

Magnetic properties of Precambrian granitic rocks in Minnesota

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Paleointensity studies on Precambrian rocks could give constraints on the history of the deep interior of the Earth. In the present study, we collected pilot samples from the granitic rocks in Minnesota with radiometric ages of about 1.8 and 2.6 Ga. First we measured low temperature magnetic properties of those samples in order to evaluate whether these granitic samples are suitable for paleointensity determinations. Low temperature measurements were made using MPMS. We measured the change of saturation remanence (SIRM) produced at 300K and taken in cooling-heating cycle through 6K. Also, we measured that of SIRM given at 6K and heated up to 300 K. For most of the bulk samples from granitic rocks, the Verwey transition is clearly recognized at about 120K. The low-temperature memories (LT memories) are 20-90% of the initial SIRMs. These LT-memories are thought to be carried by elongated single-domain Ti-poor titanomagnetite grains. Therefore, those samples would acquire primary thermoremanent magnetization and be able to preserve it until today if those titanomagnetite grains are primarily formed in the granitic rocks.