E110-004 **Room: 101B** **Time: May 29 14:30-14:45**

Characteristics of electric field variations associated with an M4.3 earthquake

Yoshimori Honkura[1]; Shintaro Nagaoka[2]; Yasuo Ogawa[3]

[1] Earth and Planetary Sci., Tokyo Institute of Technology; [2] Earth and Planetary Sci., TITECH; [3] TITECH, VFRC

We have so far paid much attention to electric field variations associated with seismic waves. In fact, we have found that arrival of unambiguous electric field changes was synchronized with the arrival of seismic wave. Then we have made more intensive field observations and proposed a likely mechanism for electric field generation by seismic wave or more specifically, by ground motion. Our claim is unique in that the Earth's magnetic field plays an essential role in generation of electric field, and hence we named the underlying mechanism as the seismic dynamo effect in an analogy with the dynamo theory for generation of planetary magnetism. In this paper, we focus our attention on the generation mechanism of electric field, with particular reference to a very clear example obtained in association with an M4.3 earthquake.

An earthquake of magnitude 6.9 (JMA) occurred on March 25, 2007 off the coast of the Noto Peninsula. Six days after the occurrence of the main shock, we installed a set of AMT (audio-frequency magnetotelluric) equipment and a short-period seismometer of velocity type at a site over the focal area, and obtained electric field variations associated with aftershocks. Among them we select an M4.3 aftershock for our analyses, which occurred about five kilometers southeast of the observation site. Analyses of AMT data obtained at this site show that a uniform layer with 10 ohm.m prevails to the depth of several hundred meters. This enables us to interpret electric field behavior without worrying about possible effects of lateral inhomogeneity of the resistivity structure such as local perturbation of the electric field.

The records indicate very clear characteristics. (1) Correlations of the three components of velocity field are good, implying arrival of a single P-wave. (2) The northward electric field is correlated with the velocity field during an initial few cycles of variation. (3) The eastward electric field is similar to the northward component but a phase lag of about 90 degree; is evident.

This phase lag implies a circular polarization of horizontal electric field and in fact, the electric field trajectory indicates a clear circular path for the initial two cycles, followed by some distortion at later cycles. To confirm such a behavior, we made the same analysis for the M4.2 aftershock. Although the trajectory is more disturbed, similar circular nature was confirmed with the clockwise rotation.

These characteristics are shown to be well understood in terms of the dynamo effect. In particular, we pay much attention to charged particles contained in groundwater. Motion of these particles gives rise to the electric field and in fact we propose a model by which we show how well the above characteristics are understood.