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Ultra-Fine Scale Magnetostratigraphy of Mn Crust with SQUID Microscope

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Hydrogenetic Mn crust is considered as a chemical archive, which enables us to reconstruct deep circulation of the ocean. In order to constract a method to give reliable age model, we have conducted ultra-fine scale magnetostratigraphy on a Mn crust sample D96-m4 from northwest Pacific (water depth 1940 m) with a high-resolution SQUID microscope at Vanderbilt University. Various rock-magnetic techniques delineate the presence of well dispersed single domain magnetic mineral with coercivity of about 30 mT and Curie temperature of about 550-570 degree C. However, low temperature measurement did not show Verwey transition characteristic of magnetite and X-ray diffractometry on magnetic separate did not show any peaks of magnetite or maghemite. Two thin sections of 5 mm width x 35 mm length x 0.2 mm thickness were taken from a Mn crust, which are perpendicular to each other. The slices were subjected to SQUID scanning on 85 microns grids with a spatial resolution of about 100 microns for NRM, and after 10 and 20 mT AF demagnetization. The SQUID microscopy revealed fine scale magnetic anomaly parallel to the growth pattern. The identification of polarity boundaries made it possible to estimate growth rate of the Mn crust as 4.5 mm per Myr. The result is much less than the previous estimate on the same Mn crust block (Joshima and Usui, 1998; 14 mm per Myr), however, it is rather consistent with the estimate by 10Be over 9Be (5.9 mm per Myr).