Highly conductive zone corresponding to an epicentral region of deep long-period tremors in the Kii Peninsula, SW Japan

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We performed the Network-MT survey in the Kii Peninsula, southwestern Japan since 2002. This method is one of magnetotelluric methods and is characterized by employing the commercial telephone network to measure voltage differences with long dipole length of several kilometers. We made 14nets (14 central-stations and 48 electrodes) in Mie Prefecture, 17nets (17 central-stations and 64 electrodes) in Wakayama Prefecture, and 23nets (23 central-stations and 77 electrodes) in Nara Prefecture. In this presentation, we show the two-dimensional conductivity structure based on MT responses in Wakayama Prefecture.

MT response functions were determined at each triangular (or rectangular) area, which are formed three (or four) electrodes and/or an earth-facility of central-stations, using the RRRMT ver.8 (Chave and Thomson. 1993). For the magnetic data, two horizontal components of the geomagnetic field were taken from both the Kakioka Geomagnetic Observatory and the Kanoya magnetic observatory in order to reduce bias of MT response functions caused by using magnetic records far from our study area.

GB decomposition (Groom and Bailey, 1989) showed a regional azimuth in the study area is N56E-S56W. Therefore, TM mode has the magnetic component along this direction. Two-dimensional magnetotelluric inversion with smooth constraint (Uchida and Ogawa, 1993) was made based on the MT responses of TM mode.

The 2D conductivity model can divide into three regions (north, central and south). The north region is characterized by near-surface thin conductive layer (0.1- 0.01S/m) on a resistive layer (0.01 - 0.001 S/m). In the central region, highly conductive zone (0.1 - 0.01S/m) exists from surface to some tens of kilometers. The south region is characterized by the thick highly resistive layer (less than 0.001S/m and 10-20km in thickness) on a highly conductive layer (0.1- 0.01S/m).

It is most interesting that the central conductive region coincides with epicentral region of the deep long-period tremors, which is recently found by Obara (2002). He pointed out that the generation of tremors may be related to the movement of the fluid which may liberate aqueous fluid by dehydration of slab. This fluid may also enhance conductivity of the central region.