

2016熊本地震活動に伴ってえびのにおいて観測された電磁気変動について
**On Electromagnetic Disturbances in the Ebino area, Kyushu, SW Japan,
 in association with the Earthquake Activities of the 2016 Kumamoto Earthquake**

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Abstract

Coseismic EM signals associated with large inland earthquakes were often detected and reported in the previous studies. The mechanism for generating those signals, however, have not been understood clearly, although several mechanisms were proposed in terms of motional-induction (e.g. Honkura et al., 2009, Matsushima et al., 2013, Gao et al., 2014) or electrokinetic effect (e.g. Gershenzon et al., 2014, Ren et al., 2016ab). In order to clarify the mechanism, it is desirable to catch the signal at not a small number of stations and to investigate characteristics in spatiotemporal distribution of the signals, with seismic recordings nearby the EM sites. However, due to rare occurrence of the inland earthquakes, such observations were rarely reported in the previous literatures especially for the main shocks.

In Iwo-yama area in the Kirishima volcanic group, in Kyushu, SW Japan, we performed an MT survey to investigate recent volcanic activities (inflation of the volcanic body, activation in the volcanic gas eruptions and development of the thermal anomaly). We put 7 ADUs (Metronix, 5 components of Ex, Ey, Hx, Hy and Hz) and 20 ELOGs (NT System Design, 2 components of only Ex and Ey) around the Iwo-yama volcano and measurements at all the stations started from day time (in JST) on April, 14, 2016. We recorded EM time series of 32 Hz from 0:00 to 23:50UT and that of 1024Hz from 17:00 to 18:00UT, every day. The data were acquired until day time (in JST) of April 25 at all the stations except 2 stations. There also exist continuous seismic stations operated by ERI, JMA and NIED in the area. Among all, the station KAR by ERI was located very close to one of the E stations, where three component broad band velocity field was measured by using Trillium 120PA (Nanometrics).

Immediately after the MT installation, the foreshock (Mj6.5) and the main shock (Mj7.3) of the 2016 Kumamoto earthquake occurred respectively at 12:26 UT on April 14, 2016 and 16:25 UT on April 15, 2016. Thus, we could record EM signals for almost all the earthquakes of the Kuamamoto earthquake sequence in the Beppu-Shimabara graben which is located about 90km north of the Kirishima volcanic group. At KAR, we could directly compare the time series of electric and seismic signals in the period range from about 10 Hz to several tens s. In this presentation, we introduced basic characteristics of both of the pre-wave and co-wave EM signals and comparison

with the seismic records.

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References

- Gao, Y., X. Chen, H. Hu, J. Wen, J. Tang and G. Fang, Induced electromagnetic field by seismic waves in Earth's magnetic field, *J. Geophys. Res.*, **118**, 5651-5685, doi: 10.1002/2014JB010962, 2014.
- Gershenson, N. I., G. Bambakidis and I. Ternovskiy, Coseismic electromagnetic field due to the electrokinetic effect. *Geophysics*, **79**, E217-E229, 2014.
- Honkura, Y., Y. Ogawa, M. Matsushima, S. Nagaoka, N. Ujihara and T. Yamawaki, A model for observed circular polarized electric field coincident with the passage of large seismic waves, *J. Geophys. Res.*, **114**, B10103, doi:10.1029/2008JB006117, 2009.
- Matsushima, M., Y. Honkura, M. Kuriki and Y. Ogawa, Circularly polarized electric fields associated with seismic waves generated by blasting. *Geophys. J. Int.*, **194**, 200-211, 2013.
- Ren, H., Q. Huang and X. Chen, Existence of evanescent electromagnetic waves resulting from seismoelectric conversion at a solid-porous interface. *Geophysical J. Int.*, **204**, 147-166, 2016a.
- Ren, H., Q. Huang and X. Chen, Numerical simulation of seismo-electromagnetic fields associated with a fault in a porous medium. *Geophysical J. Int.*, **206**, 205-220, 2016b.