Statistical Analysis on ULF magnetic anomaly and local seismicity around Kakioka, Japan

*Rui Du[1], Katsumi Hattori[1], Peng Han[1]

1.Graduate School of Science, Chiba University

To clarify and verify the ultra-low frequency (ULF) seismo-magnetic phenomena, we have performed statistical studies on the geomagnetic data observed at the Kakioka (KAK) station, Japan, during 2001-2010. 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 2:30 am-4:00 am) and exclude the geomagnetic anomalies when the energy of horizontal component is large. Statistical results of superposed epoch analysis have indicated that ULF magnetic anomalies are more likely to appear before sizeable earthquake events ($Es > 10^8$) rather than after them, especially 6-10 days before the events.
Finally, we have evaluated the precursory information of ULF geomagnetic signals for local sizeable earthquakes using Molchan's error diagram. We also compared our results with previous statistical studies at KAK. 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.

Keywords: ULF seismo-magnetic phenomena, statistical study, superposed epoch analysis (SEA), Molchan's error diagram