Conductivity Structure models of large and small slip regions at the 2016 Kumamoto earthquake sequence

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The 2016 Kumamoto earthquake sequence in Japan started with M_{JMA} 6.5 foreshock and the M_{JMA} 7.3 mainshock occurred 28 hours after the foreshock. The events occurred mainly within the Hinagu and Futagawa fault zone, which are known to be active faults.
Asano and Iwata (2016), Kubo *et al.* (2016), and Kobayashi *et al.* (2017) analyzed the detailed source rupture process of the foreshock, mainshock, and another notable event and proposed the source rupture models. It is important and interesting to reveal conductivity structure of the fault and compare it the source rupture models above mentioned because resistivity structure is one of the crucial elements to reveal subsurface structure of the fault.
We made magnetotelluric (MT) surveys using an audio- frequency MT (AMT) method, which is suitable for revealing shallow part (0 -2 km in depth) with high spatial resolution, along two lines (MSK and NSH lines) of ~2 km across the Futagawa Fault. The MKS line crosses the large slipped region and along the line, we made measurements at 11 stations. The NSH line crosses the small slipped region and along the line, we made measurements at 14 stations. We obtained two-dimensional resistivity models between depths 0 - ~1.0 km along the two lines, we call them MSK model and NSH model, respectively.
We recognize two common conducive regions in both models. One is highly and near vertical conductor below the surface fault traces of the Futagawa Fault. The conductor is located just beneath the surface fault trace in the MSK model and is shifted south in the NSH model. Another is deep and wider conductor which includes deep part of the conductor mentioned above. This conductor of the MSK model is wider and shallower than that of the NSH model. These features are consistent with that of source rupture models, further we can say that our conductivity models figured out more detailed subsurface structure of the Futagawa Fault.

Keywords: 2016 Kumamoto earthquake sequence, Futagawa fault, magnetotellurics, resistivity, active fault

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