# Deep Structure of the Nagamachi-Rifu Fault From the Joint Analysis of Resistivity and Velocity Structure

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A model was presented to meet both the MT and seismic velocity results for the Nagamachi-Rifu fault and its vicinity based on a fractal model developed by Pervukhina et al.

The model for physical properties of porous rocks with fractal structure of grain-to-grain contact was developed independently by Spangenberg (1998) and Bahr(1997) and allows description both elastic and electrical properties in identical geometry. The model allows quantitative estimation of the influence of porous rock microstructure to its either elastic or electrical properties. It was shown that in the case of porous rocks saturated by brine or melt the rock microstructure affect to both electric and elastic properties of the rock. Thus, liquid-consisting areas can be described by both MT and seismic velocity tomography data. To show up saturated areas next method was developed. Analyzing the data at the same depth, we considered the deviation of seismic velocities and resistivity between the current cell and adjacent cells. If resistivity and velocity both increase or both decrease between the current cell and both adjacent cells, the current cell was considered to be in a liquid-consisting zone. Further, when only for a one of adjacent cells was agreeable with this condition, it was taken under more careful consideration to decide to include it into analysis or not. In the case, if this cell belonged to the boundary of saturated zone, the cell was included into analysis. In other case, it was supposed that the cell located in noisy area, and it was excluded from the analysis. All the cells, whose neighbors did not meet the requirements, were excluded form further analysis

Seismic and MT experiments were carried out across the Nagamachi-Rifu fault running through Sendai city (Miyagi Prefecture, North Japan). The slip at the deep extension of the Nagamachi-Rifu fault caused the earthquake M5.0 in 1998. Several porous zones, saturated with liquid were recognized. It is shown that the model based on this method gives better coincidence with the results of reflection survey than models based exclusively on MT data or only on seismic velocity tomography data. The developed method is demonstrated to be a useful tool for analyzing of joint electromagnetic and seismic investigations.