Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09227, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09227
EGU General Assembly 2008

New pressure demagnetization experiments on rocks and synthetic samples

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We carried out further hydrostatic pressure demagnetization experiments up to 1.3 GPa on samples of meteorites and terrestrial rocks of different lithologies and on synthetic samples of dispersed powders of magnetite, hematite, pyrrhotite and iron. In our experiments we used a non-magnetic high pressure cell made of Ti-rich alloy and Russian alloy (NiCrAl) that we inserted to SQUID magnetometer in order to measure the magnetic moment of the sample directly under pressure. A wide spectrum of different mineralogies (more than 40 samples) was investigated to bring the light on pressure demagnetization effect: pyrrhotite- and titanomagnetite-bearing Martian meteorites (Bezaeva et al., 2007) ordinary chondrites (taenite-, tetrataenite- and kamacite-bearing) and Rumuruti chondrite (pyrrhotite-bearing); magnetite- and titanomagnetite-bearing basalts and granites with different hysteresis parameters and a variety of pyrrhotite- and hematite-bearing rocks as well as a sample of goethite. Under 1.3 GPa samples lost up to 70% of their initial saturation isothermal remanent magnetization. We found out that the efficiency of the pressure demagnetization is not exclusively controlled by the samples' "magnetic hardness" Bcr (coercivity of remanence) but is strongly dependent on their magnetic mineralogy. We showed that there was no simple equivalence between pressure demagnetization and alternating field demagnetization effects. Titanomagnetite and hematite appear more pressure sensitive than pure magnetite.

Reference: N. Bezaeva, P. Rochette, J. Gattacceca, R.A. Sadykov, V.I. Trukhin, Pressure demagnetization of the Martian crust: ground truth from SNC meteorites. *Geophys. Res. Lett* 34, L23202, doi:10.1029/2007GL031501.