A Theory of Mars

Introduction

Over the last 10 years or so I have been researching the idea there might be alien artifacts on Mars. Over this time there have been many interesting discoveries by myself and others, and some candidate artifacts have been found to be likely natural. So far proof remains elusive but some evidence has grown stronger.

As more and more of these candidate artifacts have been found, similarities have begun to emerge, pointing at a more plausible theory for their origin. So in this paper I am explaining this theory, with the caveat that nothing is proven at this stage. If more candidate artifacts are found and they also support this theory then this will be additional evidence for artificiality. The reason is formations of randomly appearing similar to artifacts should also randomly seem to fit in with many different contradictory theories.

To explain this theory I will need to start at the beginning of this story, which is likely to be at least several hundred million years and possibly over a billion years ago. So these artifacts, if they exist at all, are likely to be incredibly old and only have survived because erosion on Mars is very small. The main reason for this is the near vacuum on Mars prevents most erosion because most of the atmosphere is frozen at the poles. This subject then is far removed from such things as UFOs or Von Daniken like theories of extra terrestrials visiting us today. By contrast any evidence of visitation from so long ago is likely to be archeological with little more than ruins to be found.

So this kind of research is quite similar to archeology, trying to spot ruins from aerial photographs and if the evidence is plausible enough someone might one day go there and look at the site. So any real proof one way or the other is likely to be decades away.

Early Mars

Mars was not always frozen and airless like it is today[1]. Most scientists would agree at various times Mars had a climate much more hospitable to life, though whether life actually

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[1] http://www.astrobio.net/cgi-bin/h2p.cgi?sid=20&ext=.pdf

When the researchers began studying maps from the new data, they noticed that one region, western Arabia Terra,
is a kilometer lower than the rest of the highlands and borders the lowlands to the north. Before the Mars Global Surveyor mission (the orbiting spacecraft that contains the MOC and MOLA instruments), this region was lumped in with the rest of the highlands. But the new topography reveals that there is more going on here than previously thought.
Looking carefully at western Arabia, they noticed that it differs from the rest of the highlands: It contains very few large craters, few traces of valley networks, and numerous erosional remnants.
"This combination makes it very likely that the entire region was swept away," said Hynek.
But how can you push around all that Martian sand and spill deposits into the northern plains?
"Lots of things can erode planets. Wind is very effective on long timescales; volcanoes, ice and glaciers can all erode features, but on this large of a scale these are unlikely explanations," Hynek says. The massive size of the eroded area and the remnants of valley networks, he concludes, suggest running water was responsible.
greenhouse gases as well as lava and ash. This could have led to the development of an atmosphere on Mars that

evolved there is unknown. It had a strong magnetic field and higher air pressure which in turn allowed thicker clouds to form which would tend to keep out much of the solar wind and radiation which also helps life to survive. Also life might evade some radiation by staying underground for most of the day, being under a layer of snow or ice, and so on.

Once a sufficiently thick atmosphere is in place the tendency is like on Earth for heat to be trapped in it like a greenhouse effect, and so a Snowball Mars scenario might have seen a Mars somewhat like our own Antarctic with very occasional rain, some snow and sleet and an air pressure perhaps 10% of our own. Icy seas might have existed in the Northern Lowlands, with little evidence of wave action on the ancient shores.

Volcanoes on Mars would have also thickened the atmosphere and provided some heat, particularly to hypothetical life closer to them. For example Tharsis Montes, Olympus Mons, Alba Patera, and Elysium Mons.

The axial tilt or obliquity of Mars is also believed to vary widely over time[23]. When the axial tilt is large more of the polar area might point toward the sun in its summer, and so this tends

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persisted for a few hundred million years, long enough to raise surface temperature above freezing and maintain liquid water on the planet´s surface.
"Mars has not always been cold and dry with little happening on the surface. At one time it had a heyday," says Hynek.

[2] http://www.lpi.usra.edu/meetings/sixthmars2003/pdf/3056.pdf

Illustrative Results: Fig. 2 shows the variation of the various CO□ reservoirs in the very early Noachian, when the
starting total is 2.5 bar. The atmosphere is seen to fluctuate between a runaway “greenhouse” phase and an “icehouse”
phase. During the icehouse, the icecap is the largest reservoir, and in a greenhouse phase most CO□ is in the regolith. The
downward tilt in the pressure during greenhouse phases is due primarily to impact erosion, somewhat moderated at early
times by thermal decomposition of carbonates.

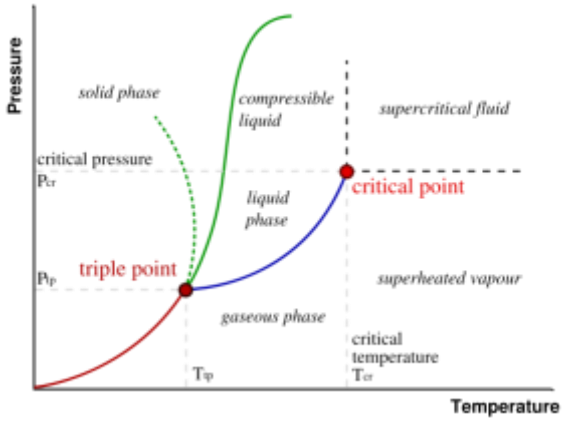
[3] http://www.planetary.brown.edu/pdfs/3250.pdf

Formation of Glaciers on Mars by
Atmospheric Precipitation at
High Obliquity
F. Forget,1* R. M. Haberle,2 F. Montmessin,3 B. Levrard,4 J. W. Head5
Surface conditions on Mars are currently cold and dry, with water ice unstable on the surface except near the poles. However, geologically recent glacierlike landforms have been identified in the tropics and the midlatitudes of Mars. The ice has been proposed to originate from either a subsurface reservoir or the atmosphere. We present high-resolution climate simulations performed with a model designed to simulate the present-day Mars water cycle but assuming a 45- obliquity as experienced by Mars a few million years ago. The model predicts ice accumulation in regions where glacier landforms are observed, on the western flanks of the great volcanoes and in the eastern Hellas region. This agreement points to an atmospheric origin for the ice and reveals how precipitation could have formed glaciers on Mars.

to melt more of the water ice on it, and sublimate CO2 ice into gas[4]. In some scenarios the ice all but disappears on the poles and creates icy oceans while the tilt is still large. As the tilt decreases the CO2 in the atmosphere freezes on the poles as does most of the water ice.

Here however I explore another scenario in which Mars was warmed for a time by volcanoes as described, and how it may have coincided with life there. Probably this life did not evolve there because these times of warming were likely not long enough for evolution to occur. One possibility though is that life was able to survive being frozen for thousands of years and wake up from this frozen state in times of greater axial tilt. For example tardigrades are a creature in Antarctica which does this successfully, and also are able to survive in high radiation. Once life is frozen it probably doesn't make much difference how much lower the temperature goes or how long it is frozen for, but we have no way of knowing for sure either way. It is not known if life[5] could have evolved sufficiently to build artifacts on Mars but it seems extremely unlikely given what we know.

[4] http://en.wikipedia.org/wiki/Triple_point



Water has an unusual and complex phase diagram, although this does not affect general comments about the triple point. At high temperatures, increasing pressure results in first liquid, and then solid, water (above around 10^9 Pa a crystalline form of ice which is denser than water forms). At lower temperatures the liquid state ceases to appear with compression causing the state to pass directly from gas to solid.

At a constant pressure higher than the triple point, heating ice necessarily passes from ice to liquid then to steam. In pressures below the triple point, such as in outer space where the pressure is low, liquid water cannot exist: Ice skips the liquid stage and becomes steam on heating, in a process known as sublimation.

[5] http://en.wikipedia.org/wiki/Extraterrestrial_life

Scientists are directly searching for evidence of unicellular life within the solar system, carrying out studies on the surface of Mars and examining meteors that have fallen to Earth. A mission is also proposed to Europa, one of Jupiter's moons with a possible liquid water layer under its surface, which might contain life.

