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THE MARS DESERT HYPOTHESIS AND THE MARS–RATE CONNECTION

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ABSTRACT

We present a catastrophic as well as creation scenario that is painted with a broad stroke to explain much of the present topography of the planet Mars. By analogy, we propose that Mars is an analog of an *extreme desert*. This is the *Mars Desert Hypothesis.* I propose that there is a history of volcanic eruptions producing rain, flash floods, and volcanic flows which created a terraformed Mars complete with streams and lakes and possibly shallow oceans. Because of the low gravity of Mars, due to its mass, which is about 10% of the Earths, this 'wet season' is followed by evaporation and sublimation of water and other light gasses which largely escape the planet's surface. I also propose that the accelerated radioisotope decay occurring during the RATE episodes, perhaps during the flood on the Earth and/or creation week, creating hot spot volcanism on Mars which resulted in the terraforming of Mars**–***The Mars-Rate Connection*. These proposals are followed by geological evidence observed on the surface of Mars for each.

WATER ON MARS

Atmospheric pressure and temperatures seem to eliminate the effects of water Mars. The earliest Mars probes, for example Mariner 4, discovered that the atmospheric pressure was on the order of only 10 mbars, as compared to the Earth's ~1 bar (http://nssdc.gsfc.nasa.gov/planetary/mars/mariner.html). This would seem to eliminate any water associated phenomena. But water related atmospheric and ice phenomena are observed with clouds, frosts, and polar caps are known Martian features. Of course, some of these phenomena arise from $C0_2$ (dry ice). But many of the effects are undoubtedly water related. Likewise, the atmosphere has been found to be extremely cold and is not presently conducive to liquid water. Viking I measured temperatures ranging from 150-250 K. Viking I and II (http://nssdc.gsfc.nasa.gov/planetary/viking.html) measured surface temperatures that seldom went above -10^{o}C, usually staying in a band between -90 and -30 C. Very rarely did temperatures rise to above the freezing point of water. Nevertheless, liquid water phenomena are apparent. The Mars Pathfinder noted rounded stones probably shaped by tumbling action of water in a stream or flood. Yellow areas on the surface were believed to be deposits left behind by evaporating water. Strata bearing sedimentary rock from deposition of smaller fragments of rocks in water seemed to be apparent. The Phoenix Mars Mission (2007-2008, http://www.nasa.gov/mission_pages/MRO/news/mro20110804.html) confirmed water ice on the surface of Mars. The Mars reconnaissance orbiter showed strong video evidence of liquid water flows in areas on warmer Martian slopes (actually in gullies) at low elevations **(**NASA Spacecraft Data Suggest Water Flowing on Mars**,** *http://www.nasa.gov/mission_pages/MRO/news/mro20110804.html).* These areas experience

higher atmospheric pressure where water might exist in a liquid form. The flows were thought to be due to melting ice from exposed permafrost (PF). Observed phenomena pointing to a once wet climate on Mars are plentiful. These include channels with dendritic drainage patterns like river beds on the earth (see figure below), alcoves, aprons, alluvial fans (Moore, 2005) mudflows, tear dropped 'islands' from water flows etc. All of these phenomena are now in dry areas where the water had apparently evaporated or sublimated away. Some of these phenomena are shown in figures below.

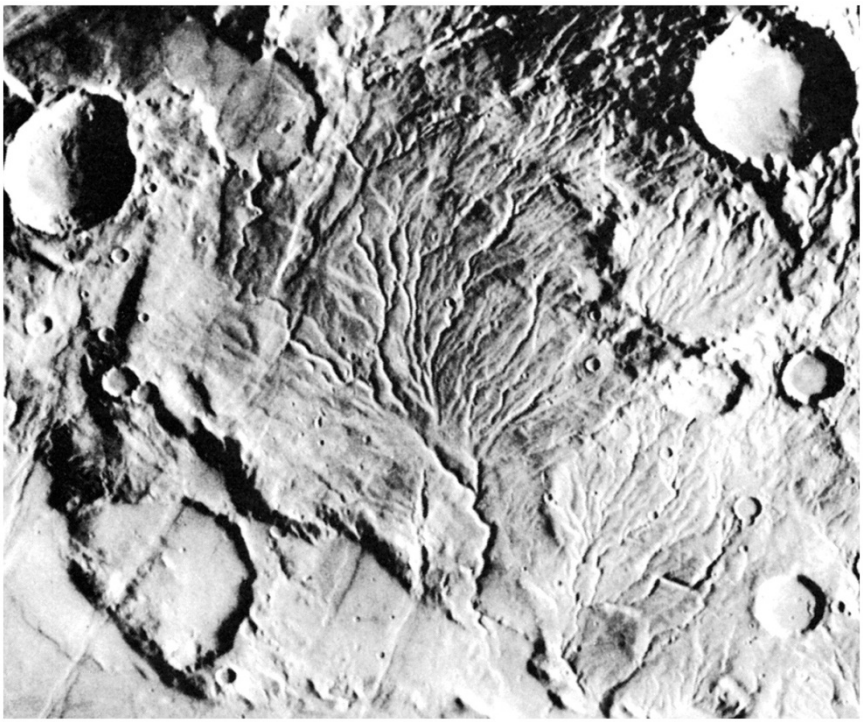

Figure 1. Dry river beds on Mars. (Viking Orbiter image 606A56, Lunar and Planetary Institute)

Figure 2. River in Yemen (for comparison) http://astronomy.nmsu.edu/mccleary/Wateron**Mars**.pptx
(STS-41G, #17-36-039)

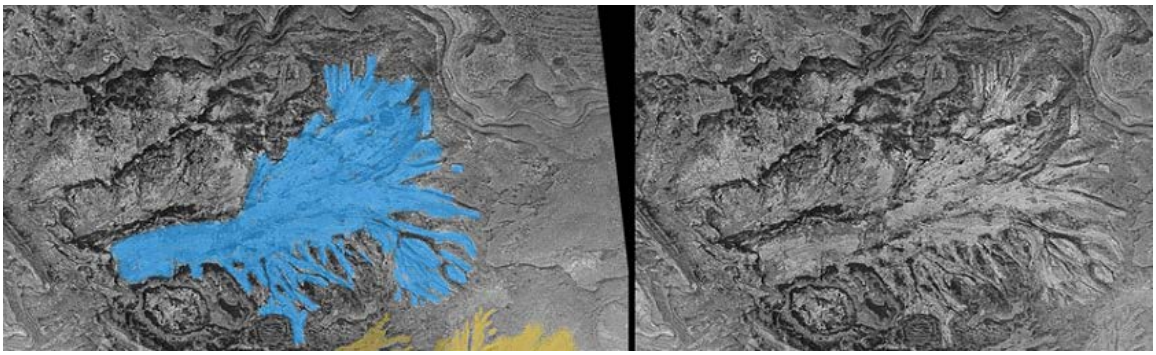

Figure 3. Martian Alluvial Fan (water added on left for the purpose of illustration)
http://spacespin.org/article.php/water-lain-sedimentary-rock-mars

