

Reactivation of the Niikappu Mud volcano following the Tokachi-oki Earthquake in 2003

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In Japan, onshore mud volcanoes are only known at near the town of Niikappu, southwestern part of Hokkaido. 'The Niikappu mud volcano' has shown to be active whenever big earthquakes occur near this area. During these activities, 5th grade of JMA seismic intensities were recorded before 1996 at the town of Urakawa instead of Niikappu following the earthquakes (Chigira and Tanaka, 1997). On September 26th, 2003, 'the Tokachi-oki earthquake in 2003' of MJMA 8.0 occurred. Following this earthquake, 6- on JMA intensity scale, and 5.7 on instrumental seismic intensity was observed at Niikappu town. We discussed the activity of the Niikappu mud volcano related of the 2003 Tokachi-oki earthquake based on results of field investigation and 3D laser profiling.

At the Taniguchi farm, where the Niikappu mud volcano is located, the owner acknowledged that mud eruption occurred following the 2003 Tokachi-oki earthquake, and it was the first time that mud erupted toward the southwest. The investigation of the area was conducted. At the top, there were cracks which were considered as vent of liquefied mud. Around the top, the mud bodies distributed as knocking up. At hillside, mud bodies were distributed on the ground and pressed other grass, and some bodies were inverted. Overthrust structures were also found at hillside. Thus, based on these evidences, the Niikappu mud volcano was in active following to the 2003 Tokachi-oki earthquake same as previous earthquakes. The style of this mud eruption might be as that the high-viscosity mud near the surface uplifted just from the top of the mud volcano, some of the mud flied and fell to the ground, and the low-viscosity mud flew out.

In order to measure the mud volcano in detail, the 3D laser profiler GS-200, manufactured by Mensi Co., Ltd. was used. We obtained the data of 476,036 points from this measurement, and became to be able to process the triangulation net in mm order. From this process, the mud volcano is found to be oval in shape, and slopes high-pitched in the part from west to southwest section. It is possible that the mud body uplifted from underground having a tilt to the west and south rather than vertical.

Sketches of surface of mud volcano, when big earthquakes (1952 Tokachi-oki, 1982 Urawaka-oki, and 1994 Hokkaido-toho-oki earthquakes) were occurred, were summarized by Kurosawa, et al. (1996). The sketches and air photos were drawn after 2003 Tokachi-oki earthquake. Fissures and soil blockings were more significant at the 1982 Urakawa-oki earthquake than other earthquakes. This is because, 1982 Urakawa-oki earthquake was the nearest in previous earthquakes. We estimated that magnitude of the activation at the Niikappu mud volcano following the 2003 Tokachi-oki earthquake was smaller than 1982 Urakawa-oki earthquake, similar with other previous earthquakes.

Based on the survey of the Niikappu mud volcano after the Tokachi-oki earthquake in 2003, the following findings were observed; (1) The Niikappu mud volcano was active following to the Tokachi-oki earthquake in 2003. (2) The mud eruption was uplifting the mud just from the top with some of mud flying. And, it was the first time for mud to fly toward the southwest. (3) The surface slopes high-pitched at the western and southern part of the Niikappu mud volcano. This is greater than in the other part of the mud volcano.

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