

3次元電磁イメージングによる紀伊半島深部の流体分布

3D Electromagnetic Imaging of Fluid Distribution Below the Kii Peninsula, SW Japan Forearc

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Although Kii peninsula is located in the forearc side of southwest Japan, it has high temperature hot springs and fluids from mantle are inferred from the isotopic ratio of helium. Non-volcanic tremors underneath the Kii peninsula also suggest rising fluids from slab.

Previously, in the southern part of the Kii peninsula, wide band magnetotelluric measurements were carried out (Fuji-ta et al., 1997, Umeda et al., 2006). These studies could image the existence of the conductivity anomaly in the crust and upper mantle. Long period observation using network MT data showed low resistivity on wedge mantle (Yamaguchi et al., 2009). These studies, however, used two-dimensional inversions and three-dimensionality is not fully taken into consideration.

As part of the “Crustal Dynamics” projects, we measured 21 more stations so that the whole wide-band MT stations constitute grids to make three-dimensional modeling of the area.

In total we have 52 wide-band magnetotelluric sites. 3D inverse modeling showed the following features.

(1) The high resistivity in the eastern Kii peninsula at depth of 5-40km. This may imply consolidated huge magma body of Kumano Acidic rocks underlain by Philippine Sea plate, which subducts with a low dip angle.

(2) The western part of the survey area has the shallow low resistivity in the upper crust.

(3) Hot springs in Kii peninsula are located in the rim of the huge high resistivity. This may imply that fluids from slab rise along the rim of Kumano acidic rocks and appear on the ground as high temperature hot springs.

(4) The non-volcanic tremor is located at the edge of the resistive block, which is interpreted as Kumano Acidic Rocks at depth. This may suggest that the plate locking is strong beneath the root of the Kumano Acidic Rocks and is weakened towards deeper part of the plate interface.

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