Rock magnetic properties of superficial sediments from the Nansei-shoto (Ryukyu) Trench: implication for early diagenetic effect

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Rock magnetic properties of marine sediments have been widely used for analyses of sedimentation processes, paleoclimate reconstruction, and so on. However, interpretations of variations in the rock magnetic properties are sometimes difficult because the composition, grain size and amount of magnetic minerals in the sediments change through post-depositional diagenetic processes. In this study, we analyzed superficial sediments above ˜30 cmbsf cored at seven sites in the Nansei-Shoto (Ryukyu) Trench, east of the Okinawa Island, where has been under the influence of Kuroshio Current during late Quaternary and is an important region for paleooceanography. We will describe rock magnetic properties, geochemistry of pore water (Eh, pH and dissolved oxygen [DO]), and grain size distribution in the sediment cores in detail and discuss early diagenetic processes in the topmost sediments. The sediment cores above or below ˜3000 m water depth consist of sandy clay with foraminifera and clay silt without foraminifera, respectively. This fact indicates that the CCD is ˜3000 m in water depth. A volcanic ash layer in the bottom of one core was correlated to K-Ah tephra (ca. 7300 yr B.P.) based on refractive index values of volcanic glasses, suggesting the sedimentation rate of ˜4 cm/kyr. Results of thermomagnetic analyses show that magnetite is a predominant magnetic mineral throughout the cores. Rock magnetic proxies for the concentration of magnetic minerals indicate that topmost sediments at the offshore sites contain larger amount of magnetic grains than those at near-shore sites. This can be explained that a lot of materials excluding magnetic minerals are supplied, and they dilute a concentration of magnetite grain in the topmost sediments. Granulomatric parameters of kARM/k and SIRM/k show that grain size of magnetic minerals is relative fine at the near-shore sites. This may suggest that the origin of magnetic grains is different from near-shore site of them. Downcore variations in magnetic hysteresis parameters, Eh, pH, and DO imply that the diagenetic stage proceeds to Mn redox boundary at the offshore sites, and Fe-redox boundary at the near-shore sites.