

Possible relationship between magnetic properties and rare-earth content of pelagic red clay

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Pelagic red clay occupies about 40% of the seafloor, but paleoceanographic and paleomagnetic studies were restricted so far mainly because sedimentation rates are very low and being devoid of calcareous or siliceous microfossils dating is difficult. Kato et al. (2011) presented occurrence of red clay with high contents of rare-earth elements in the Pacific Ocean, and its potential for resources has attracted attention. In this presentation, I will review red clay mainly from the viewpoint of rock- and paleomagnetism.

It is known that magnetostratigraphy is often lost in red clay older than about 3 Ma. This age coincides with that of increased eolian dust flux in the North Pacific. The eolian component of magnetic minerals in red clay may be carriers of stable remanent magnetization. If so, red clay of older than ~3 Ma without good magnetostratigraphy may have higher rare-earth contents because input of eolian dust would dilute rare-earth elements in red clay.

I examined possible relationship between magnetic susceptibility and rare-earth contents for the ODP cores that Kato et al. (2011) reported, when magnetic susceptibility data are available. I found a good correlation between magnetic susceptibility and rare-earth contents. It is considered that dilution by non-magnetic minerals such as calcareous and siliceous microfossils controls both magnetic susceptibility and rare-earth contents, but it may not be the only factor. If dilution controls, anti-correlation of magnetic susceptibility with sedimentation rate is expected. Although only a few cores have a good age control that enables estimation of variations in sedimentation rates, the limited data suggest that the correlation of susceptibility with sedimentation rate is not very good. More detailed rock magnetic studies are required to understand the correlation. At present it is not considered that contribution of magnetic minerals of hydrothermal origin is significant in deepsea sediments, but it might be important when sedimentation rates are quite low.

References

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