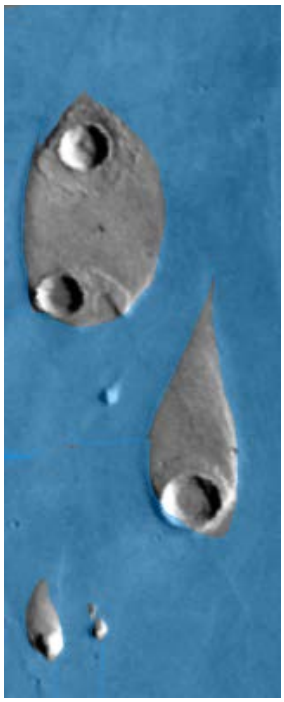

Figure 4. Martian channel “tear shaped” Islands (water has been added for the purpose of illustration), (NASA/USGS)

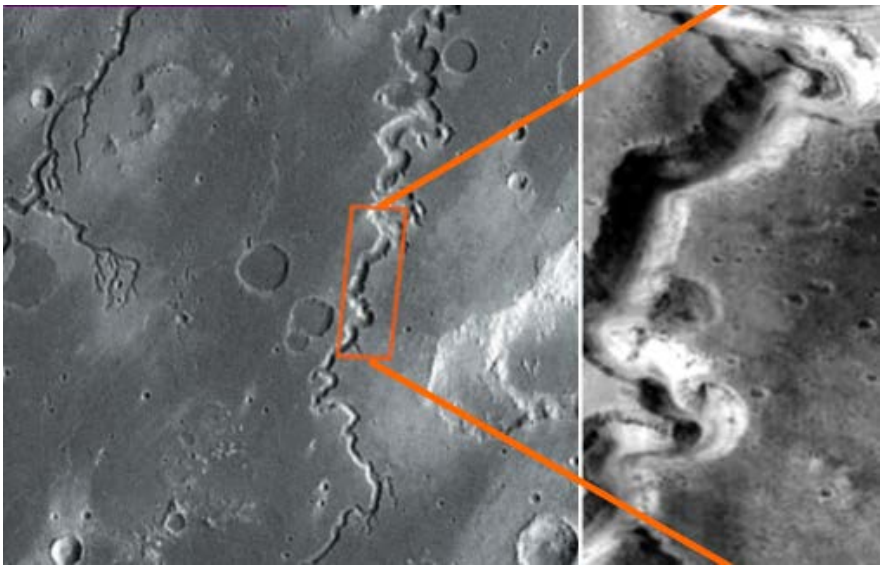

Figure 5. Dry Terraced River Canyon (Mars Global Surveyor-MGS)

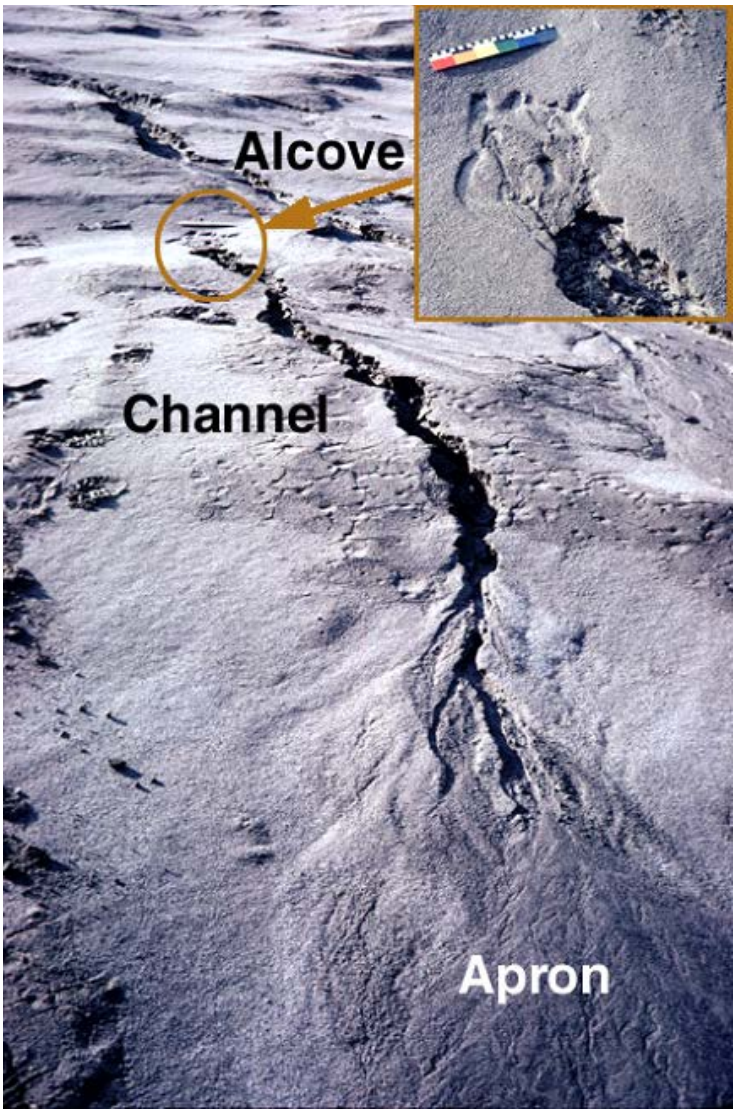

Figure 6. Apron, Alcove and Channel, MGS, (http://www.msss.com/mars_images/moc/june2000/labeled/)

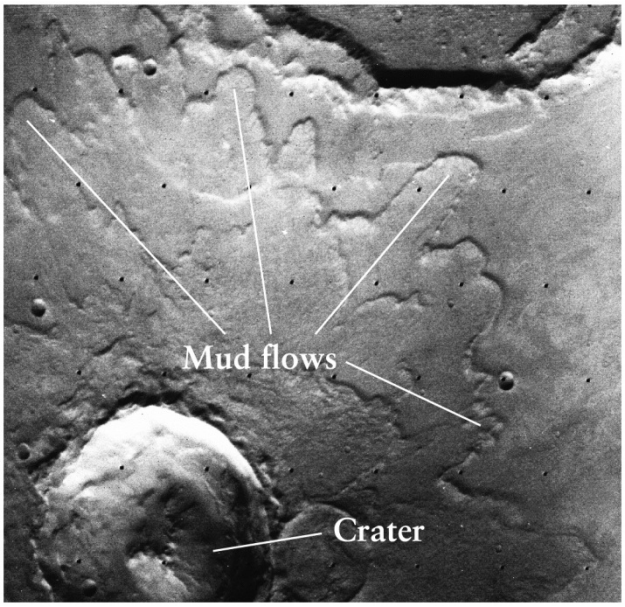

Figure 7. Mud Flows on Mars, (Rampart Crater, From NASA.)

