Magnetic field intensity as a guide to the evolution of planetary bodies

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Determination of ancient planetary magnetic field intensity provides a first-order constraint for the evolution of rocky materials in the Solar System. There is now undisputable evidence that rocky planetary bodies might record ancient planetary magnetic field at the time when the rocky planetary bodies were formed. However, it is disputable whether the estimates of the ancient magnetic field intensity were reliable. Such controversy mostly originates from the fact that rocky planetary bodies alter irreversibly during multiple heating experiments. The present study systematically examined the ratio of thermoremanent magnetization (TRM) to saturation isothermal remanent magnetization (SIRM). We found that the ratio of TRM/SIRM reflects both physical and chemical properties. For instance, ratio of TRM/SIRM is larger for finer grains. In addition, highly differentiated metal-poor silicates provide stronger ratio of TRM/SIRM. Although it is true that the uncertainty of TRM/SIRM is an order of magnitude larger than that of the high fidelity Thellier-type estimation, the TRM/SIRM is useful when planetary bodies are irreversibly alter during heating.