



Highly sensitive analysis of microstructure and interaction of natural remanent magnetization carriers by non-linear Preisach mapping

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Interacting natural magnetic mineral mixtures with intergrowth microstructures lead to coercivity distributions covering several orders of magnitude that cannot be dynamically resolved by equispaced measurement schemes. To be able to analyse such complex samples, especially from areas with strong remanent aeromagnetic anomalies, a non-linear isothermal magnetic mapping scheme is described that efficiently improves sensitivity and resolution power of Preisach maps of remanent magnetization carriers in natural samples. By using a non-linear sampling scheme and by mapping magnetization instead of magnetization density measurement noise is sufficiently suppressed to remove the need for smoothing of the measured data. Examples from synthetic and natural samples, as well as different types of natural remanent anomalies indicate that non-linear Preisach maps yield a useful classification scheme to help unraveling difficult magnetic samples and to detect characteristic features for different microstructures. This is an important step towards the physical understanding and modeling of the observed complex magnetization behaviors.