

ULF geomagnetic anomaly associated with 2008 Iwate-Miyagi Nairiku earthquake

Takuya Hirano[1]; Hitomi Ogawa[2]; Hisashi Ishikawa[3]; Chie Yoshino[4]; Katsumi Hattori[5]

[1] Chiba Univ.; [2] Earth science, Chiba Univ.; [3] Graduate School of Sci., Chiba Univ; [4] Sci., Chiba Univ.; [5] Chiba University

There are many reports on earthquake-related electromagnetic phenomena. Anomalous ULF geomagnetic field change associated with earthquake is one of the most convincing and promising phenomena among of them because of deeper skin depth. The observed ULF change at the magnetometer on the ground are superposition of some signals. The signal associated with earthquakes is considered to be weak and effective signal discrimination methods should be applied.

There have been developed different kinds of methods for the analysis (spectrum density ratio analysis by means of the ratio of vertical magnetic field component to the horizontal, geomagnetic transfer function, fractal analysis, Principal component analysis, direction finding, and so on.)

In this study, we investigate ULF geomagnetic anomalous changes associated with the 2008 Iwate-Miyagi Nairiku earthquake. We use 3 components geomagnetic data observed at Esashi operated by Geographical Survey Institute, Japan and Kakioka operated by Japan Meteorological Agency. At Esashi station, induction type magnetometer is installed and its sampling frequency is 15 Hz.

We use the data resampled to 1Hz. At Kakioka station, fluxgate type magnetometer is installed and its sampling frequency is 1Hz.

We perform Spectrum density ratio analysis ($S_z(f)/S_x(f)$, $S_z(f)/S_y(f)$, $S_z(f)/\sqrt{(S_x(f))^2+(S_y(f))^2}$) . $S_x(f)$:North-South component, $S_y(f)$:East-West component, $S_z(f)$:vertical component, f :angular frequency) and geomagnetic transfer function analysis ($Z(f)=A(f)*X(f)+B(f)*Y(f)$, $A(f), B(f)$: geomagnetic transfer function , $X(f)$:North-South component , $Y(f)$:East-West component , $Z(f)$:vertical component, f :angular frequency).

The result shows that the value of Spectrum density ratio and geomagnetic transfer function had changed before the 2008 Iwate Miyagi Nairiku earthquake.

Details will be present in the session.

Acknowledgement. We acknowledge Tohoku Regional Survey Department, Geographical Survey Institute and Kakioka Magnetic Observatory, Japan Meteorological Agency for providing us with geomagnetic data at Esashi and Kakioka.