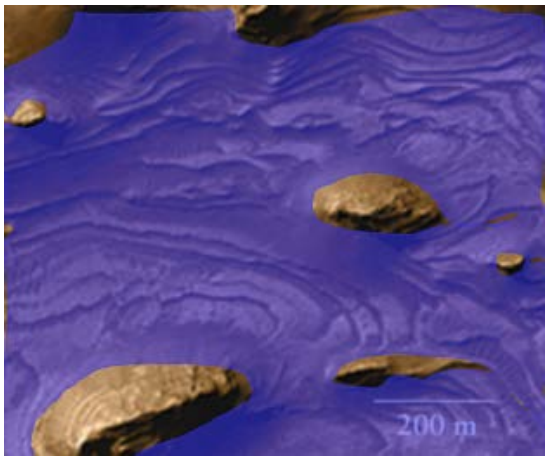

Figure 8. Sedimentation (water added for the purpose of illustration) Western Candor Chasma (MOC)

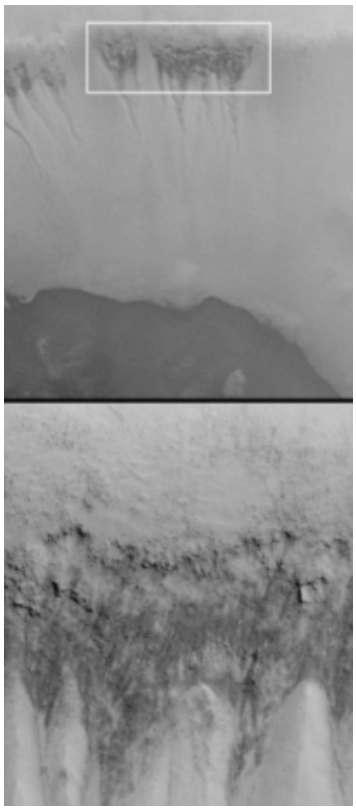

Figure 9. Permafrost melts creating gullies on Mars (MGS) on the sides of craters. It is possible that 3 layers or more of permafrost are melting as seen in this photo.

Figure 10. Clouds and changing weather patterns on Mars near the polar cap. HST WFPC2 27 April 1999, MGS MOC 2 March 2001.

VOLCANOES

Other phenomenon that has water related associations is volcanism. The largest volcano on Mars and in fact, in the entire solar system, is Olympus Mons. It has a 600 km diameter base, and rises to a height of 24 km above the Martian plains with 6 km scarps encircling its base. Otherwise, it is a normal shield volcano caused by the alternating emission of fluid lavas and ash eruption episodes. The low viscosity lava flows from shield volcanoes travel longer distances than those of other volcanic types, resulting in larger and thinner sheets of lava, often just 1 m thick with shallow slopes. Flows repeat over long periods of time, and the gradual buildup of hundreds of these flows slowly constructs the characteristically low, broad profile of a mature shield volcano. The Hawaiian chain of volcanos would have resulted in a smaller Olympus Mons-type of volcano, if it were not for plate tectonics to spread the eruptions over a great distance. This chain has a total volume of 750,000 km^3 in its 43 volcanoes. The five volcanoes

around the Tharsis ridge alone account for nearly 4.5 times this volume. The distribution of the larger volcanoes on Mars are shown in Figure 11. The largest orange zone in the figure is Olympus Mons. Only 20 volcanoes have been named by the IAU on the surface of Mars. The five largest volcanoes on Mars are larger than their shield counterparts on Earth. These include Arsia Mons, Alba Patera, Ascraeus Mons, Pavonus Mons and Olympus Mons. Volcanoes on earth are scattered due to treadmill-like plate movements. Some Ninety percent of all volcanoes lie within the "ring of fire" along the edges of the Pacific Ocean and the tectonic plates, See Figure 12.

According to catastrophic plate tectonics theory (Baumgardner, 2003), this was a result of recent events that happened from the outset of the Noahic Flood. On mars, the lack of plate tectonics causes other effects than chains or rings of volcanoes. Hot spot volcanism accumulates lava emissions in one place instead of in chains. But both types of volcanism occur due to the same phenomena—radioisotope decay in the crust of the planet. This heats up the crust and produces high pressure magma pockets which leach upward creating plumes at the surface.

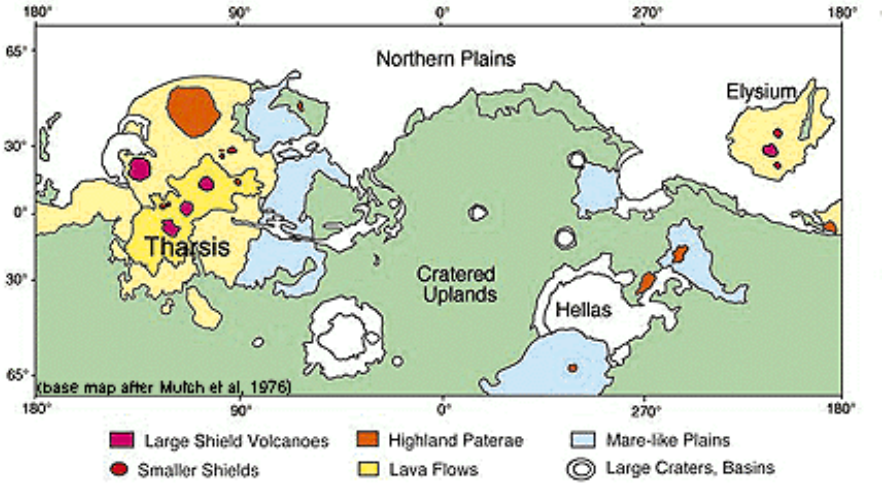

Figure 11. The distribution of the larger volcanoes on Mars. (http://www.isset.org/nasa/tss/aerospacescholars.org /scholars/earthmars/unit2/the_geology_of_mars_volcanoes.htm).

