Fluid detection using AMT survey on the seismogenic zone around the eastern foot of Mt. Ontake, central Japan

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Existence and its permeation of the fluid play an important role on occurrence of earthquakes. The electrical resistivity is a very sensitive parameter for detecting the fluid in the Earth's crust. The fluid is usually detected as the low resistivity. MT survey is powerful tool exploring fluid, and shows another image of seismogenic zone different from seismic survey. Therefore, resistivity image provides useful information to understand the seismogenic zone. Recent 2-D MT studies have detected the conductor near the seismogenic zones. Their results show the fact that foci distributed in relatively resistive zones or around boundaries between resistive and conductive zones.

In recent years, newest audio-magnetotelluric (AMT) instrument have been used for field survey. This AMT instrument is able to observe the wide frequency range from 10000 to 0.5 Hz and record the time series with high sampling rate. Therefore, it is easy to obtain detailed resistivity image. The purpose of this report is to confirm fluid detection ability of this instrument.

Active earthquake swarm activity was observed around the Mt. Ontake. This region is suitable field for research of earthquake generation, because many studies have been carried out. Geochemical studies proposed interesting results(Takahata et al., 2003). In southeastern and eastern foot of Mt. Ontake, Takahata et al. (2003) observed anomalous change of isotope ratio in Shirakawa. These changes may imply that magmatic component is transferred from the upper mantle to the surface. Moreover, Kimata et al. (2005) detected ground uplift of 3-6 mm by precise level survey nearby Shirakawa site. They pointed out that ground uplift associates with the geothermal activity and hydrothermal pressure from deeper crust.

We carried out the AMT observation at 8 sites around the eastern foot of Mt. Ontake. We set up the remote site carried out remote reference analysis. As the result, we obtained enough quality apparent resistivity and phase data. We applied with 2D inversion scheme to the data, construct 2D resistivity structure. As a result, A dipping conductor is detected at the center of 2D profile. The position coincides with isotope anomalous change and grand uplift zone.