Impact of climate change on the magnetic mineral assemblage in marine sediments from Izu rear arc, NW Pacific Ocean, over the last 1 Myr

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A rock magnetic study was conducted on upper Pleistocene marine sediments from International Ocean Discovery Program Expedition 350 Site U1437, in order to highlight the paleoenvironmental changes in the NW Pacific Ocean influenced by monsoonal regime. Remanent magnetization analyses, hysteresis properties, first-order reversal curves and low temperature magnetic measurements were carried out, along with electronic microscopic observations. The results indicated that coarse-grained (titano)-magnetite is the dominant magnetic phase in the magnetic mineral assemblage. Time series analysis supports that this assemblage is modulated by global climate changes occurring in the Late Pleistocene. During the interglacial stages, a higher amount of magnetic minerals is present with the dominance of coarse-grained (titano)-magnetite of both terrigenous (likely from mainland China) and volcanic (Izu arc front, Japan) origin. During the glacial stages, the magnetic mineral content is lower, probably reflecting partial dissolution of (Ti)-magnetite, and the magnetic assemblage is composed of terrigenous coarse-grained (titano)-magnetite and of higher coercivity supposedly finer eolian particles (likely hematite) as a result of the enhancement of the winter monsoon in continental Asia. The magnetic mineral assemblage supports a superimposition of volcanic and global climate signals. Geochemical elemental analyses for carbon, nitrogen, sulfur and organic matter content confirms a climatic signature in the composition of the sediments with a better oxygenation of the water mass during the glacial stages. Additional X-ray fluorescence measurements on bulk samples indicate various origins of the sediment particles with both proximal and distal sources.