IMPACT MELT EMPLACEMENT ON TERRESTRIAL BODIES. W. A. Yingling[1,2], C. D. Neish[1,2], L. L. Tornabene[1,2], [1]Institute for Earth and Space Exploration, The University of Western Ontario, London, ON, Canada, [2]Department of Earth Sciences, The University of Western Ontario, London, ON, Canada (wyingling@uwo.ca).

Introduction: Impact cratering is a dominant process which shapes the surface of planetary bodies. Thus, it is an important process to understand for the future exploration of the Moon and Mars. A key part of this process is the production of impact melt, which is created during the excavation and modification stage of crater formation. Impact melt deposits have been studied on the Moon, Venus, Mercury, Mars, and Ceres [1-8]. Melt-bearing material can provide samples for age dating surfaces [9]; therefore, exploration of these craters could be of use for future sample return missions. Melt production can be influenced by impact velocity, gravity, impact angle, surface composition, topography, and/or the presence of an atmosphere [1,2]. In order to understand this process for terrestrial bodies such as the Moon, we need to do a comparative study of all terrestrial planets. In this work, we use Mars as an important comparison point for understanding impact melt emplacement on the Moon and other terrestrial planets.

In particular, we aim to assess whether the primary influence on melt emplacement on Mars is impactor angle or topography dominated, and how this relates to gravity and impactor speeds. In this work, we will assess the most well-preserved craters because they will provide the most accurate data, where melt is not obscured by dust.

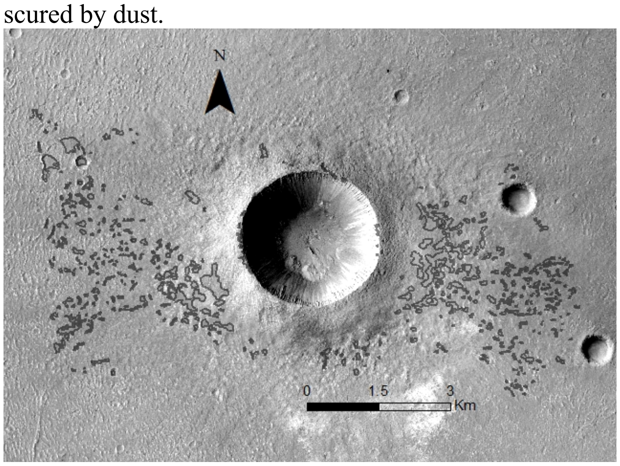

Figure 1 *CTX B12_014262_1513_XN_28S133W image of Zumba Crater on Mars. Gray outlines show mapped melt.*

The overall objectives of this work are to (1) find a statistically significant number of Martian craters where melt-bearing materials are present and discernable, based on the well-preserved crater database from [6], (2) identify and map where melt-bearing deposits are emplaced in relation to their craters, as shown in Figure 1, and (3) use a statistical test to assess the correlation between local topography and emplacement direction**.** The location of the melt-bearing materials will be assessed with respect to their relative location to the crater rim crest low, or "RCL". Results for five craters are presented in Table 1.

Candidate Name	Latitude	Longitude	Melt Direction	RCL	DTM
AcheronFossae	40.52	-128.347	S	S	HiRISE
Noord	-19.22	-11.179	W	NE	CTX
Tooting	23.184	-152.214	N	NW	CTX
TyrrhenaTerra	-18.613	69.045	W	W	CTX
Zumba	-28.658	-132.968	W, E	S	HiRISE

Table 1. *Table showing preliminary results for a five candidate sites. Note our results for Zumba Crater agree with [6].*

For comparison to other terrestrial bodies, Neish et al. [4] showed that the Moon and Venus represent two different end members in terms of impact melt emplacement on terrestrial planets. Venus has a higher relative gravity and impactor speed, and impact melt emplacement is influenced primarily by impactor angle. The Moon has a relatively low gravity and impactor speed, and impact melt emplacement is influenced by local topography. In addition, work by [8] has tentatively shown that melt emplacement on Mercury tends to be more Venus-like than Moon-like. Mercury has a lower gravity than Venus, but higher impactor speeds, implying impactor speed may be a more important factor in melt emplacement than gravity.

Mars is a connecting bridge between terrestrial planets, in terms of emplacement of melt-bearing materials, because of its gravity regime and average impactor velocity. It has a similar gravity to Mercury, making a comparison of average impactor velocity possible. This study will elucidate the dominant emplacement mechanisms for Martian conditions and then compare the results to previously studied bodies, including the Moon, Venus and Mercury. This can provide information about the cratering process and inform future sample return missions.

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