There is some limited evidence that microbial life might possibly exist or have existed on Mars. An experiment on the Viking Mars lander reported gas emissions from heated Martian soil that some argue are consistent with the presence of microbes. However, the lack of corroborating evidence from other experiments on the Viking

Those wishing to read a more technical explanation of what may have happened on Mars can go to my other site at http://www.harmakhis.org and read the History of Mars paper there.

If evolution did not occur on Mars then the only other likely explanation for artifacts is that aliens visited Mars. This however if it happened at all is likely to have occurred several hundred to over a billion years ago.

The main exception to this idea is that aliens might have seeded our planet with genetic material of their own at some point. If they did then it is likely this happened when Earth had little evolved life of its own. This is important because one of the objections to seeing faces of humanoids on Mars is that aliens would be unlikely to look like us. So if aliens were capable of visiting our solar system so long ago then they would probably be capable of anything we can do today. So if we could conceive of seeding a planet with life forms, which is what terraforming Mars is all about, then hypothetical aliens would likely to have been equally capable of doing the same thing then.

There are three main scenarios:

1. Aliens arrived when Mars was cold and likely useless to them to settle on. They settled partially on Earth, possibly contaminated our indigenous DNA with their own, accidentally or deliberately and left. At this time they had some settlements on Mars which survived because of the low erosion there. Our DNA either wiped out their DNA, their DNA triumphed over our own, or the two merged in a hybrid.
2. Aliens settled to some degree on Mars only, and left Earth alone. In this scenario the resemblance might indicate humanoid faces are not improbable in evolution on other planets. If DNA like our own is likely to evolve then it may well evolve creatures looking like our own, at least with two eyes, a nose and a mouth. Virtually all evolved life on Earth has this from the depths of the oceans to bird life. So in any environment on Earth creatures have evolved faces we might recognize vaguely if we

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indicates that a non-biological reaction is a more likely hypothesis. Recently, Circadian rhythms have been allegedly discovered in Viking data. The interpretation is controversial. Independently in 1996 structures resembling bacteria were reportedly discovered in a meteorite, ALH84001, thought to be formed of rock ejected from Mars. This report is also controversial and scientific debate continues. (See Viking biological experiments.)

In February 2005, NASA scientists reported that they had found strong evidence of present life on Mars.[11] The two scientists, Carol Stoker and Larry Lemke of NASA's Ames Research Center, based their claims on methane signatures found in Mars' atmosphere that resemble the methane production of some forms of primitive life on Earth, as well as their own study of primitive life near the Rio Tinto river in Spain. NASA officials soon denied the scientists' claims, and Stoker herself backed off from her initial assertions.[12]

Though such findings are still very much in debate, support among scientists for the belief in the existence of life on Mars seems to be growing. In an informal survey conducted at the conference in which the European Space Agency presented its findings, 75 percent of the scientists in attendance reported to believe that life once existed on Mars; 25 percent reported a belief that life currently exists there.[13]

saw them on an alien creature. The artifacts on Mars have some faces we see as humanoid but they might equally be similar to many animal faces.

In the second scenario there are two possibilities to be explored here.

A. They happened to arrive when Mars was in a warmer phase which enable them to settle or stay temporarily.
B. They terraformed Mars to some degree by heating it up temporarily, which would thicken the atmosphere, create oceans, and perhaps make it suitable for seeding with life such as plants. It is unlikely such a seeding would have been substantial because that would have converted much of the CO2 in the atmosphere to Oxygen which would not freeze at the poles. So this would mean the atmosphere of Mars would remain thicker for a long time or even permanently, rain would occur regularly from the higher air pressure and more recent water erosion would be commonly observed. Since we see virtually no water erosion on Mars except for a few isolated areas it is unlikely an Oxygen atmosphere existed except for perhaps a short time.

Scenario **A** would be random chance. Scenario **B** should be possible for hypothetical aliens to accomplish since we can at this time conceive of how we might terraform Mars to live there ourselves. So hypothetical alien visitors should have at least as good a technology as we do, if they could do something we cannot – namely travel from another star.

The main theory of the Argyre impact proposed in a History of Mars could fit into either Scenarios 1 or 2. That is, aliens might have initiated this meteor impact or they might have arrived soon after it occurred. Of curse if the theory is wrong then it didn't happen, and Mars might have been warmed in another way.

There is a path of polar wander described in the History of Mars. This is when changing weight distribution on a planet causes the poles to move to a new position. So a new mountain like Tharsis[6] if large enough might force the equator to move to it, thus moving the

[6] http://en.wikipedia.org/wiki/Tharsis

The **Tharsis** region on Mars is an enormous volcanic upland located on Mars' equator, at the western end of Valles Marineris. Its name comes from the bible, where it was the name for the land at western extremity of the known world [1].

It contains the Tharsis Bulge, on which some of the solar system's largest volcanos are located. Olympus Mons formed by a mantle plume over a period of about a hundred million years during the Noachian epoch (between 3.8 and 3.5 billion years ago).

The vast size of the Tharsis Bulge had a great impact on the geology of Mars. Tharsis is surrounded by a ring-shaped topographical depression called the Tharsis trough, and on the opposite side of the planet is a smaller bulge called Arabia Terra which may have formed as a result of the weight of Tharsis. These features were a major influence on the formation of Mars' drainage valleys, most of which formed in the late Noachian.

poles. A large enough hole like Hellas Crater or the Northern Lowlands might conversely move the poles to it. A third way is for ice deposits to be vaporized or moved to a pole and enough of this can change the weight distribution of a planet and cause polar wander.

Assuming in this theory that aliens arrived when Mars was too cold to settle on, the History of Mars theory can be adapted to show would they might have terraformed Mars. Having been able to travel from another star a hypothetical alien race should be able to command substantial amounts of power. The asteroid belt is close to Mars and large asteroids move close to Mars and often impact on it. So these aliens would have needed to be able to alter the trajectory of one of these asteroids sufficiently to create the Argyre impact in the History of Mars.

Basically then, asteroids that passed close to Mars would be surveyed, and at least one selected. Then it would need to have its orbit altered so it would hit Mars like the Argyre impact, at a shallow angle. So the trajectory of the asteroid would be moved, much as we ourselves propose to move asteroids including to prevent one hitting Earth in the future. So again no more technology is required than we ourselves have proposed and planned for. Only a small push on the asteroid would be needed over time since such hypothetical aliens could exert such a push or thrust on the asteroid over even several of its orbits around the sun.

This theory is also useful because it may be a good way for us to terraform Mars ourselves. So if the theory is correct then at some point we may be able to do this ourselves and cause Mars to become suitable for habitation for a long time.

The possible scenario might create the following:

1. The air pressure on Mars from melting the poles might be increased to 10% or more of Earth pressure, even higher in lower areas[7]. This is based on studies of increased

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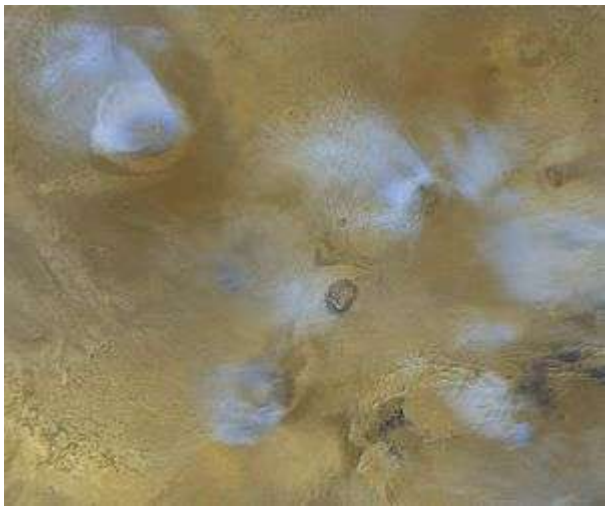

[7] http://en.wikipedia.org/wiki/Colonization_of_Mars

Valles Marineris, the "Grand Canyon" of Mars, is over 3,000 km long and averages 8 km deep. Atmospheric pressure at the bottom would be some 25% higher than the surface average, 0.9 kPa vs 0.7 kPa. The canyon runs

axial tilt sublimating all the CO2 at the poles on Mars[8]. In addition volcanoes formed by this terraforming meteor impact could increase the air pressure even more[9]. This figure is just an approximation but it may be that a high enough air pressure would allow people to breathe either like in high mountain areas like on Earth, or at least with a respirator and no space suit. Initially this air pressure would be mostly CO2 but terraforming would include the use of plants to convert much of this to Oxygen. If this could be done then the atmosphere of Mars could not refreeze at the poles because oxygen has a much lower freezing temperature than CO2. So the window of opportunity would be to convert this CO2 with various plants, lichen, algae, etc. Once

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roughly east-west, so shadows from its walls should not interfere too badly with solar power collection. River channels lead from the canyon, indicating it was once flooded.

