The most recent surface-rupturing event of the Ushikubi fault:A preliminary report of trenching surveys in Toyama/Gifu border area

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We identified the most recent surface-rupturing event on the western part of the Ushikubi fault located on the Toyama/Gifu border. We conducted a paleoseismological investigation to better understand the Ushikubi fault's past earthquake behavior. As a result of trenching surveys, it was made clear that the most recent event occurred in the 7-8th century or later.

The Ushikubi fault is a NE-SW-trending right-lateral strike-slip fault, which extends 60 km along the Toyama/Gifu border. The Atotsugawa fault runs about 10 km south, parallel to the Ushikubi fault. In 2002 we started fieldwork on the Ushikubi fault in order to evaluate the future earthquake potential.

Based on the geomorphological and geological surveys, we identified four terraces on the Ushikubi River and the Mizunashi River along the fault. The activity of the Ushikubi fault deformed the terrace III that emerged after fall of the Aira-Tanzawa tephra (AT: 22-25ka). Furthermore, we found six fault outcrops where the Quaternary alluvial sediments in contact with the basement rocks.

We excavated three trenches on terrace III. Details are described below:

1) Mizunashi trench: The Mizunashi trench site is located at the southern edge of the Toga dam lake. We excavated a trench across a 50-m-long, 4- to 6-m-high SE-facing fault scarp.

Sediments on the trench walls are divided into five units in descending order: humic soil, loam, sand, gravel and clayish silt. The main reverse fault deformed the uppermost level of loam. Another trace of the fault, situated in front of the main one, also cut at least the middle level of loam. Therefore we estimated that one or two surface-rupturing events occurred after the sedimentation of loam. A radiocarbon age of charred material obtained from the bottom of loam shows 9550 +/- 40 yBP.

2) Ushikubi trench: The Ushikubi trench site is located at 1.5 km southwest of the Ushikubi Pass. We excavated two trenches across 70-m-long 2- to 5-m-high SE-facing en echelon-arraying fault scarps. They correspond to both ends of the tectonic bulge between left-stepping fault scarps.

Sediments on the trench walls are divided into four units in descending order: humic soil a, humic soil b, gravel and clayish silt. The vertical fault deformed at least humic soil b, and the wedge along the fault plane was filled with it. Therefore we estimated that at least one surface-rupturing event occurred after the sedimentation of humic soil b. The radiocarbon ages of humic soil b (0.5 m under the ground surface) and charred material in it (1.5 m under the ground surface) obtained from the Ushikubi eastern trench show 1220 +/- 60 yBP and 1240 +/- 70 yBP, respectively.

In conclusion, we estimated that the most recent surface-rupturing event on the western part of the Ushikubi fault occurred in the 7-8th century or later.

Notes: In 2002 we stopped the trenching surveys because of heavy snow. We will restart it in the spring of 2003.