive outcomes have been achieved: (1) Support has been received from various experts and research organizations for the disaster readiness activities of Mt. Yakeyama (2) We have not only received volcanic observation data, but also been able to share our own surveys performed by the Itoigawa Geopark (3) We have been able to request a strengthening of the scientifically based observation system as the Itoigawa Geopark.

Keywords: Niigata Yakeyama Volcano, Steam eruption, Itoigawa UNESCO Global Geopark, Museum