Possible large-scale pingos on Utopia Planitia. C.F. Keating, Mason, TX (PO Box 468, Mason, TX 76856, masonrc110@yahoo.com).

Introduction: Figure 1a is of Mars THEMIS image 20061220a, released on December 20, 2006 [1]. The image is of the area around 47.7 N and 155.2 E, in Utopia Planitia and west of Phlegra Montes, approximately 1200 km northwest of Elysium Mons. The image has dimensions of 19.7 km by 69.6 km, covering an area of approximately 1370 km^2

Visual inspection of the image shows a large feature surrounded by several medium-sized features, mostly in the southern (lower) portion of the image, along with several long ridges with numerous smaller, light-colored oval features. Inspection shows the smaller, circular features to be predominantly associated with the ridges, appearing almost exclusively on top of the ridges and with only a few appearing between the ridges.

Based on 19.7 km width for the image, the largest feature is over 10 km wide. The next four largest mounds are between 2.5 and 4 kilometers across, while a typical light-colored spot is approximately 500-600 meters wide.

Additional images and MOLA data of the surrounding area reveal numerous other features similar to these indicating these features are not unique but are part of a field.

Figure 2 shows the results of crater counting and indicates this area was formed less than 100 million years ago (using the Schmidt-Housen scaling, 2004 iteration [2]).

We propose that these features are pingos and they were formed as a result of pressures on subterranean ice and/or water layers. The morphology of the observed features suggests these are pingos in the late growing or early collapse stage. This would be consistent with data collected by the Gamma Ray Spectrometer on board the Mars Odyssey spacecraft. This data is shown in figure 3 and indicates this region is high in subsurface water, most likely in the form of ice. The possibility of pingos in Utopia Planitia has been reported before [3], [4], [5]. However, this report expands the area mapped by [4] which shows a suspected pingo field to the west of this area.

In an environment such as that found on Mars, pingos form as a result of boundary-conditions of pressure and temperature at or above the triple point of water. Identifying pingos therefore has the value of also identifying areas that have, or have had, these conditions.

References: [1] Christensen, P.R., B.M. Jakosky, H.H. Kieffer, M.C. Malin, H.Y. McSween, Jr., K. Nealson, G.L. Mehall, S.H. Silverman, S. Ferry, M. Caplinger, and M. Ravine, The Thermal Emission Imaging System (THEMIS) for the Mars 2001 Odyssey Mission, *Space Science Reviews*, *110*, 85-130, 2004. [2] Isochrons For Martian Crater Populations Of Various Ages, http://www.psi.edu/research/mgs/chron04b.html. [3] Soare, R. J.; Conway, S. J.; Pearce, G. D.; Dohm, J. M. and Grindrod, P. M. (2012). Possible crater-based pingos, paleolakes and periglacial landscapes at the high latitudes of Utopia Planitia, Mars. *Icarus*, http://dx.doi.org/ doi:10.1016/j.icarus.2012.08.041; [4] Devon M. Burr, Devon M., Kenneth L. Tanaka, Kenji Yoshikawa. Pingos on Earth and Mars, Planetary and Space Science 57 (2009) 541–555; [5] R. J. Soare, D. M. Burr**,** and J.-M. Wan Bun Tseung (2005) Possible pingos and a periglacial landscape in northwest Utopia Planitia. *Icarus* 174, 373-382.

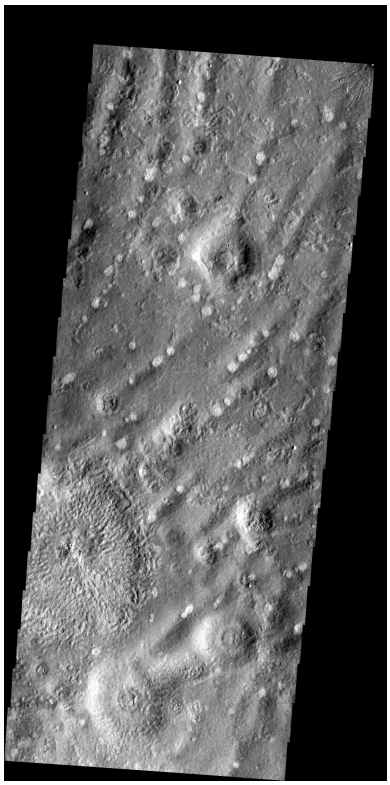

Figure 1. Mars THEMIS image showing an area in Utopia Planitia dominated by large surface mounds and associated ridges. The area shown is approximately 20

km by 70 km with the largest feature in the lower left measuring more than 10 km across.

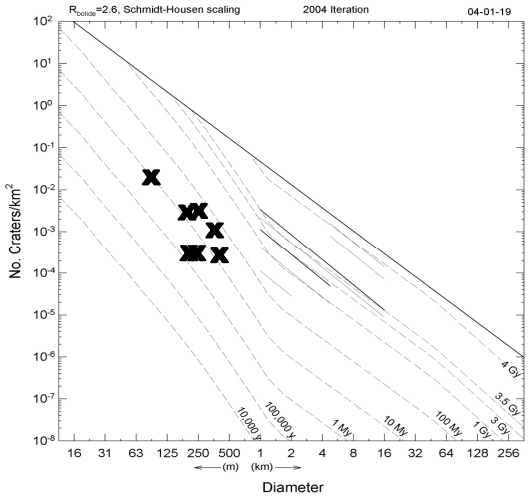

Figure 2. Crater counts results for the area shown in figure 1 indicating an age of less than 100 million years.

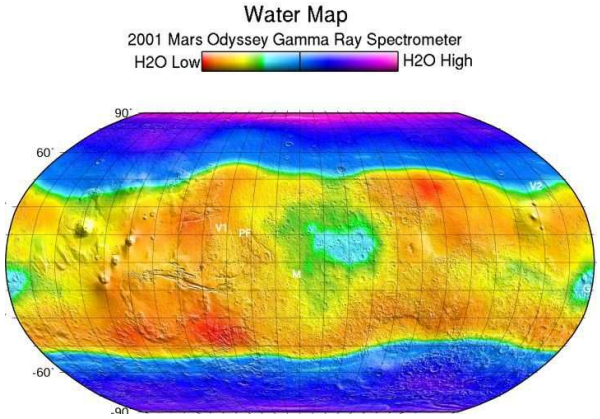

Figure 3. Distribution of water as indicated by the MRO GRS showing the region imaged in figure 1 may have significant amounts of subterranean water, probably in the form of ice. Image credit: NASA/JPL/University of Arizona