

## Relationship between near-surface resistivity structure and surface rupture at 2016 Kumamoto Earthquake.

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### SUMMARY

Fault core and damage zones often have low resistivity due to the presence of fluid and clay minerals in small-scale fractures and pore spaces. Low resistivity zones along active faults can be investigated by magnetotelluric (MT) survey. However, a spatial resolution of MT surveys is not enough to distinguish the detailed fault structure such as heterogeneous rupture distributions at earthquakes. Therefore, in this study, we discuss the relationship between surface ruptures along active faults and low resistivity zones by using spatially high-density audio-frequency MT (AMT) survey at the Futagawa fault, Kumamoto, Japan. A distinct surface rupture appeared in the vicinity along the Futagawa Fault due to the Mw 7.0 earthquake (The 2016 Kumamoto Earthquake). In this study, AMT surveys with an observation site spacing of about 50 m were carried out at 79 sites around the drilling area of the Futagawa Fault. We estimated the three-dimensional resistivity structure below about 1 km below the surface. As a result, low resistivity bodies existed along the main fault and surface rupture. In detail, a large low resistivity body is obvious on the northern side along the fault; in other words, the fault corresponds to a significant resistivity boundary. Based on comparisons with drilling core samples, logging results, and the displacement of the surface ruptures, low resistivity bodies were indicative of high porosity zones, having a number of fractures. It implies that subsurface fracture distribution is asymmetry along the surface ruptures along the fault.

**Keywords:** Magnetotellurics, Futagawa Fault, surface rupture

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