[8] http://www.spacedaily.com/news/lunarplanet-2001-01a6.html

Another possibility has to do with the fact -- pretty universally accepted -- that Mars, without a large moon to stabilize it, has its "obliquity" (the tilt of its spin axis) slowly rock back and forth between 0 and 45 degrees over a cycle of about a hundred thousand years -- with less frequent periods during which it may tile all the way over to 60 degrees, leaving the planet "lying on its side" the way Uranus and Pluto do.

Very strange things happen to the weather of such a planet; because one pole or the other is continually exposed to sunlight for months at a time while equatorial regions still go through a day-night cycle, both poles actually get warmer year-round than the equator.

Such a climate cycle could cause water ice near the poles to thaw out and vaporize in Mars' thin air, migrate to somewhat lower latitudes and then refreeze -- after which, as Mars' tilt reduced again and its lower-latitude regions warmed up, the water ice stored there would again thaw out, erupt from the gully sites as liquid and then evaporate into the thin air, and then migrate back to the poles and refreeze.

John F. Mustard pointed out at the Conference that MGS has shown that this same 30 to 60-degree latitude zone on Mars is widely covered by "stippled" terrain covered by pits just a few meters across.

He proposes that the 100,000-year climate cycle alternately causes Mars' windblown dust in such regions to be fused together into a smooth permafrost surface when it lands, and then causes the surface to become rough again during the next stage of the cycle when the ice in the upper 1 to 10 meters of soil warms up and sublimates back into the atmosphere to migrate back to the polar regions -- which, despite their periodic warming, never get warm enough below the soil surface for their ground ice to sublimate, so that they remain smoother-surfaced.

In some areas, the buildup of a thick surface layer of "duracrust" -- soil fused together into a hardpan when water sublimates out of it and leaves behind crusted sulfate salts, which is definitely known to cover a great deal of Mars' surface -- could seal away melting subsurface ground ice from sublimating back into the air, so that a near-surface layer of liquid water would build up and could occasionally break through and gush out onto slopes to form the isolated gully sites.

[9] http://www.astro.virginia.edu/class/oconnell/astr121/test/mars-status-aaas-200.html

The large quantities of carbon dioxide and water vapor that could have been outgassed by Tharsis magma may have also played a significant role in Mars' wet period; Roger J. Phillips calculated in 2001 that it could have formed a 1.5-bar carbon dioxide atmosphere and a global layer of water that averaged 120 meters thick.

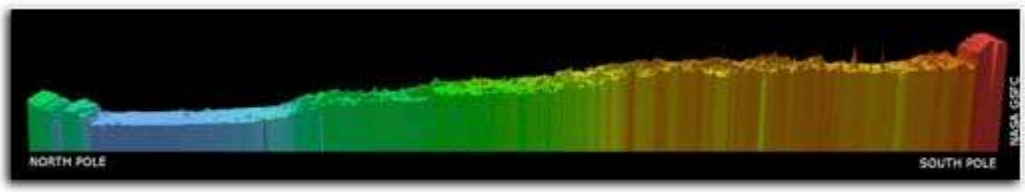
most of the air was converted to Oxygen then the atmosphere of Mars might be 10% of our own air pressure but a higher concentration of oxygen. So since most of our atmosphere is Nitrogen the higher percentage of Oxygen in the Martian atmosphere might make it more easy to thicken later, perhaps one day to breathe it unaided or only wearing a respirator and no space suit. So since Oxygen is only 20% of our own atmosphere if one was breathing in a pure Oxygen Martian air pressure 20% of our own, each breath would contain as much Oxygen as on Earth. One analogy might be like a plane pilot flying at reduced air pressure with a respirator, walking on Mars might one day be similar to this experience.

2. The poles would become much hotter, so any ice redepositing on the poles would be vaporized for a long time, which would convert the ice perhaps to rain, snow, sleet, etc. This might create weather patterns, Hadley Cells, etc on Mars since some parts would be much hotter than others and limited oceans should form. So one analogy might be a hotter landmass and colder ocean, and this on Earth forms clouds and rain.
3. The melting of much of the water ice on the Poles would tend to refill low areas on Mars near them. So the Northern Lowlands[10], comprising much of the Northern Hemisphere might be partially filled with water, some of which might reform as ice, and other areas remaining liquid if Mars is warm enough. So the areas near the hot crater impact would vaporize water forming clouds, rain, etc which would likely

[10] http://www.astro.virginia.edu/class/oconnell/astr121/test/mars-status-aaas-200.html

Analysis of MOLA data has shown conclusively that Mars' northern hemisphere is extremely smooth, one of the smoothest regions seen on any planet. The southern hemisphere, on the other hand, is very rough- indeed; Mars is shaped with a gentle slope such that north is "downhill" from south on Mars. The north pole of Mars is 6 km lower than the south pole. This is of extreme importance when consideration is give to the behavior of liquid water on the surface of Mars.

The global maps made of Martian topography show what would seem to be a large ocean basin in Mars northern hemisphere compete with drainage system running from South to North which could have fed it with water. The images his team generated have different colors assigned to different elevations. Blue is lowest (5 km below the average planetary mean) white is highest (23 km above). While Smith was leery of suggesting that there was indeed an ocean, he did point out that it would have had to have existed long ago. Some channels which seem to have been caused by flowing water lead from the highlands all the way up to the present ice cap and have left channels in the flat northern plains. This could only have happened after the area was free of water.



Just as Martian oceans were described as being quite ancient, the age of the current polar caps was described as being quite the opposite. While the southern ice cap is at a higher elevation than the northern cap, they both show a similar profile and are thought to be composed of water ice covered and/or mixed wit with carbon dioxide ice. When one looks at the way in which Mars poles wander over time and the effect this has on lighting conditions at the poles, it becomes clear that there were periods where the poles would receive sufficient sunlight so as to cause the caps to melt and not reform.

condense in colder areas of Mars as rain or snow. Near the impact crater should be found liquid water and further away depending on the overall amount of heat release and salts [11]dissolved in the water, ice sheets would form. This large amount of water and ice should also create weather on Mars and rainfall in land areas, such as most of the Southern Hemisphere. For example in the Northern Summer there would be more water vaporized on the North Pole and more ice forming on the South pole. In the Southern Summer the extra heat and air pressure should cause ice on the South pole to partially melt rather than convert directly to vapor and so create a sea around the Pole such as in the Prometheus Basin[12].

So potentially Mars might be covered perhaps 20% or more with water and ice, and the higher air pressure should maintain this liquid phase of water. Currently on Mars the low air pressure causes the triple point of water to only be reached rarely so water

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[11] http://www.spacedaily.com/news/mars-water-science-00a.html

The substantial enrichment of the Martian soil with chlorine and sulfur discovered at the Viking 1 and 2 and Mars Pathfinder landing sites [1, 3] makes it more probable that the water-soluble salts (as chlorides and sulfates) may exist on Mars surface [6].

