DOMAIN STATE RELATED BIAS IN ABSOLUTE PALEOINTENSITY DETERMINATION

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The magnetic domain state of the remanence carrying fraction affects absolute paleointensity determinations in various different ways. Multidomain magnetic behaviour produces magnetization tails and ongoing stabilization during repeated heating steps. As a consequence, concave and s-shaped curves are observed in Thellier-type experiments and multispecimen protocols (MSP) have been suggested to avoid these problems. Single domain behaviour leads to a strong cooling rate dependency and false results if natural cooling rates differ from the ones used during laboratory treatment. Usually overestimates of field intensity result.

In order to overcome such single domain bias due to cooling rate differences, a correction technique is introduced and tested for synthetic volcanic glass. These remelted glasses are produced under controlled laboratory conditions facilitating SD behaviour, known field values, and a variety of different cooling rates. Uncorrected paleointensity values overestimate the field by up to 35% for usually observed cooling rate differences. Only after correction the correct field value is predicted.

The effect of multidomain remanence on a multispecimen protocol, leading to field overestimates and scatter, is demonstrated. This protocol is then extended by experimental tests to recognize any multidomain bias and to significantly reduce related scatter in the MSP diagram. Even a correction for multidomain contribution is possible, which in case of the investigated synthetic magnetites of well defined grain size allows for reconstructing the originally applied field strength.

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