

複数タイプのFORCダイアグラムを用いた磁区構造の識別と犬山赤色チャートへの適用

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Magnetic domain state diagnosis using multiple FORC-type diagrams and their application to the Inuyama red chert

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First-order reversal curve (FORC) diagrams provide a practical approach to assess switching and interaction field distributions, which provide valuable information about magnetic domain states. FORC diagrams are a complex representation of remanent, induced, and transient magnetizations that can be assessed individually using additional FORC-type measurements. Recently developed remanent, transient, and induced FORC diagrams provide substantial information in addition to conventional FORC diagrams that aids comprehensive domain state diagnosis for mixed magnetite particle assemblages. Transient FORC diagrams provide a measure of nucleation and annihilation fields of magnetic vortices and domain walls, remanent FORC diagrams enable detection of stable single domain (SD) behavior along with thermally activated particles near the superparamagnetic (SP) to stable SD threshold, while strong induced magnetizations are evident for stable SD particles in induced FORC diagrams. Triassic-Jurassic red cherts from the Inuyama section near Nagoya represent a complex mixture of magnetite and hematite. Using new FORC-type diagrams mentioned above, SD hematite, non-interacting SD biogenic magnetite, vortex state magnetite, and SP particles are identified in red chert samples. Our results demonstrate the application of FORC-type diagrams in interpreting the domain state of complex mixtures of ferrimagnetic and antiferromagnetic minerals in natural archives.