Spatial distribution of the electrical resistivity beneath western part of Shikoku Island where long-term SSE events have repeatedly occurred

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In the Bungo channel area at the western margin of the Nankai megathrust rupture zones, the long-term slow slip events (SSE) repeatedly occurred about every 6 or 7 years. Since the last large-scale SSE event occurred in 2010, we will have a next large event soon. In order to obtain the electrical resistivity structure in the vicinity of the SSE area and examine its temporal change, we have started the Network-MT survey in the western part of the Shikoku Island facing the Bungo channel since April, 2016. Just before beginning of the observation, a tiny-scale SSE event occurred in the Bungo-channel (Ozawa, 2017, Hirose et al., 2018). We selected 17 areas in the western part of the Shikoku Island and installed 3 or 4 electrodes in the respective areas. The electrical potential differences with typical electrode spacing of several km are measured by using metallic telephone line network. We also measure the geomagnetic field at two stations in the target region. With the aid of the BIRRP code (Chave and Thomson, 2004), we could estimate the frequency-domain Network-MT response functions of good quality between the voltage difference and the magnetic field. The Network-MT response functions were directly inverted to estimate the 3-D resistivity structure in this area with the aid of the DASOCC Network-MT 3-D inversion code (Siripunvaraporn, Uyeshima & Egbert, 2004).

Conductive portions are commonly detected in the mid-crust of the target region. Their roots are just on the upper surface of the subducting Philippine Sea slab. This may suggest dehydration there. Among the spatial distribution of resistivity, that of seismic P-wave attenuation (Kita and Matsubara, 2016), and that of SSE slips (e.g. Ozawa et al., 2013, Yoshioka et al., 2015, Hirose et al., 2018), some mutually related features are detected. Low Qp (high attenuation) areas tend to correspond to highly conductive areas. The low Qp and highly conductive area are detected just above the subducting slab and outside of the SSE area. Inside the SSE area, while Qp takes generally high values, a patchy conductive area is detected in overall resistive background structure.

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