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Thermoremanence acquisition and demagnetization for titanomagnetite under lithospheric pressures

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Abstract

©2017. American Geophysical Union.The geological sources of large-scale lithospheric magnetic field anomalies are poorly constrained. Understanding the magnetic behavior of rocks and minerals under the pressures and temperatures encountered at large crustal depths is particularly important in that task. The impact of lithospheric pressure is not well known and most of the time neglected in numerical models of the geological sources of magnetic anomalies. We present thermal remanent magnetization (TRM) acquisition and stepwise thermal demagnetization on synthetic titanomagnetite dispersed powder, within an amagnetic cell under hydrostatic pressure up to 1 GPa. TRM is measured after thermal cycling within a cryogenic magnetometer. Pressure-dependent increase in the Curie temperature (initially in the 50-70°C range) is observed, mostly between 0.3 and 0.6 GPa, on the order of 20 K/GPa. TRM intensity also increases with pressure up to 200% at 675 MPa, although the pressure variation with temperature inside the cell complicates the interpretation.

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Keywords

Lithosphere, Magnetic anomalies, Pressure, Titanomagnetite, TRM