Shallow resistivity structure around fault ruptures appeared with the 2000 Tottori-ken Seibu Earthquake

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INTRODUCTION

Distinctive fault ruptures, the Nojima and the Ogura faults, were appeared at the time of the 1995 Hyogo-ken Nanbu earthquake. However, no clear fault ruptures were not found accompanying the 2000 Tottori-ken Seibu earthquake, even though its magnitude is nearly equal to that of the 1995 Hyogo-ken Nanbu earthquake (Mj=7.3).

It is well known that electrical resistivity show abrupt change at a surface location of active faults and /or highly conductive zones exist along the faults.

We aimed to detect the earthquake fault accompanying the 2000 Tottori-ken Seibu earthquake and decide the location and subsurface structure of it using the electromagnetic and electrical methods.

OBSERVATION AND ANALYSIS

We made VLF-MT and resistivity surveys at the ground of the Ryokusuien near the Ryokusui-ko lake. Many ruptures and deformations were found in the ground (Yoshioka et al., 2000).

The VLF-MT survey was made along two profiles every 5 meters.

The multi-electrode (32 electrodes) resistivity survey were carried out along one profile (Electrode spacing is 1 and 2m. Electrode arrays are Wenner and Eltran). Based on these results, 2D inversion model were decided using the 2D inversion code with smoothness-constrained by ABIC minimization method (Uchida, 1993).

RESULTS

(1) VLF-MT

Highly resistive zone (more than 1000 Ohm-m) with 20-25 meter in width and highly conductive zone (less than 200 Ohm-m) are recognized.

(2) 2D resistivity model

Highly resistive zone was delineated below -2 m in altitude and between 28 and 36 meters on the profile. Adjacent to the zone, highly conductive zone of 4m in width was detected below -4 m in altitude.

DISCUSSION

Referring to the trench survey, which was made in the same ground by Fusejima et al (2001), we interpret the geoelectrical section as follows.

(1) The sharp resistivity boundary between highly resistive and conductive zone indicates the subsurface fault plane.

(2) Resistivity contrast is vague near the surface, but is clear below -4m in altitude.

(3) The fault plane is nearly vertical.

(4) Highly resistive zone corresponds to the intrusive rocks.

(5) Highly conductive zone corresponds to fractures zone in granite.