

# Electromagnetic field variations arising from the seismic dynamo effect for aftershocks of the Niigata-Chuetsu earthquake

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Recently, Honkura et al. (2000, 2002, 2004), Matsushima et al. (2002) and Ujihara et al. (2004) observed co-seismic electromagnetic variations and they proposed a hypothesis called 'seismic dynamo effect'. The hypothesis is based on the electromotive force, which is generated at depth by the seismic vibration of the conducting earth relative to the main magnetic field. It can potentially induce electromagnetic field prior to the seismic wave arrival and will be important for earthquake prediction or disaster mitigations. However, regarding the seismic dynamo effect, more detailed and quantitative discussions are necessary to verify the hypothesis.

In this thesis, we made observations of the pre- and co-seismic electromagnetic variations using aftershocks of the large earthquakes, i.e., 2004 Niigata-Chuetsu earthquakes. In the field experiments, we simultaneously observed the electromagnetic fields and seismic velocity.

Our conclusions on the nature of the electromagnetic variations are as follows.

(1) We checked the existence of pre-seismic electromagnetic variations, no clear pre-seismic variations were found in this observation.

(2) We tried if we can explain the co-seismic electromagnetic variations, in terms of the seismic dynamo effect. Decrease of coherency between electric and magnetic fields after the P-wave arrival was observed and simple explanation by the seismic dynamo effect was not successful. It became apparent that the sources of the co-seismic electromagnetic variations were not easily explained.

In the future, we will develop computer simulation codes for the seismic dynamo effect, and to investigate the possible origins of the co-seismic electromagnetic variations.