ULF Geomagnetic Anomalies Associated with Earthquakes

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It is important to estimate probability of ULF phenomena associated with large earthquakes and also a reliability of possible short-term EQ prediction using this effect. RIKEN / UEC-NASDA scientific group is going to extend the ULF research in collaboration with Russian and Ukrainian researchers, and so on.

(1) Practical basis for the regular ground ULF monitoring system has been established in Japan.

(2) Spectral analysis have been performed for data associated with EQs. Convincing results on the existence of preceding ULF magnetic anomaly have been obtained for Kagoshima EQs , Iwate EQ, Izu EQ swarm, Biak EQ, and EQs observed at Matsushiro station.

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(1) Practical basis for the regular ground ULF monitoring system has been established in Japan. It consists of Kanto-Tokai network composed by sensitive sensors (torsion and search coil type magnetometers type) with high sampling rate and stations with a fluxgate type magnetometer. The network we have installed over the Kanto-Tokai region has base lines of 5km, tens km, and 100km.

(2) Spectral analysis have been performed for data associated with EQs. Convincing results on the existence of preceding ULF magnetic anomaly have been obtained for Kagoshima EQs , Iwate EQ, Izu EQ swarm, Biak EQ, and EQs observed at Matsushiro station.

- Enhancement of polarization (intensity ratio of vertical and horizontal components) a few weeks preceding the main shock.
- Tendency of increase of horizontal components just before the EQ.

(3) Principal component analysis has been adapted to the horizontal component data observed at Izu. Analyzed data have been from three sensors of 5 km distances. A few days before earthquakes $M > 6$, the apparent anomalous behavior has been detected in the smallest eigenvalue around Izu earthquake swarm in 2000.

(4) In order to remove the global effects such as geomagnetic pulsasions, the usage of remote reference data is very effective. Especially, data observed at the geomagnetic conjugate station which is located in an inactive seismic zone.