Such salts as NaCl, MgCl2, and CaCl2 are considered as the most probable candidates for salts contained in the Martian regolith [2, 6].

The solutions of the salts have eutectic points (or temperature of total solution freezing) at 252, 238, and 218 K respectively [7, 8].

If the Martian regolith contain multi-component salt solutions, their eutectic point is lower and will attain 210 K [7].

The zone of the temporal existence of the solutions in the surface regolith may be associated directly with the layer of seasonal temperature variation within the ice-containing regolith.

When the temperatures in the layer are higher (seasonally) than the freezing point of the eutectic mixtures (ice + salt), an appearance of the liquid phase in the soil is becoming possible.

The ultimate amount of the liquid phase will depend on the amount of ice and salts in the regolith.

The quasi-periodic axial-obliquity changes (from minimal to maximal over a period of 125 kyr [9, 10]) are one of the chief factors responsible for time-dependent changes of the ground ice stability on the Martian surface as the function of the latitude.

[12] http://en.wikipedia.org/wiki/Promethei_Terra

Promethei Terra is a large Martian region, centered at 57.7S, 100E and covering 3300 km at its broadest extent. It lies to the east of the massive Hellas basin. Like much of the southern part of the planet it is a heavily cratered, highland region planet. Promethei Terra was named for a classic albedo feature of Mars, with the original name derived from that of the Greek god Prometheus.

ice usually goes directly to water vapor without forming water. With higher air pressure though liquid water should last for a long time.

Once this scenario had occurred the race would be on to accumulate enough oxygen on Mars before it cooled down again. It is hard to know how long this warm period would last but if necessary the cause of this could simply be done over and over.

The main way this would have occurred so long ago is described in the History of Mars and the scenario of when it occurred also shows strong evidence this water did accumulate in lower areas and the CO2 from the poles did thicken the atmosphere. So one advantage is this proposal might have happened precisely in the way necessary to terraform Mars. Because this was so successful the possibility exists that hypothetical aliens simply initiated it like we might be able to do.

The basis of this terraforming would be to duplicate something like the Argyre impact on Mars. Normally when a meteor hits Mars the shock wave goes into the ground in the direction the meteor was travelling, and the heat from the impact warms deep down where the energy is wasted for terraforming. Also if the objective is to form volcanoes to heat Mars then the shock wave underground is not useful for this. A shockwave is strongest in front of a moving object. For example if a moving car uses its horn then it sounds louder in front of the car than behind it. This is because the sound waves from the horn are closer together from the motion of the car, which we perceive as a higher frequency. Also this translates into a shockwave as stronger in the energy it carries.

The difference with the Argyre impact is that the angle of impact was likely very shallow, perhaps at an angle of 80 degrees from vertical. While this is not known exactly the angle of impact should be able to be worked out from geological data around the impact site, assuming this theory is correct. So an observer might have seen the Argyre meteor coming from low on the horizon and strike a glancing blow on impact. It might also have broken up into several pieces before impact.

The difference now is that the shock wave cone as before is strongest in front of the meteor and because the angle is so shallow on impact much of the shock wave cone doesn’t go into the ground but part of the shockwave is above ground and part is below ground. Therefore part of the shockwave travels on the surface. The outline of this shock wave might be shown here.

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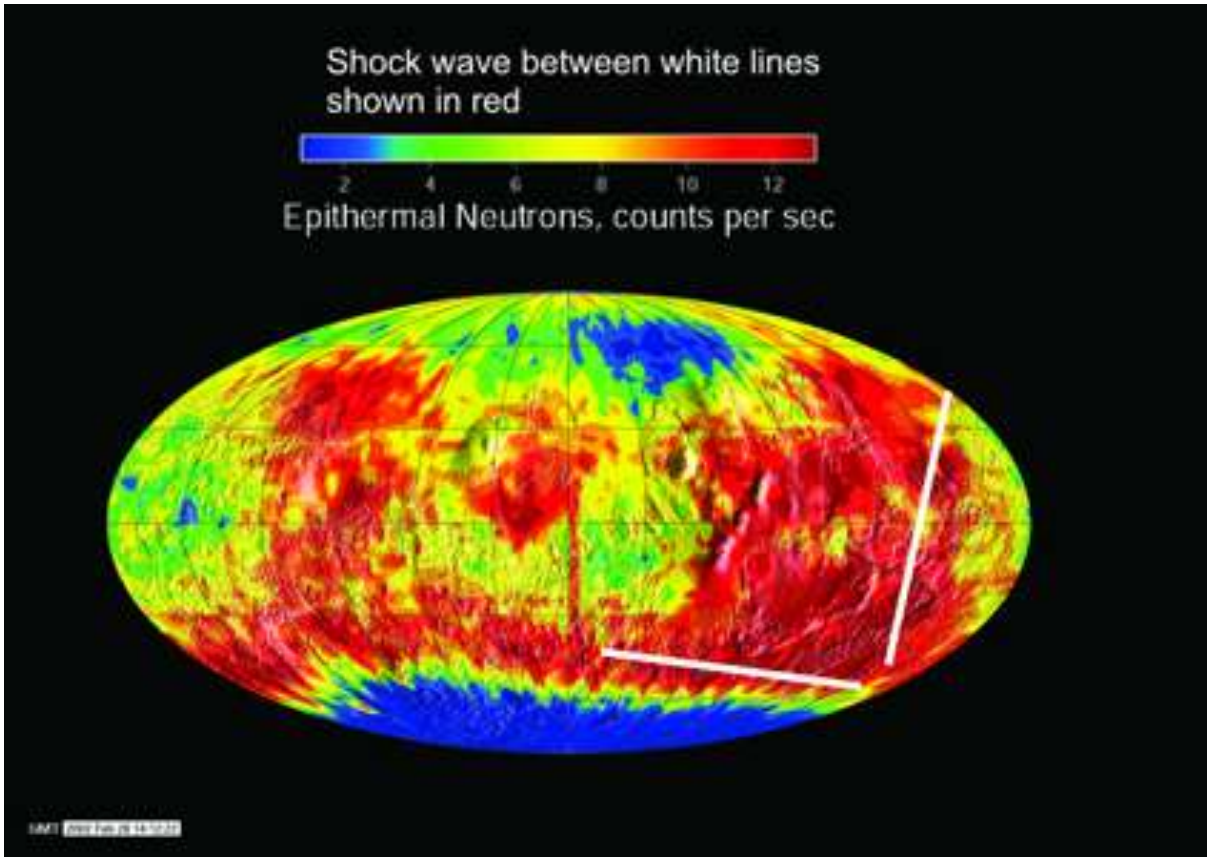
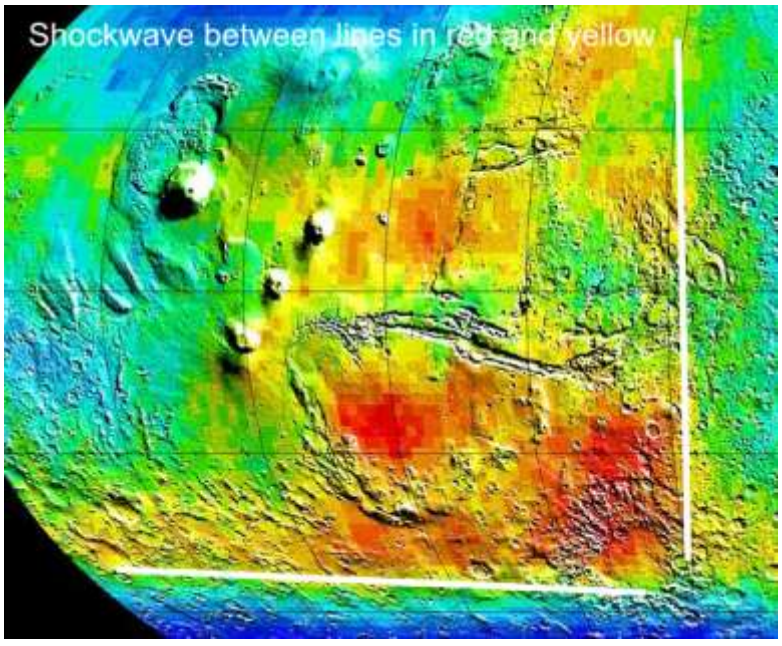


http://mars.jpl.nasa.gov/odyssey/gallery/latestimages/latest2002/march/Fig2_NS_Global.html

the redder area indicates the ground contains less water ice. This radiates out from the Argyre impact crater and the length of this red boundary is more than the whole diameter of Mars. The shallow impact can be seen in Figure 2,

http://www.lanl.gov/orgs/pa/News/cover_epi.jpg

where a reddish drier area again radiates out from Argyre crater.



