**A GEOLOGIC OVERVIEW OF THE LATE HOLOCENE WHITECOURT METEORITE IMPACT CRATER**

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**Introduction:** Small impact events resulting in simple impact structures <100 m in diameter are common features recorded on the solid surfaces in our Solar System. Such structures are rare in Earth's impact cratering record; most are typically heavily modified by subsequent erosion or are often found in remote locations. The recently discovered Whitecourt Meteorite Impact Crater (WMIC) provides significant contrast in that it is both well preserved and easily accessible. The level of preservation, age (<1.13 ka) and associated meteorite fragments [1] suggest that this site will provide considerable data for the improvement of current models for similar structures.

**Structure:** The WMIC target surface consists of gently sloping materials resulting in the southwest crater rim being 4 m higher than the northeast rim. The crater is 36 m in diameter and has a depth of 6 m as measured from a cross-section oriented parallel to the hill slope. The crater shape is similar to other Barringer type (simple) structures.

The subsurface stratigraphy is presently constrained by a single borehole 5.4 m deep located at the center of the crater. The local water table is below this depth. The stratigraphy consists of a 10 cm thick organic-rich silty soil sharply overlying a pebble diamict. The diamict includes clasts up to 10 cm in diameter in the upper 50 cm decreasing to 5 cm to a depth of ~2.9 m. At ~2.9 m there is a sharp transition to medium bedded sand, which continues uninterrupted to the base of the borehole. Rare fragments of amber-colored glass have been identified using XRD and polarizing light microscopy in samples from ~2.9 m within the diamict. A soil pit located 11.5 m east of the crater rim reveals a buried charcoal-rich soil horizon sharply overlain by a 20 cm thick pebble diamict.

**Conclusions:** The sharp contact observed at 2.9 m is interpreted as being very near to the base of the transient crater. The presence of glass above this boundary and its abrupt disappearance immediately below the 2.9 m boundary support the expected rapid dissipation of energy in unconsolidated material. The soil pit reveals the classic overturned topography found along impact crater rims. The current model, based on only seven simple structures ranging from 400 to 3800 m in diameter, overestimates the true depth of the WMIC [2].

**Further Investigations:** A detailed field investigation is currently underway which includes magnetic, seismic refraction tomography, and auger/soil pit surveys. The purpose of the magnetic survey is to determine if any of the main impactor mass remains embedded in the crater floor. The refraction tomography survey will elucidate any seismic velocity disturbances in the subsurface material caused by the impact. Additional soil pits and boreholes will further constrain the crater morphology and stratigraphy, and determine the distribution of the ejecta blanket.

**References:** [1] Herd, C. D. K. et al. (2008) *this meeting.* [2] Grieve, R. and Therriault, A. 2004 *Meteoritics & Planetary Science* 39:199-216.