Magnetic anomalies of the Cretaceous oceanic crust in the northern Pacific: Implications for paleointensity variations of the CNS

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Marine magnetic anomalies of the Cretaceous Normal Superchron (CNS) are known to show very small magnetic anomalies, and are often called the Magnetic Quiet Zone. Recent studies reported that small-amplitude total-intensity magnetic anomalies, so called tiny wiggles, can be correlated between different oceans and therefore these tiny wiggles contribute to paleomagnetic intensity studies. In particular, in relatively long polarity chrons such as the Brunhes chron and Chron 5A, tiny wiggles reflect paleointensity of the geomagnetic field (Roberts and Lewin-Harris, 2000; Bowers et al., 2001), and have resolution comparable to the relative paleointensity records obtained from sediments (e.g. Gee et al., 2000; Yamamoto et al., 2005). On the basis of the studies mentioned above, this study aims to measure marine magnetic anomalies of the Cretaceous oceanic crust in order to detect relative paleointensity variation of the early CNS. We chose the Cretaceous crust of northwest of Hawaii since the Pacific plate shows a higher spreading rate than other plates at that time and are hence considered to be suitable for this study.

In the YK07-16 cruise, we have measured total intensity and three components of the magnetic field at sea surface in two areas in the northern Pacific, northwest of Hawaii, which are separated by 480 mile (800 km). Total intensity of the magnetic field was measured using a proton magnetometer. Three components of the magnetic field were measured using two sets of shipboard fluxgate magnetometers. Three components were independently measured and converted into the geographical coordinates using different orientation systems. The survey was made along three to five parallel lines with 15 mile (27.7 km) intervals in each area. On the basis of the preliminary analyses, we detected that total intensity and three component magnetic anomalies with amplitude of several tens nT and wavelength of 10-30 mile (18-55 km). These results may give implications for relative paleointensity variations of the early CNS.

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