Paleoenvironmental control on the magnetic mineral assemblage in the Izu rear arc over the last 1 Ma

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During April and May 2014, IODP Expedition 350 drilled a 1806.5 m deep hole at Site U4137 in the Izu-Bonin rear arc, in order to understand, among other objectives, the compositional evolution of the arc since the Miocene and track the missing half of the subduction factory. Mostly fine grained sediments were recovered and variations in magnetic properties and mineralogy are well documented. Routine rock magnetic measurements performed on about 360 samples in the first 120 meters of Hole U1437B showed that pseudo single domain to multidomain (titano-) magnetite is the main carrier of the remanence. The studied interval covers the last 1 Ma, i.e. marine oxygen isotope stages (MIS) 1 to 25. Rock magnetic properties and composition, concentration and grain size variations of the magnetic minerals are compared with the isotopic record in order to investigate the rock magnetic signature of climate changes in the Izu rear arc in the Late Pleistocene. The proxies for magnetic concentration (e.g. magnetic susceptibility, saturation isothermal remanent magnetization) show generally higher values during the interglacials; and lower values during the glacials. This might be partly explained by increasing volcanic activity at the glacial/interglacial transitions as is shown by an increase in the frequency of tephra layers near the time of the transitions. In addition, the composition of the magnetic assemblage also varies with the oxygen isotope record. After the mid Pleistocene transition (1250-700 ka), higher coercivity minerals (such as hematite) dominate the magnetic assemblage in the glacial stages, whereas lower coercivity minerals dominate the interglacial stages. The magnetic assemblage of the Izu rear arc sediments is thus complex with various origins. Ti-magnetite, of detrital and volcanic origins, dominates the interglacials whereas higher coercivity minerals dominate the glacials confirming an increasing supply of Asian dust in the sediments in glacial times. XRF measurements support our observations.

Keywords: Izu rear arc, IODP Exp 350