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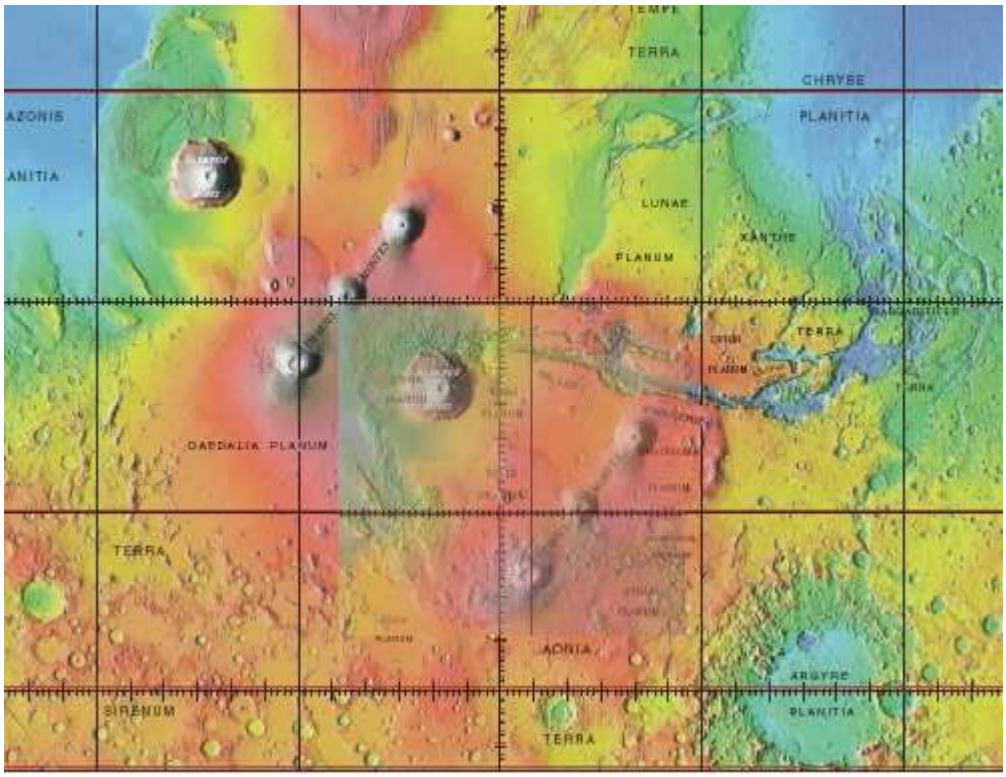


The 3 Tharsis Montes and Olympus Mons are superimposed over the annulus or ring of volcanoes around Solis Planum, showing they are the same size. So the theory is the shock wave from Argyre in the lower right corner came out around these mountains, and perhaps a reflection of the shock wave from underground came out and formed the shape around Solis planum, including Valles Marineris.

In the next image the blue area is again drier, shown as radiating out from Argyre Crater.

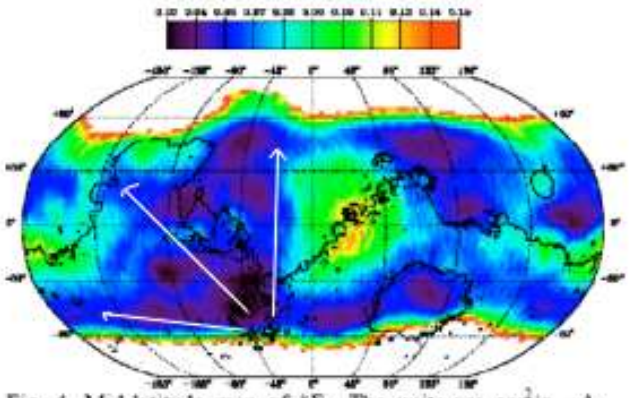


Fig. 4. Mid-latitude map of $\xi\Sigma_t$. The units are cm^2/g. A contour of topography at 0 km elevation is superimposed on the map.

http://www.lpi.usra.edu/meetings/sixthmars2003/pdf/3253.pdf

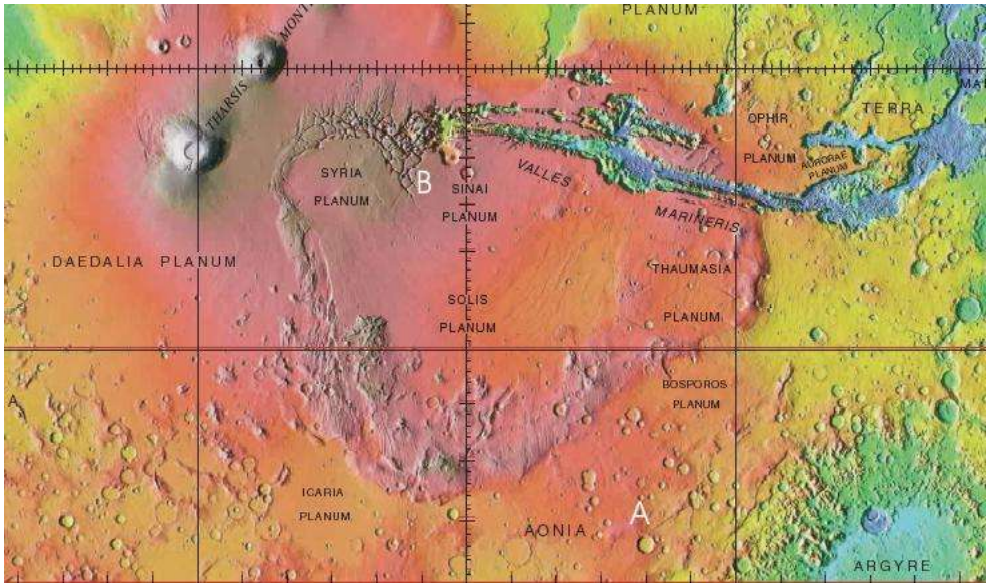
So it is proposed the strongest part of the shock wave from Argyre warmed all the redder ground between it and Olympus Mons enough to drive water out of it, so it was likely hotter than the boiling temperature of water.

For this kind of terraforming of Mars to be done by us the size of the asteroid and its speed would have to be selected carefully. As can be seen here an enormous amount of energy was added to this area of ground, and this would be needed to heat the ground without blowing off large pieces of Mars rubble which might threaten to hit Earth later. So the angle of impact would have to send this debris outwards in the solar system, which may have been how some of the comets were formed in the past. Heating such a large portion of the Martian surface hot enough to drive water out of it can translate to more heat in the atmosphere, which gives a window of opportunity for terraforming.

