R004-16
D 会場 ： 11/26　PM2（14:50-16:20）
15:20〜15:35:00

鉄マンガンクラストの極微細古地磁気層序における高精度年代推定手法

#小田 啓邦 [1)], 福與 直人 [2)], 山本 正伸 [3)], 臼井 朗 [4)], 柏原 輝彦 [5)], 長谷川 精 [4)], 河合 淳 [6)], 河端 美樹 [6)]
([1 産総研, ([2 法政大学, ([3 北海道大学, ([4 高知大学, ([5 海洋研究開発機構, ([6 金沢工業大学

High accuracy age estimate using ultrafine scale magnetostratigraphy on ferromanganese crusts

#Hirokuni Oda[1)], Naoto FUKUYO[2)], Masanobu Yamamoto[3)], Akira Usui[4)], Teruhiko Kashiwabara[5)], [4)], Jun KAWAI[6)], Miki Kawabata[6)]
([1National Institute of Advanced Industrial Science and Technology, ([2Hosei University, ([3Hokkaido University, ([4Kochi University, ([5JAMSTEC, ([6Kanazawa Institute of Technology

Marine ferromanganese crusts are invaluable archive of past environments of the ocean recorded as internal microscopic structures and chemical compositions including isotopes. One of the key parameters is the dissolved oxygen concentrations in deep Ocean water, which is associated with the oxygen minimum zone developed in the intermediate water. For the reconstruction of the environments, it is quite important to develop a reliable age model for each ferromanganese crust. Utilizing one of the cosmogenic nuclides, 10Be, for dating is one of the reliable isotopic methods for the crust, which is effective back to ~15 Myr. Another independent method for age dating is ultrafine scale magnetostratigraphy (e.g. Oda et al., 2011; Noguchi et al. 2017). In order to further promote scientific outputs, a ferromanganese crust sample from Takuyo Daigo seamount in the North Pacific Ocean (NT09-02_Tak5_01_A; water depth 2987m) was measured with scanning SQUID microscope (SSM) at Geological Survey of Japan, AIST. 10Be dating on the sample suggest average growth rate of ~2.2mm/Myr for this samples (Usui et al., 2017). A thin section from the sample was measured with the SSM after AF demagnetizations at 0, 5, 10, 15, and 20 mT. All the results show magnetic stripes corresponding to geomagnetic reversal boundaries parallel to the growth layers. Preliminary interpretation of the magnetic stripes seems to be consistent with the age model suggested by 10Be dating. We also applied dipole subtraction and upward continuation on the magnetic image using software ProcSQMicro developed on Igor Pro (Oda et al., 2025). Especially, a new feature implemented to calculate X and Y from Z components of magnetic field based on an algorithm by Lima&Weiss (2009) exhibit enhanced magnetic stripes in X magnetic field image. From three components of magnetic field, we calculated the intensity of spatial differential vectors (ISDV; Seama et al., 1993) along a profile perpendicular to geologic layered structures. The identification of the boundary was partially successful, however, the results were not satisfactory. In the presentation, we further apply reduced-to-pole transformation, prior to the application of ISDV, and explore the optimum post processing treatments to further enhance geomagnetic reversal boundaries recorded in the ferromanganese crust sample for the development of reliable age model based on magnetostratigraphy.

Acknowledgements
This study was supported by JSPS KAKENHI Grant Nos. 21H04523 and 23K13188.

References
Lima, E.A. and Weiss, B.P. (2009) J. Geophys. Res., 114, B06102.
Noguchi, A. et al. (2017) Geophys. Res. Lett., 44, 5360-5367.
Oda, H. et al. (2011) Geology, 39, 227-230.
Oda, H. et al. (2025) Prog. Earth Planet. Sci., 12, 56.
Seama, N. et al. (1993) Geophys. J. Int., 113, 155-164.
Usui, A. et al. (2017) Ore Geol. Rev., 87, 71-87.