Geophysical Research Abstracts, Vol. 7, 07608, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07608

Thermal Alteration of Titanomagnetite: Implications for Palaeointensity Study

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The thermal alteration of titanomagnetite may play an important role in paleointensity studies as this can affect the palaeointensity determination. Several titanomagnetite-containing, continental basalt samples were annealed in air at temperatures of 150, 250, 350, 450, 500, 550 and 600 degrees. Hysteresis loops and back-field demagnetization measurements after cooling to room temperature indicated that the saturation magnetization increasing with temperatures. Remanence coercivity decreased up to 500-550 degree, but sharply increased after heating at 600 degree. A distinct change occurred after 350 degree. Reversible heating and cooling curves were observed below 250 degree but above not, with an increase of magnetization on cooling. To further examine the alteration process, we measured low-temperature field-dependence of AC susceptibility and low-temperature SIRM on these thermal-treated samples. It indicated that titanomagnetite were transformed from Ti-rich to Ti-poor magnetite or magnetite-ilmentite intergrowth by heating. Our results can provide useful constrains for sample-selection in palaeointensity studies and therefore enhance the success rate of palaeointensity determination.