

# Subsurface survey around the Matoishi-bokujo 1 Fault in the northwest of the outer rim of the Aso caldera, southwestern Japan

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## 1. Introduction

A lot of linear surface displacement derived by the 2016 Kumamoto Earthquake (Mj 7.3) were detected by InSAR analysis around the northwest of the outer rim of the Aso caldera, central Kyushu Island, southwestern Japan, and it is estimated that they were displaced passively. Many of them appeared along the known active faults. We have investigated the detail topography and geology to elucidate the mechanism around Matoishi-bokujo 1 Fault. In this presentation, we report the results of the subsurface structure survey found by using topographical/geological survey and ground-penetrating radar (GPR) survey.

## 2. Result & Discussion

The trenching survey at the foot of fault scarp of the Matoishi-bokujo 1 Fault showed that a white color pyroclastic layer presumed as Aso-4 pyroclastic flow deposit (89Ka) was observed around GL-3.5m (EL= ca. 917.4m) in deep case and GL-0.3m (EL= ca. 921.6m) in shallow case (Une et al., 2018). Also, the topographical and geological survey around the fault showed that the Aso-4 pyroclastic flow deposit was observed at the stream bed on the north side of the fault (EL= ca. 917.8m) and at the gully bed on the south side of the fault (EL= ca. 935.0m). Furthermore, on the east side of the site, the outcrop of stratum considered to be representative of the sedimentary structure in this area can be observed, and it was found that blackish soil layer and loam layer sandwiching multiple tephra layers above the Aso-4 pyroclastic flow deposit accumulated ca. 5m in thickness.

GPR profiles performed on the survey line crossing the fault showed clear echoes in GL-2m to -4m on the south side of the fault. It is presumed from the trenching survey and geological survey in the waterway on the south side of the fault so far that these clear echoes correspond to the upper surface of loam layer below the subsurface blackish soil or riverbed gravel layer covering the loam. On the north side of the fault, since GPR echoes are decayed drastically at deeper than GL-1 to -1.5m (EL= ca. 930.5 to 931.0m), it is suggested that there are a layer with a relative dielectric constant greater than that of the upper layer (blackish soil) at GL -1.5m or deeper. In addition, there is a weak echo around GL -4 to -5m (EL= ca. 927 to 928m). It is possible that this weak echo corresponds to the upper surface of the Aso-4 pyroclastic flow deposit from its continuity.

From these result, although the shape of the upper surface of the Aso-4 pyroclastic flow deposit is roughly similar to the present topography surface, it is located at GL-5m deeper on the south side of the fault and around GL-4 to -5m at the north side of the fault. Therefore, its relative height difference is estimated to be about 13 m or more, and this is considered to be the apparent vertical offset of the fault for ca. 90,000 years.

## 3. Summary and Challenges

As a result of topographical and geological investigation and the subsurface structure survey around the Matoishi-bokujo 1 Fault which was secondarily displaced associated with the Kumamoto Earthquake, we could presume the subsurface structure and the apparent vertical offset of the Aso-4 pyroclastic flow deposit surface. We plan to analyze and interpret the GPR profile in more detail with reference to the result of percussion boring in the future.

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