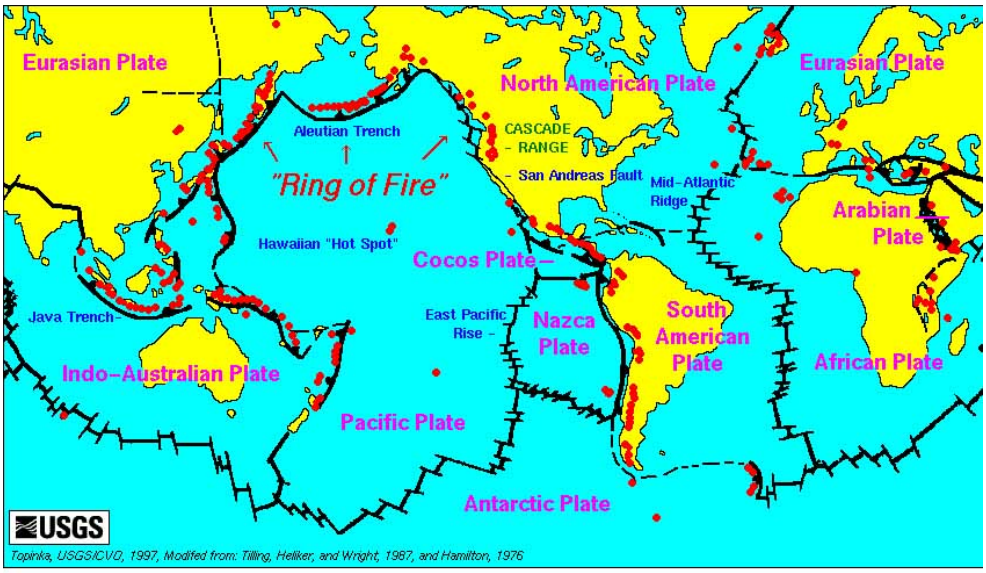

Figure 12. Volcanism and tectonic plates on the Earth (the 'ring of fire', USGS, http://www.crystalinks.com/rof.html, for comparison)

THE MARS DESERT HYPOTHESIS

A catastrophic and creationary scenario that explains much of the present topography of the planet Mars is the *Mars Desert Hypothesis*. And the method of this occurrence is accelerated radioisotope decay that was the main emphasis of the RATE (Vardiman *et al.*, 2005) project. Western Deserts in the U.S., like those in Arizona and Mexico, have seasonal heavy rains and flooding followed by long periods of drought. Dried up streams and very reduced or dried up lakes are common sights to the traveler in our western states. In Arizona, this is also a seasonal occurrence. The summer monsoons mark the wet season. During this time, lakes are full, and streams are swollen with the possibility of flooding likely. This is followed by a dry season for the rest of the year. The next year, the cycle repeats itself— dry followed by wet —followed by dry etc.

By analogy, we propose that Mars is an analog of an extreme desert. We postulate that there is a history of volcanic eruptions producing rain, flash floods, and volcanic flows which create a terraformed Mars complete with streams and lakes and possibly shallow oceans. Because of the low gravity of Mars, due to its mass, which is about 10% of the Earth's, this 'wet season' is followed by evaporation and sublimation of water and other light gasses which largely escape the planet's surface.

The details of this process follow (See Figure 13.). Volcanoes output CO_2, H_2O, N_2 and SO_2. This creates clouds, rainfall, streams, lakes etc. -- a terraformed Mars. Mars acts like the Earth for a brief time except that there is no carbon cycle since there is no life on the surface. Rain takes CO_2 and SO_2 out of atmosphere which causes cooling and more precipitation. The rain continues to remove gasses, thinning the atmosphere and cooling it. Thus, much of the greenhouse gasses are removed. This cumulative action is called the "Runaway ice house effect" (Freedman, Geller, and Kaufmann III, 2011). This drastically cools the atmosphere. It freezes

out a layer of water soaked soil that will ultimately become a PF layer. Ultraviolet radiation, now flooding the atmosphere, breaks up the water molecules in the air. On the ground and H and O_2 escape due to the low surface gravity and the thin atmosphere's inability to absorb the UV. The remaining water soaks into the ground and joins the ground water. Much O_2 combines with irony surface soils to make the rusty looking surface. Hence, we see a *red* Mars today with the unaided eye and in our backyard telescopes. Next, the ground water freezes and PF forms. Some CO_2 is photo-dissociated, but some of the unaltered CO_2 is heavy enough to be retained. The atmosphere thins out and loses its light gasses, leaving a thin CO_2 atmosphere.

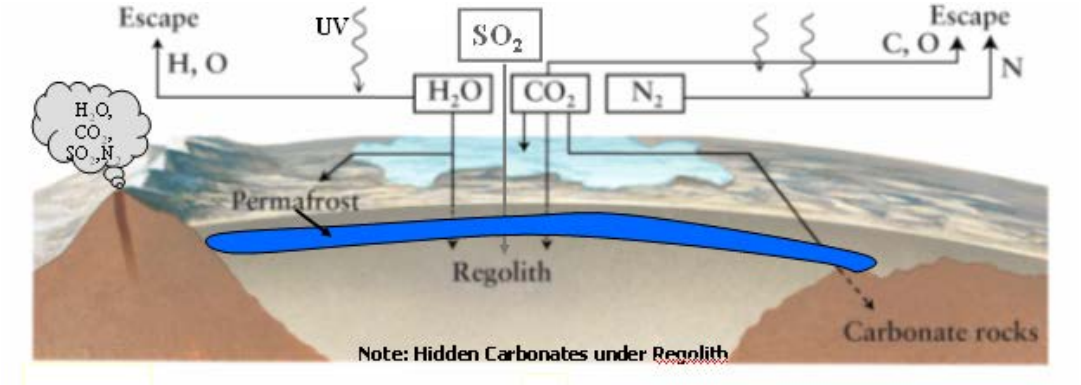

Figure 13. A Single Volcanic cycle on Mars

The runaway ice effect not only freezes much of the water into PF, but also into the Northern and Southern polar caps. After this, the topography is that seen in the present day—a dry Mars. This dry season is characterized by long periods of drought. During dry times, asteroids are free to strike the surface, since there is little atmosphere to act as a shield. Because of the PF, when the ground is heated by meteor and asteroid collisions, it produces mud flows about the crater fields as we see in Figure 6. There is little erosion to conceal the crater blemishes. Craters scatter dusty regolith about the cratered terrain.

