DANNY BOY EXPLOSION CRATER: PRELIMINARY FINDINGS.

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Introduction: Basalts and allied mafic rocks are fundamental building blocks of differentiated crusts in our Solar System. Their major minerals (olivine, pyroxene, feldspar) are ubiquitous in many classes of meteorite, particularly those sourced from differentiated planetary bodies [1]. However, most of the impactites available for study on Earth are felsic in composition [2], while experiments assessing shock are restricted in scale and often focus on felsic phases *e.g.,* [3].

The Danny Boy explosion crater (Fig. 1) is a nuclear test crater hosted in andesitic basalt that is located in Area 18 of the Atomic Energy Commission's Nevada Test Site, USA. The crater is 86 m × 29 m in size with 6 m high rim and was formed by a 0.43 kT explosion in March 1962 [4]. Samples were collected both before and after the host rocks had been deformed by the explosion, and so the Danny Boy explosion crater is an excellent test case for investigating how minerals with a known microstructures are affected by hypervelocity impacts.

Methods: Eight thin sections representing a range of unshocked and shocked stages (Fig. 2) were mechanically and chemically polished using standard electron backscatter diffraction (EBSD) preparation methods, then carbon coated prior to analysis [5]. EBSD experiments are currently being conducted at the University of Leeds School of Chemical and Process Engineering.

Results: EBSD experiments are ongoing. We look forward to presenting our preliminary results at the meeting.

***Figure 1**: Ejecta from the Danny Boy explosion crater*

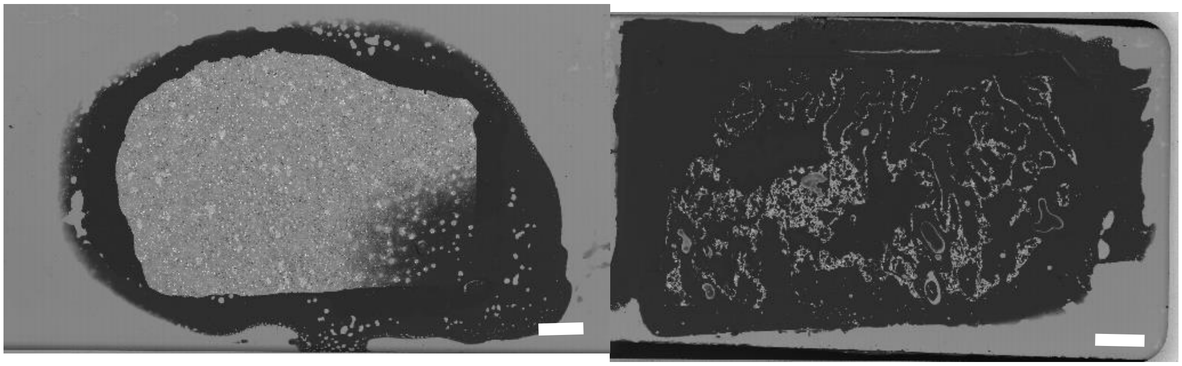

***Figure 2:** Backscatter electron images of two different Danny Boy Impact crater sections: unshocked (left) and impact melt (right). Scale bar is 5 mm.*

Implications and Conclusions: This projects aims to assess any shift and/or development in internal crystal misorientation (plastic deformation) within olivine, pyroxene, and plagioclase. We aim to track how pre-existing plastic deformation signatures related to the emplacement and crystallisation fo the igneous rock influence the development of shock metamorphism patterns. We also intend to identify at what shock pressures and temperatures the initial emplacement micro-structures are completely overwritten.

References:. [1] Weisenberg, M. et al. 2006. *Meteorites and the early Solar System* II:19–52. [2] Crósta, A. P. et al (2012) *Meteoritecs & Planetary Science* 47:51–71. [3] Hoerth, T. et al. (2013) *Meteoritics & Planetary Science* 48:23-32. [4] Short, N. M. (1968) *Shock Metamorphism of Natural Materials* 1:185–210 [5] Halfpenny, A. (2010) *Journal of the Virtual Explorer* 35:1-18.

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