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A Comparison Evaluation of Geomagnetic Observation Signal Using HTS-SQUID Magnetometers at Iwaki Observation Site

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This study addresses a comparison evaluation of high-resolution geomagnetic field observation systems using HTS-SQUID (high-temperature-superconductor based super conducting quantum-interference-device) magnetometers.

Our research group reported successful observation of ”co-faulting” Earth’s magnetic field changes, whose sources are the earthquake piezomagnetic effects, in 2008 Iwate-Miyagi Nairiku earthquake of M7.2 (2011 Okubo et al.). Then, an important finding is that the geomagnetic variation signal accompanying fault movement is very small; therefore development of a high-sensitive magnetometer system is very significant.

To solve this problem, since March 2012 we have introduced long-term precise geomagnetic observations using high-temperature-superconductor based superconducting-quantum-interference-device (HTS-SQUID) magnetometer system Unit No.1 (mark I) at Iwaki observation site (IWK) in Fukushima, Japan. The observation clock has been synchronized by use of GPS signals. An high-resolution accelerometer is also installed at observation point.

Moreover, since October 2014, we have also introduced the new HTS- SQUID magnetometer system Unit No.2 (mark II). In this study, we make a comparison evaluation of the geomagnetic field observation systems, and then we estimate the performance of our HTS-SQUID magnetometer systems for geomagnetic observation.

Keywords: HTS-SQUID Magnetometer, Geomagnetic Observation, earthquake piezomagnetic effect