Carbonate rocks are known to be rare on the surface of Mars. This is a problem for those believing that Mars has a watery past as proposed here. I believe that carbonate rocks *do* form during wet phase but they do not have time for recycling and volcanic venting. The meteors that strike the surface bury the landscape in the regolith *including the carbonate rocks*. Thus, over time, the regolith/volcanic debris and carbonate bearing sediments should alternate. (Recently the Spirit rover *did* uncover some carbonates on the surface of Mars. http://martianchronicles.wordpress.com/2010/06/04/spirit-rover-discovers-carbonates/). The presently exposed sediments are mostly regolithic metamorphic/igneous rocks. After this cold dry season, the volcanoes eventually again erupt. This causes the same cycle to recur—dry followed by wet—followed by dry etc.

Instead of a year apart as on these "seasons" are in Arizona, on Mars the wet seasons are centuries apart. I believe Martian volcanoes are poised for another eruption and a wet season will follow. When will Mars be terraformed again? Perhaps there were oceans originally. And perhaps the strength of the cycle is weakening with each repetition. These are speculations, which we will explore further.

The remaining water is in the polar caps insulated by dry ice and in the crust hidden as PF. When the PF is exposed (for example, by asteroid strikes, volcanism, earthquakes) at the lowest altitudes (highest pressure), and heated (as radiant heat from Sun or radioisotope decay), it again flows for a brief time before it sublimates creating additional mud flows and gullies from buried layers of PF melts. In addition, ice laden glacial type flows (Forget and Haberle, 2006) should follow as the climate cools. Images of valley glaciers (Sample, 2008) have been detected by the Mars orbiter. Vast concealed glaciers exist on surface of red planet, and have the same appearance as glaciers outside of Anchorage, Alaska today. They are indicated on the surface. See the Figure 14 and 15.

Recently, a National geographic report stated that the Tharsis range volcanoes may not be extinct and that "If sufficiently large eruptions do eventually occur, they could spew enough heat-trapping carbon dioxide and water into the atmosphere to warm the red planet up from its current cold, dry state—at least for a little while." Thus, some secular scientists are now agreeing with the thesis of this paper (which I have been thinking about for some 10 years or more), that these fantastic volcanoes which would cover the west coast of the US (see Figure 16) may re-erupt, terraforming Mars for a short time.

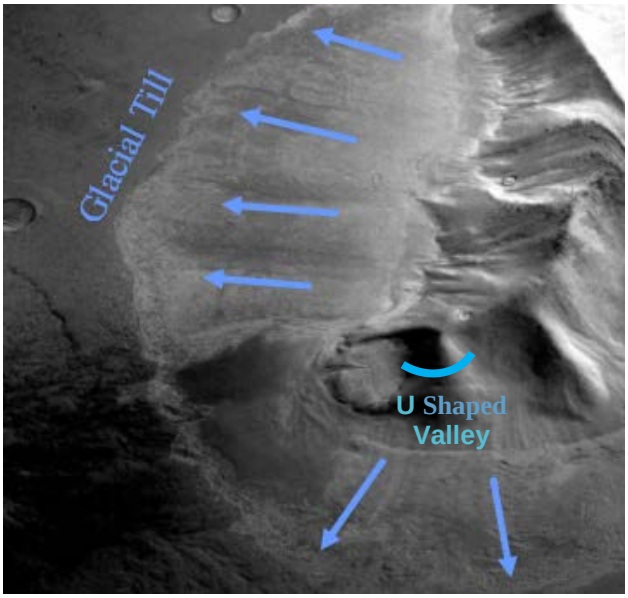

Figure 14. Rigolith covered Valley Glaciers on Mars, (http://www.guardian.co.uk/science/2008/nov/20/mars-orbiter-glaciers-ice) ESA/DLR/FU Berlin

Figure 15. Deposits of materials in lobe shapes that resemble certain terminal moraines associated with mountain glaciers. http://www.fas.org/irp/imint/docs/rst/Sect19/Sect19_11.html, Geology of Mars; The Martian Atmosphere; Ice at the Poles.

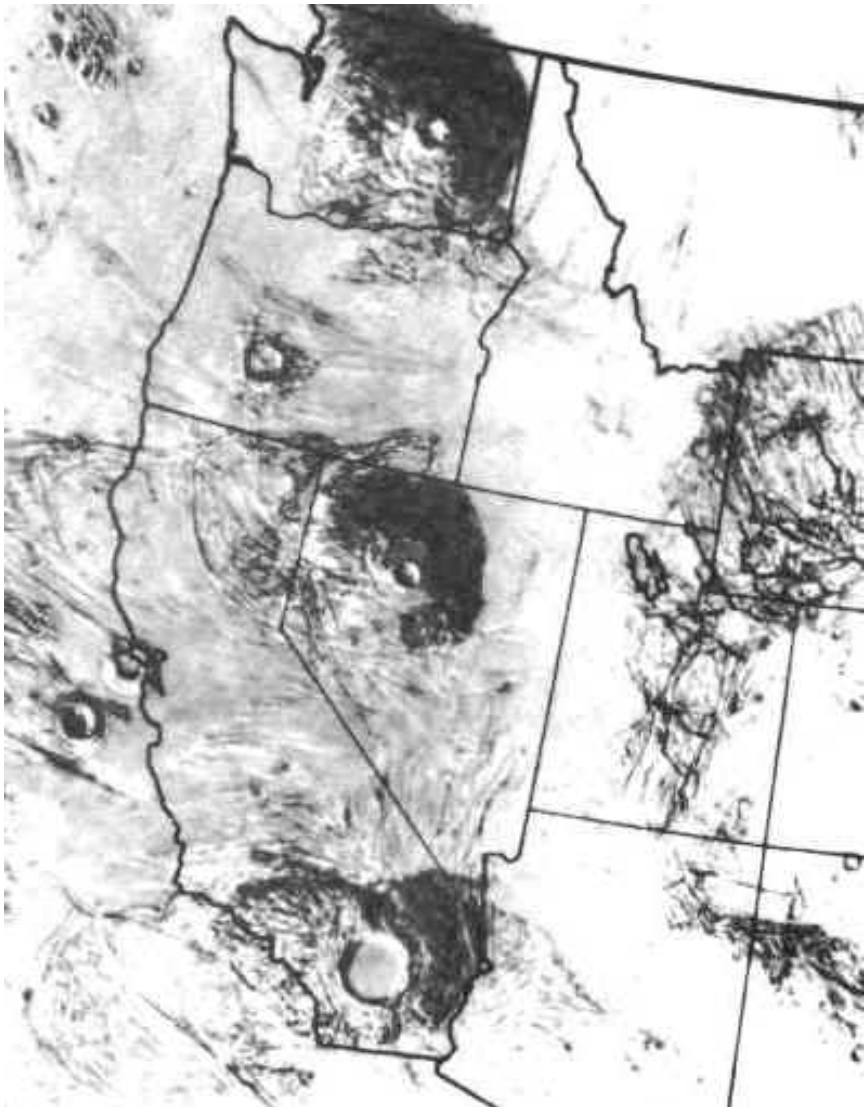

Figure 16. Tharsis Range Volcanoes compared to the West Coast of the US. (http://www.pianeta-marte.it/marte_in_cifre/english_guinnes_of_mars.htm)

