PETROPHYSICAL CHARACTERIZATION OF METEORITES IN THE NATIONAL METEORITE COLLECTION OF CANADA: INITIAL RESULTS. D. L. Smith[1], R.E. Ernst[2], and R. Herd[2].[1] Department of Earth Sciences, Carleton University, smitdarr@hotmail.com, [2]Geological Survey of Canada, Natural Resources Canada, rernst@NRCan.gc.ca, herd@NRCan.gc.ca.

Introduction: Various petrological, mineralogical and magnetic techniques have been used for the classification of meteorites, [e.g. 1-4]. Because of the high rate of discovery of new meteorites, there is a particular need for fast, easy and non-destructive methods for classification. Appropriate petrophysical techniques include low field magnetic susceptibility, intensity of natural remanent magnetization (NRM) and bulk density [1-4].

The National Meteorite Collection of Canada contains 2700 meteorite specimens belonging to 1100 different meteorites. Among these are 730 different stony meteorites. The Canadian collection has not been previously systematically assessed for petrophysical properties, and thus represents an opportunity to expand the global database [1-4]. Recently, there has been a concerted effort to obtain magnetic susceptibility data from collections around the world [3,4], and herein, we report initial magnetic susceptibility results from the Canadian collection. Future work on the Canadian collection will report on NRM intensity and bulk density.

Magnetic susceptibility represents a fast, non-destructive and systematic method for classifying meteorites essentially based on Fe-Ni content [1-4]; Fe-Ni is the most magnetic material and thus carries the bulk of the magnetic signal. Since, current petrological/mineralogical classification is also primarily based on Fe-Ni content, then magnetic susceptibility classification should correlate with accepted classifications. The magnetic susceptibility technique may also help in identifying misclassified meteorites, and help with the interpretation of magnetic fields around asteroids [3,4].

Results: A database of magnetic susceptibility measurements on 203 stony meteorites and one stony-iron meteorite is presented. Meteorite classes show distinct susceptibility ranges following trends governed by metal content. Susceptibility values increase from carbonaceous chondrites through LL, L, H to enstatite chondrites. As expected, based on its higher metal content, the lone stony iron (mesosiderite) measured yielded the highest susceptibility.

A frequency dependence is observed within each class when using frequencies of 825 Hz and 19000 Hz [5,6]. Initial results suggest that the H and carbonaceous chondrites, along with the SNCs have the greatest frequency dependence, while the aubrites and lone howardite sample have the lowest.

A proxy method was used for an estimation of anisotropy of magnetic susceptibility [5,6]. The aubrites, enstatite chondrites and SNCs have the largest inferred anisotropies, while the LL chondrites, carbonaceous chondrites and the howardite have the lowest.

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