**EMPLACEMENT TEMPERATURE OF THE IMPACT BRECCIA AT HAUGHTON IMPACT CRATER**

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**Introduction:** The Haughton impact structure is a well-preserved Eocene structure 23 km in diameter, located on Devon Island in the Canadian Arctic Archipelago [1]. A remarkable feature is the abundance of allochthonous impactites derived from the sedimentary target rock (Paleozoic dolomites and limestones). These impactites were originally interpreted to be lithic or fragmental breccias [2] but have since been interpreted as impact melt breccias/clast-rich impact melt rocks [3,4]. In this work, we estimate the emplacement temperature of the impact breccia, using a paleomagnetic method known as "conglomerate test". This consists in sampling oriented samples in several clasts in the breccia, and determine their paleomagnetic direction using thermal demagnetization. The direction will be scattered for emplacement at low temperature, and clustered for emplacement at high temperature.

We sampled a total of 20 oriented clasts in the impact breccia at two sites located 3 km apart. The paleomagnetic measurements show that all clasts give an identical paleomagnetic direction that is unblocked to at least ~350 °C. This direction (D=, I=, a95) is well in agreement with the direction of the magnetic field during Eocene or younger times.

Most of the clasts consist of Paleozoic carbonate rocks whose main ferromagnetic mineral is pyrrhotite (as evidenced by our rock magnetism analyses) that has a Curie temperature of 350 °C. As a consequence, these clasts can provide only a lower limit for the emplacement temperature. However, some clasts consists of Precambrian basement rocks, and among this population a few ones are dominated by magnetite that has a Curie temperature of 585 °C. These latter clasts show two components of magnetization: one unblocked up to ~350 °C with the above-mentioned Neogene direction, and a second one unblocked between ~350°C and 580°C which is random from clast to clast indicating that the magnetization was not completely reset by heating.

Although additional data are needed from magnetite-bearing clasts, these preliminary results suggest that when the impact melt rocks were emplaced, its temperature was clearly above 350°C and probably not much higher. This is of interest for reconstructing the P–T history of the melt rocks and for cratering processes in general. The presence of shock-melted quartz clearly indicates that initial temperatures following decompression were >1850 $^{o}$C [3,4] and possibly higher. These high temperatures occurred *before* emplacement of the impactites in to their final resting place (i.e., the outcrop locations we see at the present-day). The co-existence in the impact melt breccias of carbonate melts with liquidus temperatures of ~500-600 °C [4], and clasts that were not heated above 350-400 °C seems to indicate that the temperature in the breccia was heterogeneous at small scale, and that the high clast content of these melt rocks have ensured rapid cooling. This is in agreement with a previous study showing temperature sensitive fossil biological signatures preserved in the same clasts [5].

**References:** [1] Osinski G. R. et al. 2005. *Meteoritics & Planetary Science* 40:1759–1776. [2] Redeker H.J. and Stöffler D. 1988. *Meteoritics* 23:185-196. [3] Osinski G. R. and Spray J.G. 2001. *EPSL* 194:17-29. [4] Osinski G. R. et al. 2005. *Meteoritics & Planetary Science* 40:1789–1812. [5] Lindgren P. et al. 2006. *Lunar Planet. Sci. Conf.*, abstract #1028.