



On the efficiency of shock magnetization processes

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The effect of shock waves on the remanent magnetization of rocks has strong implications for the understanding of the magnetic anomalies associated to impact basins on Mars, the Moon or on Earth, and also for the interpretation of the paleomagnetic signal of meteorites and lunar rocks that have all been shocked to a variable degree. In this work, we present new experiments of acquisition of shock remanent magnetization (SRM) using laser shocks in a controlled magnetic field. About 100 titanomagnetite-bearing basalt samples have been shocked up to 5 GPa in ambient fields varying between 10 nT and 2 mT. We show that for a given shock pressure, SRM intensity is proportional to the ambient magnetic field, that SRM intensity does not depend on the direction of the ambient field with respect to the direction of shock wave propagation and that SRM is perfectly aligned with the ambient field. We will also discuss the efficiency of the acquisition of SRM with respect to thermoremanent magnetization which is a crucial parameter for the interpretation of the magnetic anomalies observed above impact basins.