

**ESTABLISHMENT OF AN UNDERGRADUATE RESEARCH PROGRAM FOR THE NASA HAUGHTON-MARS PROJECT.** C. E. Mason<sup>1</sup>, P. Lee<sup>2,3,4</sup>, M. E. Ennis<sup>1,5</sup>, J. W. Atwood<sup>5</sup>, and W. C. Smith<sup>1</sup>,  
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**Introduction:** The NASA Haughton-Mars Project (HMP) base camp is located on the rim of the Haughton impact crater on Devon Island in the Canadian High Arctic [1]. Dr. Pascal Lee established HMP as a Mars analog site in 1997. The focus of this study is to develop a funded, nationally competitive HMP undergraduate research program, which will allow undergraduates to participate in this exciting, fieldwork-based geology and planetary science research program.

**Overview of Pilot Student Projects:** Earth and Space Science undergraduate students from Morehead State University were used during the 2006 and 2007 field seasons at HMP for pilot studies in developing the undergraduate research program. During the 2006 HMP field season the PI and one MSU undergraduate (Wesley Smith) worked on a collaborative project on biomarkers with Dr. John Parnell and his research group from Aberdeen University in Scotland. Here the conodont color alteration index (CAI) was utilized to check results of chemical biomarkers taken from melt breccia clasts by Dr. Parnell's research group. Conodonts are a type of extinct primitive vertebrate animal which ranged from Cambrian to the Upper Triassic and were excellent age indicators during their range. They were soft bodied and exclusively marine with only their distinctive conical or multi-denticulate teeth, generally 0.1-1.0 mm in size, being preserved worldwide in the rock record. Conodont teeth which are made of apatite show color alteration due to thermal maturation. A CAI technique was developed to determine the amount of thermal maturation. The CAI index varies from a level of 1 (50–80 °C) to a level of 8 (which ranges into the amphibolite metamorphic facies). The focus of our study at HMP was to use conodonts in order to determine the relative age and thermal maturation of clasts contained within impact breccia and ejecta blocks found within and outside the Haughton Crater and compare our thermal maturation results to the results of chemical biomarkers obtained by Dr. John Parnell and his research group. Our study, using CAI of conodonts, gave the same or similar temperatures reached by the melt breccia clasts as the chemical biomarkers thus collaborating the results of their study[2]. This research constitutes the first report of conodont CAI's from the Haughton impact crater. In addition to collaborating the work on biomarkers of Dr. John Parnell and his research group using conodont CAI's, the conodonts themselves are useful in

determining what rock formations in the target rock sequence the clast came from. Also, in this study, an insulation effect was noted between the inner and outer parts of the large melt breccia clasts. During the 2007 HMP field season two MSU undergraduate students, Megan Ennis and James Atwood accompanied the PI. A primary objective of the Morehead undergraduate research team during the 2007 HMP field season was to obtain a large number of impact breccia clasts in order to validate the observation of thermal insulation noted from the CAI values obtained from the large clasts. This research was the primary focus of Megan Ennis. A total of 17 samples, each weighing approximately 8-12 gm, were collected from several different localities throughout the crater. The sample size needed to be large enough so that the sample could be split into interior and exterior sub-samples, with a small amount of each of these sub-samples being sent to Dr. John Parnell and his research group for collaborative results.

A second objective of the undergraduate research team, which was the primary objective of James Atwood, was to work with Dr. Pascal Lee to evaluate the HMP field site for establishing a Search for Extra-Terrestrial Intelligence (SETI) installation. He is currently in the process of writing a proposal with Dr. Pascal Lee to get funding to make Devon Island the first high arctic SETI installation. The biggest advantage to placing a SETI instrument at HMP is that there is much less interference (noise) here than almost anywhere in the continental United States. If a SETI antenna is placed here it will be the first to be looking for life outside the galactic plane.

Both of the 2007 projects are currently in progress, and preliminary results look very promising. Future work will focus on publication of this work and due to the success of these projects utilizing undergraduates we will seek permanent funds to establish an undergraduate research program at HMP.

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**References:** [1] Lee P. and Osinski G. (2005) *Meteoritics & Planet. Sci.*, 90, 1755–1758. [2] Lindgren P. et al. (2006) *LPS XXXVII*, Abstract #1028.