

INNOVATIVE, COLLABORATIVE RESEARCH ON SPECIMENS FROM THE NATIONAL METEORITE COLLECTION OF CANADA

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Summary: The National Meteorite Collection of Canada (NMTC), housed within Natural Resources Canada, Earth Sciences Sector, Ottawa, includes 2700 fragments and masses of 1100 different meteorites. Many specimens from the collection have been utilized by local scientists and engineers over the last eight years for hardware, software, analytical and method development related to space exploration. This has led to a recognition of the utility of meteorites to help build a skilled community of planetary scientists in Canada in anticipation of manned and robotic missions to the Moon, Mars, asteroids and comets, and of sample returns from these. The successful collaboration relates to initiatives from the NMTC, Carleton University (CU) and the Neptec Design Group, a NASA prime contractor.

Collaborative Studies: Include: Use of 3D laser imaging of terrestrial rock samples, and meteorites, to help develop image libraries for use in recognition of the nature of solid objects in extraterrestrial environments (meteorites and igneous, sedimentary and metamorphic rocks as outcrops or boulders) [1]; Non-destructive measurement of petrophysical properties of meteorites especially volume/density and magnetic susceptibility. The first digitally determined meteorite volume was calculated, along with measurements of the magnetic parameters of stony meteorites that assist in their classification [2, 3]; U-Pb investigation of a suite of H6 chondrites for cooling history [4]; Development and testing of a new system of nomenclature for chondrules in ordinary chondrites to help elucidate their origin [5, 6,7].

Outcomes: Co-operation among federal government, university and industrial partners has resulted in novel uses of meteorite samples from a large and varied collection, and increased awareness that meteorites can be used for “planetary exploration without the commute”, and to prepare for that commute.

References: [1] Herd, R., Spray, J. Samson, C., Miller, S., and Christie, I., 2003. Abstract # 1718, 34th Lunar and Planetary Science Conference. [2] Smith, D.L., Ernst, R.E., Samson, C., and Herd, R., 2006. *Meteoritics & Planetary Science* 41 (3), 355-373. [3] Smith, D.L., Samson, C., Herd, R., Christie, I., Sink, J-E., DesLauriers, A., and Ernst, R., 2006. *Journal of Geophysical Research* 111, E10, E10002. [4] Blinova, A., Amelin, Y., and Samson, C., 2007. *Meteoritics & Planetary Science* 42 (7-8), 1337-1350. [5] Dixon, L., 2009. *B.Sc. thesis, Department of Earth Sciences, Carleton University, Ottawa*, 133 pages. [6] Herd, R. K., Samson, C., Dixon, L., Cooke, A., and Hunt, P.A., 2010. Abstract #2026, 41st Lunar and Planetary Science Conference. [7] Cooke, A.M.D., 2010. *B.Sc. thesis, Department of Earth Sciences, Carleton University, Ottawa*, 33 pages.