
Thellier-Multispecimen-Triaxe: Which method for which kind of samples?

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Résumé

The strength of Earth's magnetic field represents the most challenging aspect of paleomagnetic research. While the paleodirection is often straightforward to recover even if only a small part of the primary magnetization vector is preserved, absolute paleointensity requires much more complete preservation. For several decades, a major part of international paleomagnetism research has been devoted to methodological developments, both in terms of protocols and a priori sample selection or post-processing corrections. In this study, we used three fundamentally similar protocols to replace part of the natural thermoremanent magnetization with an artificial laboratory magnetization for controlled temperature and field ranges, namely, the original Thellier-Thellier, the Multispecimen, and the Triaxe protocol. We will compare the results of different kinds of reference materials, such as historical lava flows (Réunion 2002, 2007; Etna 1983) and samples from an archeological baked clay whose ages are precisely known by archaeological dating techniques. This collection is characterized by magnetic carriers whose properties can vary greatly from one sample to another. This work underlines the importance of not considering one of these three approaches exclusively in competition with the other two but as an alternative to each other depending on the material studied. This is a specificity that France can offer thanks to the presence of unique facilities dedicated to paleointensity (Triaxe, FURemAG, and conventional paleointensity furnaces). It is therefore of paramount importance to continue efforts in paleointensity instrumental development during the next decade. Now, it is challenging to understand why some methods are working while others are not for given samples to produce accurate data efficiently.

Mots-Clés: Paleointensity, Thellier, Multispecimen, Triaxe

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