

Magnetic petrology of red beds: the carrier of primary magnetization

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Red beds are recognized as good recorder of the ancient geomagnetic field and contributed to construct the polar wander paths for continents. However, it has been controversial when the magnetization of red beds is acquired. There are many researches that concluded detrital nature of remanent magnetization of red beds, whereas there are also investigations that suggests secondary nature of characteristic magnetization of red beds. Although the timing of red beds remanence acquisition is usually estimated by fold/tilt tests, this kind of field test can only make conclusions whether the magnetizations are acquired before or after tilting movements. Without precise age control of the geological structures, it is hard to determine the age of remanence acquisition. In order to identify the carrier of primary magnetization of red beds, paleomagnetic, petrographic and petrologic investigation of red beds has been performed. The study area of the present study, Sasayama basin in Southwest Japan, is a syn-folding sedimentary basin. The magnetization in such basin is expected to show apparent syn-folding magnetization nature if the magnetization is of primary. Thermal demagnetization experiments of the red beds revealed a stable remanent magnetization component that is unblocked at around 680C, indicating hematite with no or little component of ilmenite as magnetic carrier. We observed the red beds under an optical microscope, and many angular grains of opaque mineral were observed. These grains, under the reflected light, generally show lamellae twins that are diagnostic of hematite. Electron probe microanalysis is performed on the hematite grains and indicates that these grains are nearly pure hematite. It is therefore interpreted that detrital pure hematite grains are derived into the syn-folding basin and are responsible for the primary magnetization of the red beds.