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Reliable absolute paleointensity independent of magnetic domain state: the multispecimen parallel differential pTRM paleointensity method

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Absolute paleointensity determinations are known to be notoriously problematic because of the requirement of SD particles, the NRM being a pure TRM, and the absence of laboratory alteration. Existing protocols, as a rule based on a version of the Thellier-Thellier method, are designed to though simple are difficult to comply with in practice, and consequently success rates are disappointingly low in many studies. Here we present a new protocol that is based on the linearity of pTRM with applied field, a property that is independent of domain state. By inducing the pTRM parallel to the NRM (TRM) pTRM tail effects are avoided. When the pTRM is induced in a field lower than the paleofield a weaker composite remanence is the result, when induced in stronger field the composite remanence is higher. Magnetic arguments for non-SD particles dictate that a virgin specimen must be used for each pTRM acquisition. By selecting a temperature higher than a potential viscous overprint and lower than that at which alteration sets in, meaningful paleointensities can be derived. We show experimentally in simulated paleointensity experiments and for historic lavas from Paricutin that correct answers are obtained to within a few percent.