In the History of Mars there was theorized to be a pole[13] in the Solis Planum area:

[13] http://www.aas.org/publications/baas/v31n4/dps99/40.htm

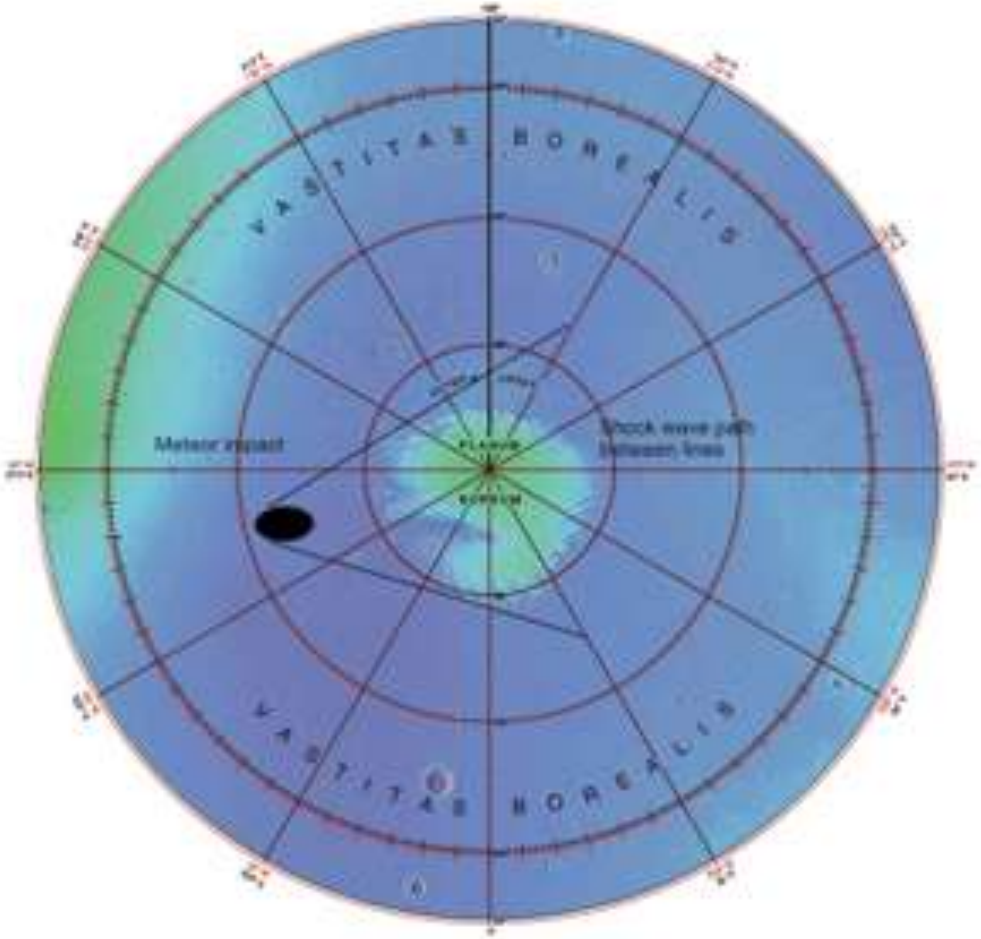
A study of martian impact craters with fluidized ejecta morphologies has revealed that the area south of the Valles Marineris canyon system may contain a large near-surface volatile reservoir. The area is located in the Solis Planum region (20S-30S, 50W-90W). An analysis of craters displaying the single lobe (SL) ejecta morphology found that the onset diameter for these craters is between 3 km and 5 km, compared to the 5 km to 6 km onset diameters found for this morphology throughout most of the martian equatorial region (i.e., within 30 degrees north and south of the equator). This is the largest area of smaller-than-normal onset diameters found in our study of the equatorial region. In addition, analysis of the distribution of multiple lobe (ML) ejecta morphologies also indicates a higher than normal abundance of craters with this morphology in the Solis Planum region. A global study by Barlow and Bradley (Icarus, v. 87, pp. 156-179, 1990) found a strong correlation among latitude, diameter, and ejecta morphology, which is consistent with the proposed distribution of subsurface volatiles based on geothermal and hydrologic models. Acording to the Barlow and Bradley model, SL morphologies result from impact into ice while ML morphologies result from excavation into liquid-rich reservoirs. Our current study suggests that the ice-rich layer producing the SL morphology lies closer to the surface (<300 to 500 m) in the Solis Planum region than elsewhere in the equatorial region (~520-572 m) and that an underlying liquid reservoir, which produces the ML morphologies, has been present since the region formed in the Hesperian.



So this heat from the shock wave was aimed fairly precisely at the future South Pole of Mars. As the History of Mars paper further explains the pole moved to Meridiani Planum, to Hellas Crater and eventually to its current position. This heat from the Argyre impact directed at the pole then would have melted the water and CO2 on it, and as shown in the History of Mars much of this water ran into Chryse Planitia.

So to terraform Mars the idea would be to do something similar, to aim a meteor to impact at a shallow angle near the current North pole on Mars so the impact should likely occur at

around 70-80 degrees North. Ideally it may be better to aim this shock wave at Chasm



Borealis.

In the illustration the dark ellipse would be the crater formed by the impact, and the dark lines show the shock wave aimed at the North Pole. As this is aimed at the large valley Chasma Borealis[14][15]

[14] http://www.lpi.usra.edu/meetings/lpsc2003/pdf/1854.pdf

We note that the build up of CO_2 frost occurs first at the deepest portion of the Vastitas Borealis forma-tion where the atmosphere is thickest. It then pro-ceeds poleward through Chasma Boreale (also corre-sponding to the thickest atmosphere at that latitude) eastward to its head before proceeding northward to the pole. This behavior can be explained by the higher CO_2 frost point temperatures (the temperature at which CO_2 vapor will begin to condense) at the higher pressures that exist within, and just beyond the mouth of Chasma Boreale.

[15] http://www.lpi.usra.edu/meetings/lpsc2006/pdf/1363.pdf

Introduction: Chasma Boreale, a large reentrant in the martian North Pole, is distinct from other polar troughs by its large size and counterclockwise orientation [5]. The ~ 1300 m deep chasma extends for ~ 500 km from its proposed origin at 85□N, 2º E and is on average ~ 60 km wide.

because melting ice would flood back down this Chasma onto the impact site. So this floodwater would hit the impact crater and this heat would convert much of it into water vapor so ideally there would be a flood of water into the Northern Lowlands and the impact crater would continue to boil this water into clouds and rain elsewhere on Mars.

Elysium Mons is one of 3 mountains directly on the opposite side of Mars to the Argyre impact, likely formed by antipodal volcanism. The most likely event is that according to the theory the shock wave from the Argyre impact travelled through the Martian core and created a tear in the ground, releasing magma and forming these Mountains. One reason to believe this is likely is that the drier areas from the shockwave radiating out from Argyre are as long as the diameter of Mars, so such a shock wave should have been able to travel this far.

So in terraforming Mars a volcano might form near the South Pole opposite the Northern impact crater, and this would provide some warming on the South pole, melting water and draining into the surrounding lowlands and perhaps Hellas Crater. This heat would also persist because magma from this volcano would continue to make it grow and add heat to the area. Also a volcano like this should release gases to thicken the atmosphere further.

The shallow impact directed at the Martian poles could also be done by several smaller meteors from different angles. Assuming then that the Argyre impact happened this way, accidentally or by design, Mars would have had a warmer climate for hypothetical aliens to use. It would have been relatively easy for them to direct such a meteor and then wait for the climate to stabilize.

Such a settlement could have been of many different types:

1. It may have been only for a short time, a kind of "flag and footprints" visit such as we did on the Moon. Earth had no sentient life and it may have been too contaminated by our own DNA for them to survive on it. Terraforming Mars then would have been relatively sterile for their own DNA. Then they may have moved on.
2. It may have been a longer term settlement, taking advantage of the warmer climate. In that case the possible artifacts we see may be remnants of a long period of civilization. Any metallic technology would not have survived but occasional large scale monuments would have. Even tens of thousands of years of settlements would be insignificant compared to how long ago this may have occurred.
3. Earth DNA may have been altered or overcome by their own, so they might have eventually moved to Earth and any signs of them have long gone except for their DNA.