THE MARS –RATE CONNECTION

We propose that the accelerated radioisotope decay occurring during the RATE episodes, and perhaps during the flood on the Earth or creation week, created hot spot volcanism on Mars without plate tectonics, catastrophic or otherwise. This created the massive, oversized volcanic mountains visible on Mars today. Such vast eruptions extended over large portions of the Martian surface resulting in a fantastic emission of water vapor and other greenhouse gasses into the atmosphere. This ultimately terraformed Mars as proposed in previous sections. The sudden heating of the crust due to accelerated decay would produce vast areas of heated subsurface magmas that would result in surface volcanism. Volcanic emissions are some 90% water vapor and are followed by torrential rains on the Earth. This would be followed by subsidence and eventual loss of most of the atmosphere as outlined above, thus producing the present desert topography of Mars in a brief time, fitting the creationary, 7000 year age frame. The clues of a watery past are easily discernible on the surface of Mars as noted in the earlier section. These

events likely occurred several times in the past from either *multiple RATE episodes* or from the latent heat from a single, but long lasting accelerated radioisotope event, followed by additional and weaker eruptions of the present day. Slower emissions would also produce future eruptions as they do presently on the Earth. In that case, these events would subside in strength, becoming weaker and farther and fewer between as the energy from previous accelerated decay episodes (or from a single eruption) are lost.

The original terraforming episode was initiated at the outset of the RATE event on the Earth. Probably this initial *super* event was so violent that it could have produced an ocean on the surface of Mars, perhaps causing the present day low lands in the Northern Hemisphere and the apparent shore lines of Syrtis Major, Arabia Terra and Chyse Planitia (See the Figure 17.). By setting the average altitude as "sea level", the Northern low lands, which are very smooth with fewer craters, are at a depth of 4 km. and the volcanic mountains (Mons) rise to a height of 4 km above a plain with an elevation of about 2 km. There is a great inland dry lake bed about the size of a lunar mare and our great lakes called Hellas Planitia as well as the bays along the "sea shore". All of these could have been formed by the original terraforming event. Earth is more complex with its catastrophic plate tectonics and much more work is ahead to explain its topography. But the possibility exists that much of the present Earth's seas came from the RATE event/s.

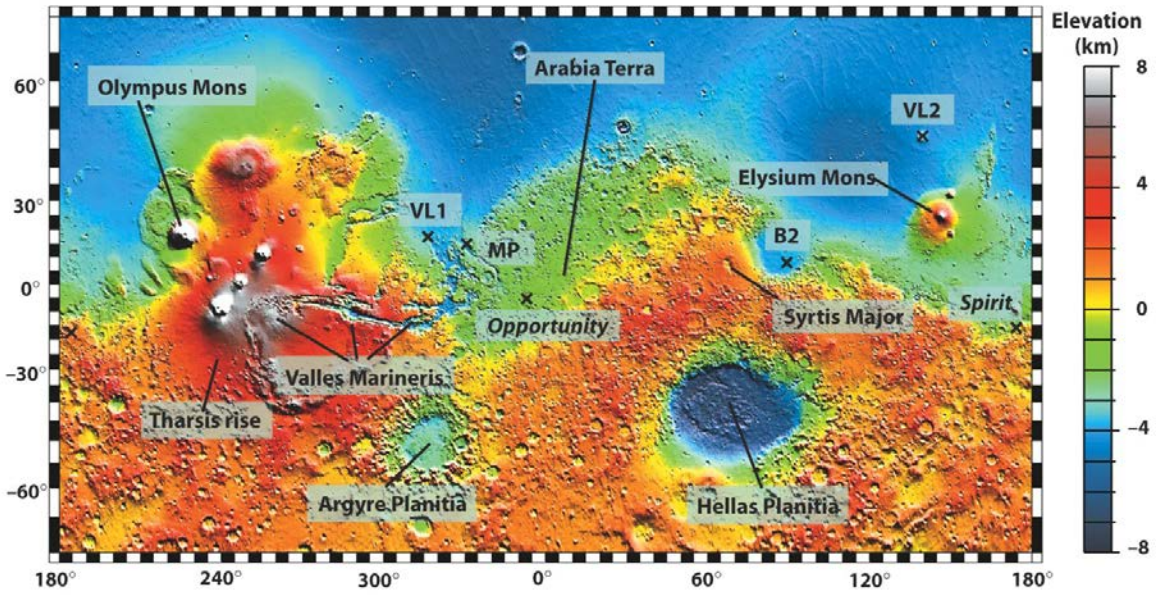

Figure 17. The Topography of Mars. (Smith, 1999)

EVIDENCE FOR ALTERNATING SEDIMENTARY LAYERING ON MARS

As suggested by our referee, one of the confirming evidences for the Mars Desert Hypothesis would be the existence of alternating sedimentary layering on Mars. This would be expected from repetitive events. Indeed, *there is sedimentary laying on Mars*! But these phenomena could be caused by alternating directions of wind-blown dunes which are also prevalent on mars, or something as simple as lake deposits. But we are talking about *thick* layering. And thick layering has also been found on Mars! Some of the thickest layers have been found in West Candor Chasma on Mars discovered by HiRISE (http://www.redorbit.com/images/pic/61308/sedimentary-layers-in-west-candor-chasma/). This article states, "The layers may have been deposited from windblown materials, fall of volcanic sediments, or carried in by water, or all of the above. Subsequently the layers may have been altered by groundwater, producing hydrated minerals such as sulfates. The enhanced colors in the sub image are related to the minerals or to overlying dust or sand. The dark blue sharp-crested ridges are sand dunes." See the Figure 18.

