Clarification of the relationship between the damage distribution and surface cracks caused by the 2016 Kumamoto earthquake

*Tsuyoshi Haraguchi¹

1. Department of Geosciences, Graduate School of Science, Osaka City University

In the 2016 Kumamoto earthquake, catastrophic damage concentrates along active faults. At the time of the earthquake, various cracks appeared on the surface. I will discuss surface displacement and damage caused by the earthquake.

Clear surface earthquake faults appeared along the line where the active fault position was recognized before the earthquake. In the part where the fault passed, the retaining wall was broken in the range of several meters wide due to fault displacement. However, there are no houses collapsed by fault displacement. The wooden house existing on the surface earthquake fault twisted and deformed, but it did not collapse. In the old wooden house built at the point where the fault passed beside the fault, there was no falling of the roof tile and it was not damaged. The catastrophic damage concentrated in the center of Mashiki- machi. A surface earthquake fault appeared on a part of it, displacing the paved road up to 40 cm. However, the line where the surface earthquake fault appeared and the distribution of the collapsed houses are not finely matched.

A surface earthquake fault appeared also in the western part of the Aso caldera. A part of the fault displaced the houses, but the houses has not collapsed. In the Aso Valley, a linear collapse area crack occurred. Analysis of the surface displacement vector from the DEM before and after the earthquake showed that the blocks with a major diameter of 1 to 2 km moved 2 to 5 m in the north - northwest direction in the three areas along the Kurokawa river (Mukaiyama et al. 2016). As a result of the underground exploration conducted in the Matoishi which is one of the three districts, I confirmed the existence of a low velocity layer of about 10 m in thickness right under the crack. According to the testimony of the elderly, the linear cracked parts ware that the yellow soil was collected before 1940. In summary, devastating damage concentrates along the active fault in the 2016 Kumamoto earthquake. However, focusing only on damage caused by fault displacement, it was shown that the range of damage is extremely limited.

Keywords: 2016 Kumamoto earthquake, active fault