There have been many candidate artifacts found on Mars and at this point none of them can be proven to be artificial. However they are similar to each other and appear to have been built in a certain kind of climate:

1. Artifacts are usually near water or ice. They might be on a higher area, a hill, platform of rock, be associated with walls or dykes perhaps to keep water out.

2. They are roughly found in a range of latitudes[16] centered on a previous proposed pole position at Meridiani Planum, where the rovers on Mars are exploring now. So this might for example indicate an area in which polar melt in summer provided some water.
3. They are often found near ravines of craters and hills believed to have been formed by water. So this implies there was a water table at the time, which implies some rain or snow. While most of Mars can be shown to be desiccated over its history such a terraforming might have been only over a short time historically and not show many signs of water erosion.
4. There are also some signs of dunes in the area which imply a higher air pressure.
5. There are possible dams, craters used as dams, and so on which also imply rain or sleet being captured and used by inhabitants.
6. There are possible buildings made by constructing on the side of a hill and then creating a hollow area inside[17]. This might have been made from mud like materials and often there are signs of a funnel or entrance into the structure. Some appear to have eroded away, collapsed exposing the interior. This would be a logical way to build and we ourselves have proposed this such as living in lava tubes, building from rock and soil to shield from radiation and so on. So this implies a medium term settlement with low technology used.

Conclusions

The reader can go through various formations listed on this web site and make up their own mind as to how they fit into this kind of scenario. I hope the reader will see some similarities in these possible artifacts. Since these were found long before this theory was worked out it is unlikely they point to a common origin by coincidence.

There are also some problems with this theory. One is that the Argyre impact would initiated polar wander and eventually the pole stopped in the Meridiani Planum region. It appears artifacts may be in a zone of latitudes around the pole at Meridiani Planum but we don't know how long the pole would take to move to Meridiani from its original position near Solis Planum. If this was a long time, say millions of years then it is unlikely aliens were around for that long without building more signs of civilization. In that case they might have simply arrived at this time by coincidence, or if having come from close by might have detected a hospitable Mars before they left their home world. If such polar wander only took hundreds or perhaps thousands of years then they might have settled on Mars during this time while it was moving.

Another more serious problem is the lack of technology associated with artifacts supposedly built by aliens capable of interstellar travel. However over several hundred million years or

[16] http://www.ultor.org/pole3.htm

[17] http://www.ultor.org/like%20cydonia/dwelling.html

more of high radiation on Mars most metal would not survive, and artifacts of rock might be all that would. So there might have been much larger areas of higher technology that in effect rusted away and cannot be seen from orbit.

Another problem is that while there appear to be artifacts there are no signs of roads or quarries and few if any signs of a city in the grid shape we would expect to find. The ground around these artifacts shows no signs of any road remnants, and moving rocks from a quarry should show signs of this. Also there are some candidates for quarries but few and too small to account for the large amount of material to build these artifacts. It may be they wanted to hide such roads and quarries for aesthetic reasons but the construction doesn't show as much dedication to detail to match this huge cleanup afterwards.

One could hypothesize aliens using advanced technology to build these artifacts, but one would expect them to use this technology to build more modern structures and not bother with the artifacts we see. There are some signs of surveying around these artifacts, like mounds in right angles, but this is also a very low tech way of building. One might hypothesize aliens that slowly ran out of resources and died out.

A more likely explanation is the area was icy and watery and most signs were eroded away by ice moving, floods, rain, etc. Some areas were also resurfaced with volcanism, perhaps destroying signs of a civilization. Those artifacts jutting out of the ice and water in the Northern Hemisphere would be less affected and erosion effectively ceased after the air pressure was reduced as the CO2 froze at the poles.

Candidate artifacts

SP240503

The full image can be seen here. The area appears to have been on the edge of a sea, with signs of waves having broken over the shoreline, or perhaps rain had washed soil into the sea. There seems to have been signs of a bar building up just offshore. Most likely the water was very icy.

M0303960

The image is in an area widely believed to have been covered by shifting plates of ice and perhaps water, creating a spaghetti like appearance. So this feature might have been just above the water or ice. A new image here seems to show walls or dikes perhaps to hold water or ice out.

M2001848

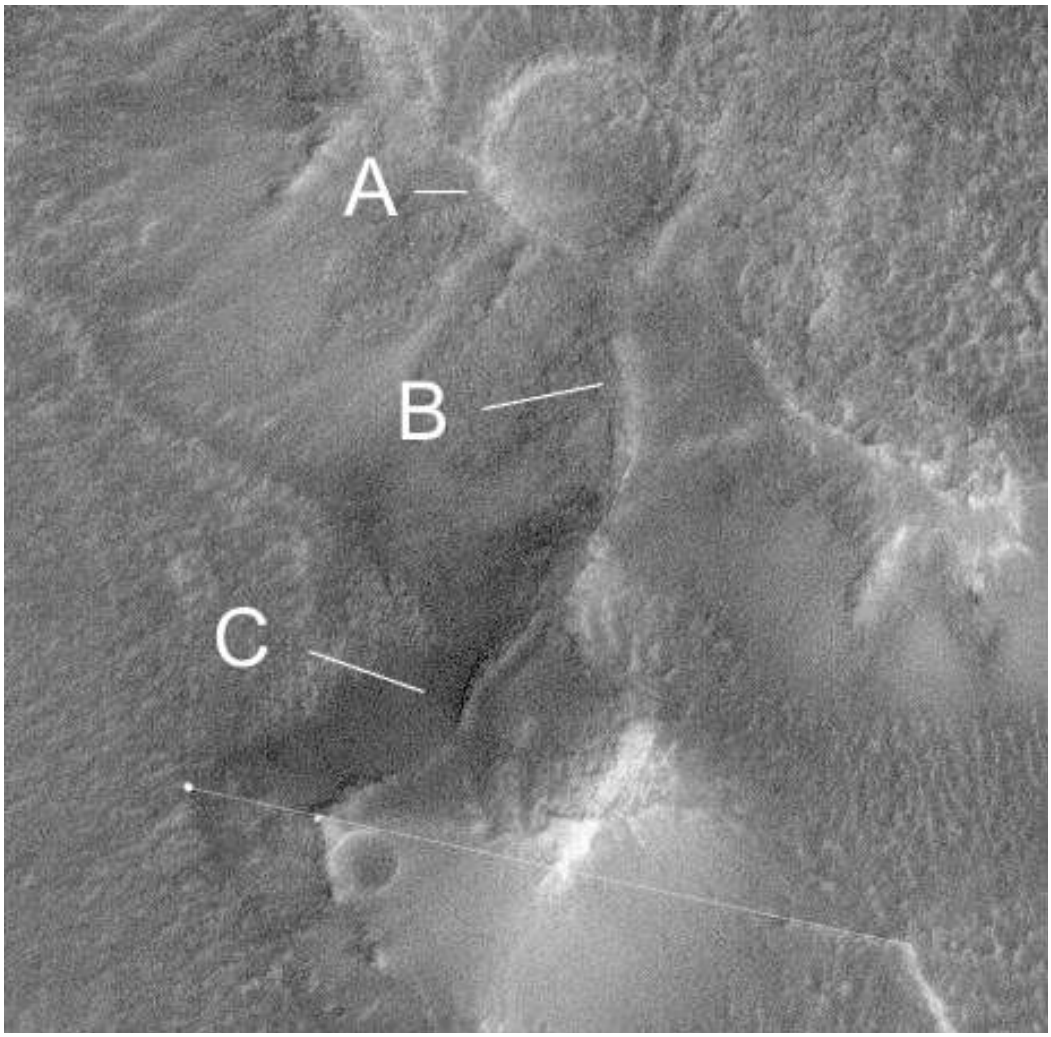
This area is believed to have been an ancient ocean because the plain, Elysium Planitia and particular Amazonis Planitia just to the East is smooth like an ocean floor. The square mesa appears like a pyramid with walls perhaps to rise above water or ice like an artificial island. A second formation of nearly the same size and orientation was found by me here. This feature

appears to have been eroded away by water, which fits in with the idea they were built near water.

