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Resistivity structure in the southern part of Boso Peninsula inferred from MT observations

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1. Introduction

The southern part of Kanto District is situated in front of the triple junction of plates, and the tectonic activity is remarkable. At the southern part of Boso Peninsula where is near the boundary of Philippine Sea Plate, there exists complex geological features. The outcroped serpentinite and basalt around Mineoka Range are noticed as the evidence of the past plate movements.

The main purpose of this paper is to infer the underground geological features beneath the southern part of Boso Peninsula by means of magnetotelluric (MT) method. In addition, we investigate the crustal activity related electromagnetic field variation at the foot of Mt. Iyogatake, central part of Kamogawa tectonic belt. To explicate and infer the feature of signals, direction of sources, and mechanism of radiation, we need to know the resistivity distributions in the crust.

2. Observations

MT observations were carried out in the southern part of Boso Peninsula from July to August, 2001. Observation sites were 29 which are along 3 base lines; across the Kamogawa tectonic belt (2 lines) and along the Mineoka Range. We used ten U43 (Tierra Technica Inc.)s to collect electric and magnetic field data. At six sites of them was aquired the whole observation term (about 40 days) intermittently. At another 23 sites, data acquisition were carried out from 3 to 4 days.

3. Data analysis and results

We analyzed electromagnetic data observed at 7 sites which are on the NS line (16km length) includes Iyogatake station. To estimate the MT impedances in frequency domain, we used the robust remote reference algorithm (e.g. Chave et al.,1987). As a remote reference of magnetic fields, we adopted data observed Kakioka geomagnetic observatory. To eliminate the train-induced noise, night time data were used from 10 to 500 seconds. As a result, favorable impedances were estimated from 10 to 2700 seconds.

To estimate the effect of galvanic distortion of impedance tensors, we used the tensor decomposition algorithm developed by Groom and Bailey(1989). The results shows that regional strike of geological features indicates WNW-ESE or NNE-SSW directions. In comparison with actual surface geological structure, the former direction seems reasonable.

We modeled the two dimensional resistivity structure by means of 2-D inversion code developed by Siripunvaraporn and Egbert (2000). As a result, extremely low resistivity layer is existed beneath Mt. Iyogatake, and spreads to the depth of 6 km. In the northern side of Mt. Iyogatake, the thickness of shallow low resistivity layer increases northward.

4. Conclusion

We studied the resistivity structure in the southern part of Boso Peninsula, and found that extremely low resistivity layer is existed beneath the Mt. Iyogatake .

We plan to carry out more detailed reseaches written as follows :

(1) The evaluation of the reliability of resistivity structure models.

(2) The estimation of the coast effects included in MT impedances.

(3) The comparison with geological features and the result of other geophysical explorations.

5. Acknowledgements

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6. References

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