

## Statistical Analysis of ULF Seismo-Magnetic Phenomena in Kanto, Japan

HAN, Peng<sup>1\*</sup>; HATTORI, Katsumi<sup>1</sup>; ZHUANG, Jiancang<sup>2</sup>

<sup>1</sup>Graduate School of Science, Chiba University, Chiba, Japan, <sup>2</sup>Institute of Statistical Mathematics, Tokyo, Japan

In order to clarify and verify the ultra-low frequency (ULF) seismo-magnetic phenomena, we have performed statistical studies on the geomagnetic data observed at several stations, in Japan, during 2001-2010. They are Kiyosumi (KYS), Uchiura (UCU), Fudago (FDG), Seikoshi (SKS), Mochikoshi (MCK), Kamo (KAM), and Kakioka (KAK). KAK is a standard geomagnetic station operated by JMA (Japan Meteorological Agency) and the others are operated by us. We investigated the energy of ULF geomagnetic signals of the frequency around 0.01Hz using wavelet transform analysis. To minimize the influences of artificial noises and global geomagnetic perturbations, we used only the geomagnetic data observed at nighttime (LT 2:30am-4:00 am). In this abstract, we describe the results of KAK as an example. As for KAK data, we utilized observations from a remote station, Kanoya (KNY), as a reference. Statistical results of superposed epoch analysis have indicated that ULF magnetic anomalies are more likely to appear before sizeable earthquake events rather than after them, especially 6-15 days before the events. Further statistical investigations show clearly that the ULF geomagnetic anomalies at KAK are more sensitive to larger and closer events. Finally, we have evaluated the precursory information of ULF geomagnetic signals for local sizeable earthquakes using Molchan error diagram. The probability gain is around 1.6 against a Poisson model. The above results have indicated that the ULF seismo-magnetic phenomena at KAK clearly contain precursory information and have a possibility of improving the forecasting of large earthquakes. The statistical results for the other stations also show similar tendency. These facts suggest that ULF magnetic anomalies have a significant correlation and precursory information on a sizable earthquake.

Keywords: ULF seismo-magnetic phenomena, statistical test, short-term earthquake forecast