Revelation of the properties of the deep extension of the Nagamachi-Rifu fault

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In this study theoretical model was applied for quantitative joint analysis of collocated seismic velocity tomography and electromagnetic experiments. The developed model allows involving in quantitative analysis of 3 independent parameters: the compressional and shear velocities and the resistivity. Based on the model, an attempt have been made to elaborate a quantitative method for solving the problem whether the variation of resistivity and seismic velocities in a region can be attributed to presence of liquid only or whether another assumption should be involved. The suggested method was applied for analyzing a collocated seismic velocity tomography and MT experiment carried out across the active Nagamachi-Rifu fault running through Sendai city, Northeastern Japan. Several zones, where the perturbation of both the velocity and the resistivity can be explained with several percents of a liquid fraction, were recognized in the region. A zone of the low velocity of 15% decrease and of the low resistivity about tens of ohm x m at the depth of 15 km was explained by about 3% of porosity and interpreted as the deep extension of the Nagamachi-Rifu fault. It was reveal that this zone is characterized with an aspect ratio of 0.01, and, thus, can be regarded as a region, where pores microstructure is typical of a system, which is far from the equilibrium geometry.