END-MEMBER MODELING OF ISOTHERMAL REMANENT MAGNETIZATION (IRM) ACQUISITION CURVES: A NOVEL APPROACH TO DIAGNOSE REMAGNETIZATION

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Being able to identify remagnetization is essential in paleomagnetic studies with evident geodynamic implications. Traditional directional analysis of paleomagnetic data combined with field tests where possible may be flawed if the apparent polar wander path (APWP) is poorly constrained or if the remagnetization predates folding. Regularly, measurement of hysteresis loops allows identification of the so-called "remagnetized" and "non-remagnetized" trends. However, for weakly magnetic samples this approach can be equivocal. To improve the diagnosis of remagnetization, we investigated 192 isothermal remanent magnetization (IRM) acquisition curves (up to 700 mT) of remagnetized and non-remagnetized limestones from the Organyà Basin, northern Spain. Also 96 IRM acquisition curves from non-remagnetized marls were studied.
A non-parametric end-member modeling approach is used to analyze the IRM acquisition curve data sets. For the complete limestone data set, a three end-member model was judged optimal. This model consists of a high coercivity end-member, a low-coercivity end-member that saturates at ~300-400 mT and a low-coercivity end-member that approximately saturates in 700 mT. Higher contributions of the latter end-member appear to occur dominantly in the remagnetized limestones while the reverse is true for the non-remagnetized limestones, so they plot in clearly distinguishable areas. When corrected for the high-coercivity end-member contribution, the remagnetized and non-remagnetized groups are statistically significantly different. The IRM curves from non-remagnetized marls show a behavior very similar to the non-remagnetized end-member in the limestones. Therefore, this new approach can be a very useful tool to diagnose remagnetization in weakly magnetic limestones and marls. We recommend applying it to other areas of potentially remagnetized low intensity sediments.

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