Measurement of ferromanganese crust using a scanning SQUID microscope: Age model by sub-millimeter scale magnetostratigraphy

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Ferromanganese crusts are chemical sedimentary rock composed mainly of iron-manganese oxide. Because the ferroman- ganese crusts grow very slowly on the sea floor at rate 3-10 mm/Ma, long-term deep-sea environmental changes can be obtained from the ferromanganese crusts. It is important to provide reliable age model and growth rate reconstructed from the ferromanganese crusts, while there are few studies on sub-millimeter scale age dating. To obtain sub-millimeter scale age, we conduct magnetic study on a ferromanganese crust sample using scanning SQUID (superconducting quantum interference device) microscope (Kawai et al., 2016; Oda et al., 2016). The ferromanganese crust using this study was sampled from Takuyo-Daigo Seamount, Hanzawa Seamount, Ryukyu trench. Methods of magnetic measurements were adapted from Oda et al. (2011), which pioneered the investigation that estimate sub-millimeter growth rate using SSM. The vertical component of the magnetic field above a thin section sample of the ferromanganese crust was measured using SSM. As the result, sub-millimeter scale magnetic stripes originating from approximately magnetized regions oriented parallel to lamina were obtained by two samples few supply of dust and sediment from continents (Takuyo-Daigo Seamount, Hanzawa Seamount). In addition, we attempted to remove noises retaining resolution of raw measurement data. After analyses, magnetic stripes could be recognized on the magnetic image. By correlating the boundaries of magnetic stripes with known geomagnetic reversals, we estimated that average growth rate of Takuyo-Daigo Seamount, Hanzawa Seamount is 3.37 +/- 0.06 mm/Ma, 2.67 +/- 0.04 mm/Ma , which is consistent with that deduced from the $^{10}Be/^{9}Be$ dating method (2.93 +/- 0.15 mm/Ma, 2.56 +/- 0.04 mm/Ma).

Keywords: scanning SQUID microscope, ferromanganese crust, Age model, remanent magnetization