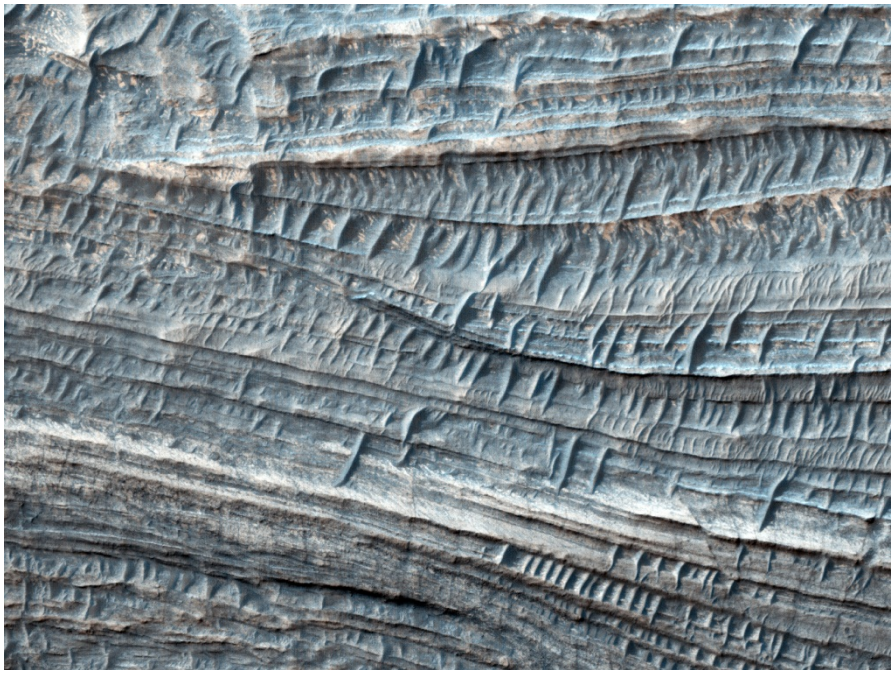

Figure 18. Thick sedimentary layering in West Candor Chasma (see reference in text).

Another image taken by HiRISE is given as Figure 19. These layers occur in an unnamed crater. In the related article, we read, "Sequences of cyclic sedimentary rock layers exposed in an unnamed crater (located at 8N, 353E) in Arabia Terra, Mars. NASA/JPL/Univ. of Arizona Researchers at the California Institute of Technology (Caltech) and their colleagues have found evidence of ancient climate change on Mars caused by regular variation in the planet's tilt, or obliquity. On Earth, similar "astronomical forcing" of climate drives ice-age cycles." (http://phys.org/news147623815.html#jCp). We certainly do not espouse ancient and long age ice-age cycles, but the actual cause of the cataclysmic geology could very well be the Mars Desert Hypothesis.

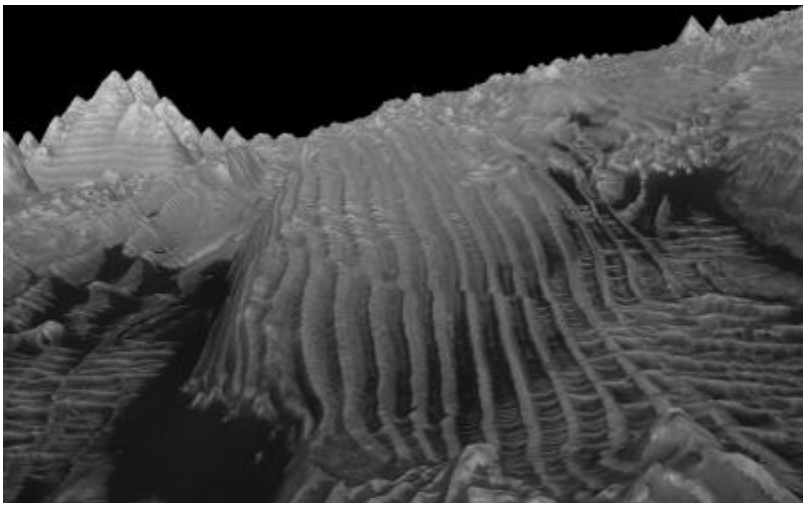

Figure 19. Sequences of cyclic sedimentary rock layers exposed in an unnamed crater. http://phys.org/news147623815.html. These images were created by draping HiRISE image PSP_002733_1880 over HiRISE stereo topography (1m/pixel). (Vertical exaggeration is 2X, redit: Topography: Caltech; HiRISE Images)

The next figure shows a drawing of a possible method of formation for the exposed layered terrain previously shown (MGS MOC Release No. MOC2-265O, 4 December 2000). This was done for the Mars Global Surveyor Mars Orbiter Camera as "Sketches Illustrating Proposed Formation of Layered Units, Massive Units, and Thin Mesa Units in Martian Terrain." The layers could have been built from debris from crater impacts (regolith) and any other precipitating phenomena like water, volcanic ash or lava thus creating layers of different materials and color. Erosion could be caused by much of the same phenomena such as micrometeor impacts or massive solar storms (a naked mars does not shield its surface from either).

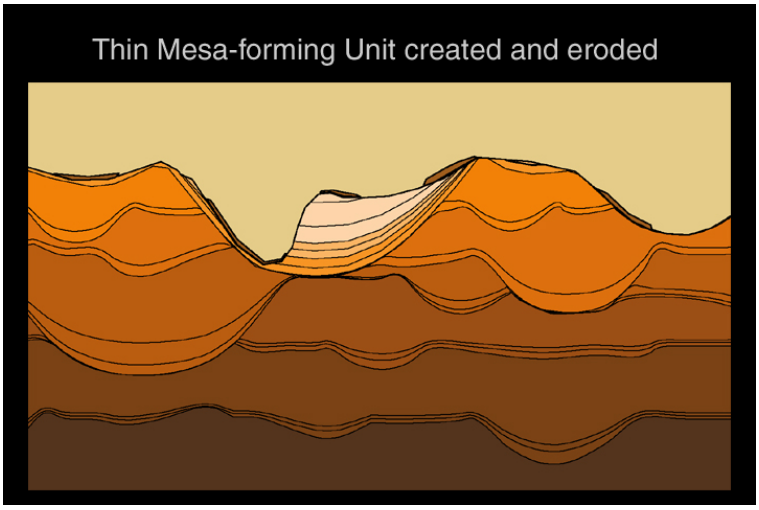

Figure 20. Possible cross section which explains for stratigraphic layering on Mars. (Malin Space Science Systems, http://www.msss.com/mars_images/moc/dec00_seds/slides/265O/)

Figure 21 shows complex layering in West Candor Chasm, an auxiliary canyon off Valles Marineris. The statement that accompanies the image is very telling and fits into our ideas here, “Various explanations are put forth as to their nature: Are they marine sedimentary, lake beds, volcanic flows, volcanic ash deposits, or other unknown types, or as seems likely a combination of these modes of layering?”

