

PyPARmC: A new software for the analysis of remanent magnetization curves

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Discriminating magnetic minerals of different origins in natural samples is useful to reveal their associated geological and environmental processes, which can be achieved by the analysis of remanent magnetization curves. The analysis relies on the choice of the model distribution to unmix magnetic components. Three model distributions were proposed in past studies, namely, the lognormal, skew normal and skew generalized Gaussian distribution (SGG) distributions, which are related to the normal distribution. Recently, a new model distribution, the Burr type XII distribution, is proposed as a model distribution. We demonstrate that the component analysis is sensitive to model distribution as well as measurement noise. As a consequence, the decomposition is subject to bias that is hard to tell due to the lack of ground-truth data. It is therefore recommended to compare results derived from various model distributions to identify spurious components. So far, however, each software for unmixing remanent magnetization curves supports one model distribution only, which discourages users to compare different model distributions. A new software, PyPARmC (Python Package for Analysis of Remanent Magnetization Curves), that provides all available model distributions is developed. PyPARmC also provides an automated protocol for assigning parameters necessary to initiate the component analysis, which can greatly reduce the efforts of users and therefore improve the efficiency and objectivity of component analysis. Samples ranging from igneous rocks, marine sediments, red beds, biogenic magnetite and synthetic minerals are analyzed using the software to compare the suitability of model distributions.