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# 地殻の比抵抗構造と地震の分布との関係

# Correlation between crustal resistivity structure and seismicity

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In this paper I will review correlations between crustal seismicity and the resistivity structure bye using the recent detailed two- and three-dimensional magnetotelluric data and modeling in seismic and volcanic zones.

We have had two-dimensional models in the intraplate seismic zones (e.g., Ogawa et al., 2001, GRL; Mitsuhata et al., 2001, GRL; Ogawa and Honkura, 2004, EPS; Tank et al., 2005, PEPI; Yoshimura et al., 2008, EPS; Wannamaker et al., 2009, Nature). Wannamaker et al. (2009) showed in the South Island New Zealand that all the active strike slip faults have respective conductors at the extension of the faults. Young strike-slip fault system showed conductor in the seismic zone due to the dewatering from the young sediment. On the other hand the mature fault system has a fluid reservoir underneath the fault system, where seismic pumping model will be applicable. For the Marchison reverse fault, deep dehydration from the 100km depth will be responsible for the high angle reverse fault, which is in unfavorable geometry for a compressional tectonic regime.

Detailed spatial distribution of cutoff depth of the earthquakes and crustal conductors are found in Northern Miyagi region (Mitsuhata et al., 2001, GRL) and geothermal fields (Umeda et al., 2005, G-cubed).

Recent 3d MT modeling around Nagamachi-Rifu fault in NE-Japan(Tank et al., 2010, JpGU) showed NS-strike two dimensional conductor beneath the NE-Japan backborne ranges and a localized crustal conductor at the hypocenter. We have found that mid-crustal heterogeneties of fluid distribution control the seismicity. Ogawa & Honkura(2004, EPS), and Mishina(2009, Gondwana Res.) point out that the distribution of crustal fluid correlate with crustal contraction zones as well as seismicity.

As for shallow volcanic environment, Nurhasan et al.(2009, IAGA meeting) point out that the distribution of volcanic A-type earthquake is controlled by that of the conductive clay minerals at Kusatsu-Shirane volcano using 3d MT inversion. Montmorillonite is one of the alteration clay minerals is characterized by high electrical conductivity and low fluid permeability, and it works as the cap of the geothermal system. The A-type earthquakes do not exist within the conductor, but they lie under the bell-shaped conductor, which work as a cap for gas-fluid reservoir. The bottom of the clay is also important as an isotherm as the montmorillonite breaks down over 200 degree C.

Keywords: magnetotellurics, conductor, fluids, clay, earthquake, volcano