Role of Fluids in the earthquake generation: The Nagamachi-Rifu reverse fault, NE Honshu, Japan

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The Japanese island arc was drastically influenced by the occurence of the 2011 Tohoku-Oki earthquake (M9) which also effected the volcanic activity and modified the local seismicity both of which are proven to be related to crustal fluid distribution. Therefore, for understanding the dynamic behavior of the region and for making further comparisons, developing an electrical conductivity model that enables to image the fluid’ s presence and capacity by means of analyses based on high-quality magnetotellurics data collected prior to the Tohoku-Oki earthquake at 61 sounding locations near the Nagamachi-Rifu Fault, Northeast Honshu, Japan, became an important task. Magnetotelluric data collected along three profiles that orthogonally cross the almost NE-SW geo-electric strike were used to image the epicentral region of this active reverse fault and its vicinity. State-of-the-art three-dimensional data-space inversion schemes were applied on the wide-band magnetotellurics data to map the fluid-rich and/or -depleted zones. Inversions included 0.3 Ohmm cells with realistic bathymetry on both sides of the initial model representing the Japan Sea in the west and Pacific Ocean in the east to realize the ocean effect. Resulting models were compared with prior and post seismicity of the main event.

Keywords: Magnetotellurics, Nagamachi-Rifu fault, Fluids