Figure 21. Set of layers exposed in West Candor Chasm, an auxiliary canyon off Valles Marineris (http://www.fas.org/irp/imint/docs/rst/Sect19/Sect19_11.html)

Figure 22. Periodic layering. (MRO)

Ten major repeated periodic patterns of ten minor layers was discovered with the HiRISE camera of the Mars Reconnaissance Orbiter (MRO) found in Becquerel crater and is thought to indicate proof of varying but periodic changes in the inclination of Mars over the past 12 billion years. "Each layer has weathered into a stair step in the topography where material that's more resistant to erosion lies on top of material that's less resistant to erosion,"
http://www.dailygalaxy.com/my_weblog/2009/07/mars-climatechange-cycles-in-3d.html
This is the first discovery of spatial periodicity in rock layers on Mars indicating a complex repeating pattern of erosion and deposition. A referee asked me to make some sort of prediction

from our study. Just for speculation, if we apply a catastrophic scenario to this phenomenon, say the ten major layers could have happened over the past 6000 years, making a 600 year periodicity. Since the telescope is about 400 years old and no bright spots on Mars were recorded by Galileo, we would expect another start to a major cycle (of volcanic eruptions) in less than 200 years, d 2200 AD! We must disclose to the reader that this speculation is shear fantasy at this point!

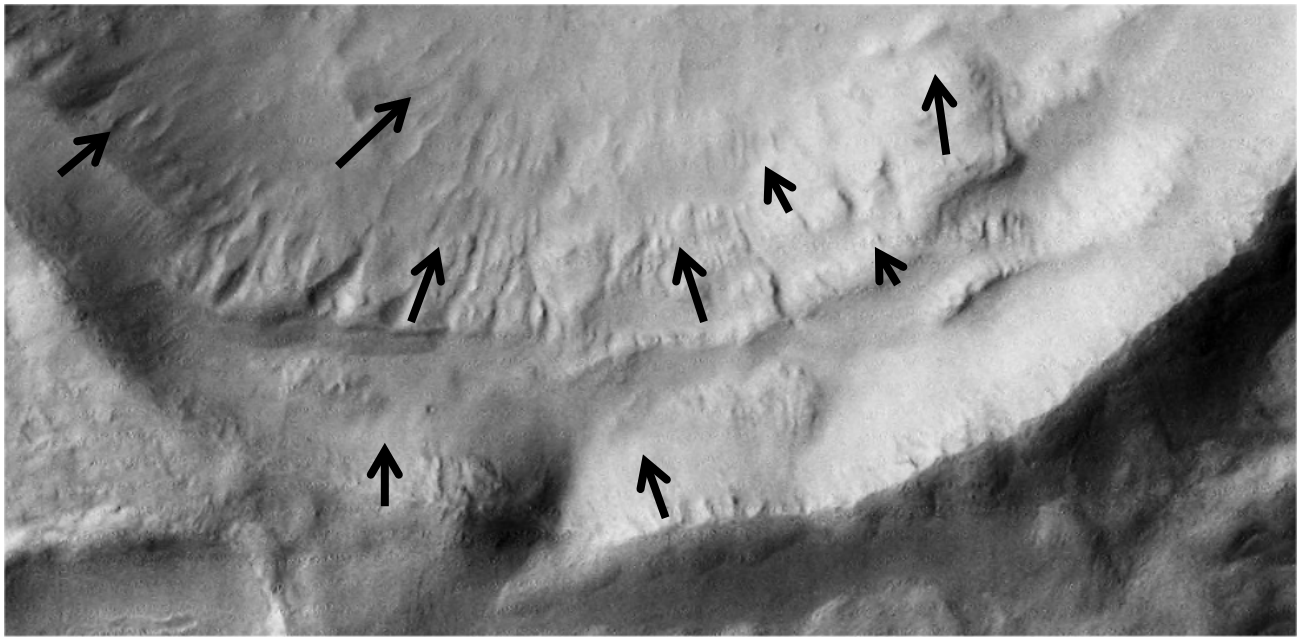

Figure 23. How many layers of exposed gulleys from permafrost melts do you see on the side of this crater wall? (http://themis.asu.edu/search/node/gullies?page=7 Impact Crater with Peak (Released 14 June 2002)) An unnamed crater (Mars Odyssey: THEMIS). The water flows that caused the gulleys are evidently sublimated.

Finally (the images are nearly endless), we show features on the exposed permafrost layers due to a crater, (Figure 23) which shows repeated layers that may be proof for the conjecture of the Mars Desert Hypothesis. Perhaps the ridges shown are PF layers from repeated terraforming events. This will have to wait further exploration of the surface to add credibility to my claims. Regardless, the existence of large scale layering of the crust of Mars cannot be argued.

MARTIAN DRY RIVER BEDS (ARROYOS) SHOW EVIDENCE OF PERIODIC FLOODING

In his paper, *Geological Observations of Martian Arroyos*, Hartmann (1974) states, "major arroyos with tributaries and the network of fine equatorial channels imply a more widespread source of fluid. Some channels probably had *episodic* (my italics) activity. Time intervals between episodes are uncertain, but marginal cratering evidence suggests that the episodes may have been more than 10^7 years apart." He calls these events, *Martian fluvial episodes*. Fluvial episodes could be caused by repeated volcanic eruptions that result in a planet wide or region wide terraforming and flooding rather than other oscillations like high amplitude changes in the

inclination and displacement and the accompanying spreading/melting of polar ice as suggested by others (one mentioned in this article). In passing, we note here that Mars does not have a large moon to gyrostabilize the planet like earth, so that gyrations of the angle of inclination of Mars could well be happening, and should be an object of future creationary research and geophysical computer modeling.

But whatever the cause of these topographic oscillations, the RATE connection must be apparent on Mars if the RATE episodes actually happened and if they occurred on Mars as well as the Earth. I think this is likely since I believe the Creator would have us explore its effects on the simpler geologic strata of Mars, unhindered by plate tectonics. I believe He has done this with a different phenomenon that is very apparent on our present day Moon and the origin of its Mare, unhindered by the effects of water and other sources of erosion as well as the absence of plate tectonics (Samec, 2008). Psalm 33:14, "From the place of His habitation he looketh upon all the inhabitants of the earth." Psalm 66:4, "All the earth shall worship Thee, and shall sing unto Thee; they shall sing *to* Thy name. Selah."

FURTHER WORK

The proposals contained in this paper are broad and very involved and represent a mere *proposal* at this point. They should be followed up, if possible, by computational modeling and a thorough analysis of the topography of Mars. These are all beyond the expertise of the author who is a stellar astronomer. As with most ground breaking ideas, they require much follow up work by experts in the field. This may require the addition of new PhD creation geologists and geophysicists/astrophysicists to our number. Perhaps young people will become interested in giving their lives to service for Christ as creation scientists or rather, scientists with Biblical worldviews with the courage to pursue their beliefs and follow their God into the future. We are praying in that direction and we are offering the opportunity for the actualization of such a reality beginning at Bob Jones University.

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