北太平洋および赤道太平洋オントンジャワ海台堆積物の環境岩石磁気研究：FORC図を利用した陸源・生物源成分の変動の推定

山崎 俊嗣 [1]
[1] 産総研・地質情報

Environmental magnetism of North and equatorial Pacific sediments: Utilization of FORC diagram for estimating magnetic sources

Toshitsugu Yamazaki[1]
[1] GSJ, AIST

http://staff.aist.go.jp/toshi-yamazaki/

Recently FORC diagram has become widely used for characterizing magnetic mineral assemblages in paleomagnetism and rock magnetism. Using FORC diagrams, Yamazaki (2008) semi-quantitatively estimated relative abundances of a non-interacting single-domain (SD) component (hereafter called N-I component) and an interacting SD component (I component) in North Pacific sediment samples by curve fitting of cross-sections along a line parallel to the axis of local interaction fields (Hu) and through a peak in the coercivity (Hc). Together with the results of the decomposition of IRM acquisition curves, Yamazaki (2008) estimated that the N-I component is mainly carried by biogenic magnetite and the I component is carried by terrigenous maghemite. The ARM/SIRM ratio of the samples decreases with increasing proportion of the I component, which is resulted from the dependence of ARM acquisition on magnetostatic interaction. This implies that the ARM/SIRM ratio does not necessarily reflect magnetic grain size; instead it may be used for estimating relative abundance of biogenic and terrigenous components in sediments.

In this study, I investigate time variations of the sources of magnetic minerals in sediment cores from the North Pacific and Ontong-Java Plateau utilizing FORC diagrams. In core NGC65+KR0310-PC1 from the North Pacific, variations of the ARM/SIRM ratio and S-ratio (S-0.1T) resemble with each other, and they decrease in glacial periods. Relative abundance of I component estimated from FORC diagrams increases in the same periods of time. These variations would reflect an increase of terrigenous input in glacial periods as eolian dust. In cores NGC36 and NGC88 from the Ontong-Java Plateau in the western equatorial Pacific, on the other hand, lows in the ARM/SIRM ratio and S-0.1T occur at glacial-to-interglacial transitions, and relative abundance of I component estimated from FORC diagrams increases in these periods. Terrigenous materials in this region are considered to be transported mainly from the New Guinea and Solomon Islands by the Equatorial Undercurrent, but increases of terrigenous input at glacial-to-interglacial transitions have not been documented. Instead, minima of carbonate contents are known to have occurred at glacial-to-interglacial transitions. Population of magnetotactic bacteria and hence production of biogenic magnetites may have varied with the environmental changes which caused carbonate production/preservation changes.