Three-dimensional imaging of geo-fluid distribution at NE-Japan forearc using wideband magnetotelluric measurements

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In Tohoku Japan, the Pacific plate that subducts under the Eurasian plate is old, thick, and cold. The basalt - eclogite phase transition is expected to occur at a depth of 100 km. The water released in the dehydration reaction forms serpentinite, which is transported to the deeper part. Serpentinite decomposes at a depth of about 150 km and water rises in the mantle due to buoyancy. Therefore, it is believed that there is no rise in water caused by slab mineral dehydration in the Northeast Japan forearc (Kazahaya et al., 2014). In contrast, the seismic tomography in NE Japan fore arc (Zhao et al., 2014) imaged low velocity regions in the forarc which suggests rising fluids from slabs which is called as "Water wall". In this research, we aimed to constrain the rising fluid distribution in the forearc from the 3d electric conductivity structure by magnetotelluric observations in Kitakami Mountains.
In our model, distribution of low resistivity indicating rising fluids from the deep part was not analyzed corresponding to the P wave low velocity region of Zhao et al.(2014). However, vertical low resistivity was analyzed from the volcanic front toward forarc. The conductors spread 30 km east of the volcanic front at depths of 10-40 km. This low resistivity is in good agreement with the low velocity distribution (Zhao et al., 2014; Okada et al., 2015). The low resistivity east of volcanic front is almost vertically continuous from the uppermost mantle to the middle crust. Therefore, this may indicate that the fluid on the mantle flow reaches the uppermost mantle of the forearc and releases fluids in the forearc crust.

Keywords: geofluid, NE Japan forearc, magnetotelluric method