M0203051

The Crowned Face and other faces here are on a hill. In the bottom of the valley are dunes which imply perhaps water and a higher air pressure giving wind. Also the valley leads to areas which were perhaps ancient oceans, in this area.

Cydonia



The crater in Cydonia A appears to have been altered as if being directed toward a pipe or aqueduct B moving water, perhaps from rainfall to the pyramid shape C.

D&M Pyramid

This appears to be built on a rock platform as if to be above a water or icy sea. Also there are signs of water having leaked down the side, forming ravines. In fact there are many areas around Cydonia with water ravines indicating it had a water table. Here if any of the D&M pyramid is artificial it is associated with water around that time.

FHA00533

The Spaceman area seems to have been a small inland sea, perhaps receiving water from when the pole was in meridian Planum. Dark soil indicates it may have been transported by water or ice, see the wide angle image here. The spaceman image is heavily scored, probably by moving glacial ice. This dates it (if artificial) as very ancient and situated perhaps intentionally near a sea and later covered in ice.

M0401833

The Crater Face appears like an artificial mound connected to a crater, perhaps to use as a dam for water collection. The area is also considered to have been perhaps an ancient sea.

SP243304

On the edge of a higher area next to an ancient sea. Several craters appear to have been modified to use as dams.

Cydonia Face

This shows a theory on how the Cydonia Face might have been built. The wall like edge on the left appears like a wall, perhaps to keep water or ice out. Elsewhere in Cydonia water signs are seen:

Photo EO202036 (water signs in Cydonia):

Photo EO301281: (water signs in Cydonia):

Photo EO102244: (water signs in Cydonia):

Photo EO301847 (water signs in Cydonia):

Exploded Planet Hypothesis

This theory can also include some explanations of the Exploded Planet Hypothesis or EPH. This theory basically says the asteroids may be at least partially remnants of an exploded plant. Readers can read more at Tom van Flandern's site on this here.

It is common for meteors to hit planets and moons in our solar system. If such an impact happens at a steep angle, then as explained with the Argyre impact the shock wave goes into the planet, imparting less force onto debris and making it less likely this debris will reach escape velocity and become asteroids or comets. If it is a shallow impact then like the Argyre impact the shock wave is more on the surface of the Planet or Moon, also any debris from the impact is more likely to have this shock wave give it escape velocity and so this debris could more likely end up in space as meteors and comets.

This debris can appear like it is from an exploded planet. Because the shock wave pushes the debris in the same direction there is little energy driving the debris apart and so gravity will tend to keep rocks together and larger rocks with gravitationally attract satellites, as is seen with asteroids and comets today. This would be the same as an exploding planet expelling debris[18], in which the main force would be outward not pushing fragments apart from each other. So the Argyre or Hellas impact may have been responsible for debris like an exploded planet, creating asteroids and comets, perhaps some debris hitting Earth[19]. Also in earlier times many ancient impacts[20] are said to have formed the Northern lowlands on Mars, perhaps some of them[21] might have been a shallow impact like Argyre, and so expelled debris appearing to come from an exploding planet.

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[18] http://www.metaresearch.org/solar%20system/eph/eph2000.asp

A major explosion would send a blast wave through the solar system, blackening exposed, airless surfaces in its path. Most such solar system surfaces are indeed blackened, even for icy satellites. But a few cases have such slow rotation that only a little over half of the moon gets blackened. Saturn's moon Iapetus is one such case, because its rotation period is nearly 80 days long. **Error! Reference source not found.** shows a spacecraft image of Iapetus. One side is icy bright; the other is coal black. The difference in albedo is a factor of five. Gray areas are extrapolations of black areas into regions not yet photographed. As such, they represent a prediction of what will be seen when a future spacecraft (Cassini?) completes this photography.

[19] Ibid..

On Earth, geological boundaries are accompanied by mass extinctions at five epochs over the last billion years. Two of the most intense of these, the P/T boundary about 250 Mya, and the K/T boundary (and the extinction of dinosaurs) at 65 Mya, are the most likely to be associated with the damage to Earth's biosphere expected from a major planet explosion.

[20] http://ltpwww.gsfc.nasa.gov/tharsis/smith.mgs.grav.pdf

Gravity over the north polar region (Fig. 4A) reveals several positive anomalies that have no obvious correlation with topography (*16*). A combination of ice and crustal material has been proposed (*17*) to account for anomalies situated
in the immediate vicinity of the north polar layered terrains. …A possible explanation for the high-latitude northern hemisphere gravity anomalies, adjacent to and remote from the residual ice cap, is that they represent moderate-diameter
(100 km) impact basins buried beneath the resurfaced northern hemisphere (*18*).

[21] ftp://ftp.lpi.usra.edu/pub/outgoing/lpsc2006/full102.pdf

Page 6:

EVIDENCE OF BURIED BASINS IN THE NORTHERN LOWLANDS OF MARS FROM THE MARSIS
RADAR SOUNDER.
T. R. Watters1, **C.J. Leuschen**2, **J.J. Plaut**3, **G. Picardi**4, **A. Safaeinili**3, **S.M. Clifford**5, **W.M. Farrell**6, **A.B.**
Ivanov3, **R.J. Phillips**7, **E.R. Stofan**8 and the **MARSIS Science Team**,

Statistically there is little reason why meteor impacts should occur at a steep angle only. Usually meteors are found in the ecliptic but this is only approximate. Especially earlier in the solar system it might have been say 1/9 as likely for a meteor to hit a planet between say 75 to 85 degrees north or south latitude on that planet as another latitude and so debris in the asteroid belt and other areas would accumulate more and more appearing to have come from an explosion. Impacts like this hitting icy areas including possibly the Argyre or Hellas impact on Mars might have formed some comets.

Also such debris might be more common than 1/9 because such an angle of impact is more likely to throw debris off a planet. If a meteor hits a planet at a steep angle then the shock wave and energy goes into the ground. At a shallow angle this shock wave is more directed onto this debris making it more likely to escape the gravitational pull of the planet. If the angle is too shallow the meteor might simply bounce off the planet and there could be little debris.

So if some comets show a point of origin of around 50 million years ago at the orbit of Mars this could be caused by such an impact. One candidate is Hellas but this is thought to be much older. An impact near a pole might have sent mainly icy rocks into space which are returning now as comets. Such an impact might have left little sign on Mars or it might be an impact crater buried under ice today.

Buried Basin in the Lowlands: Radargrams for two adjacent orbits 1892 and 1903 (Fig. 1A, B) over the lowlands of eastern Chryse Planitia show multiple parabolic-shaped echoes interpreted to be off-nadir reflections from subsurface structures because of the long delays (up to 180 μs). If the echoes are from the subsurface directly beneath the spacecraft, the penetration depths would be unrealistically large for the frequencies used (3 MHz band for 1892; 4 MHz band for 1903) [1]. Surface clutter models derived from MOLA for the two orbits show no parabolic-shaped clutter features (Fig. 1C, D). Projecting the 1903 and 1892 radargrams in ground-range, which assumes the buried features are at a shallow depth, the echoes appear as arcs on the surface (Fig. 2A, B). Under the hypothesis that these features are of impact origin, it is possible to infer the probable location and basin size from these arcs. Some arcs from the two orbits are collocated and overlap, suggesting that echoes are from the same subsurface features. We suggest the echoes can be accounted for by either a ~220 km-diameter basin, a ~310 km-diameter basin, or two superimposed basins. Most of the arcs in the two orbits can be encompassed by a ~220 km-diameter basin. A 310 km-diameter basin is suggested by fits to two parallel, overlapping sets of arcs the source of which could be the top and bottom of a rim wall. The remaining echoes in both cases could be accounted for by rim-wall slumps or a discontinuous peak ring structure. Many of the echoes in the two orbits approach the surface suggesting the 220 km-diameter basin is superimposed on the 310-km diameter basin.