# Extended Mars-theory

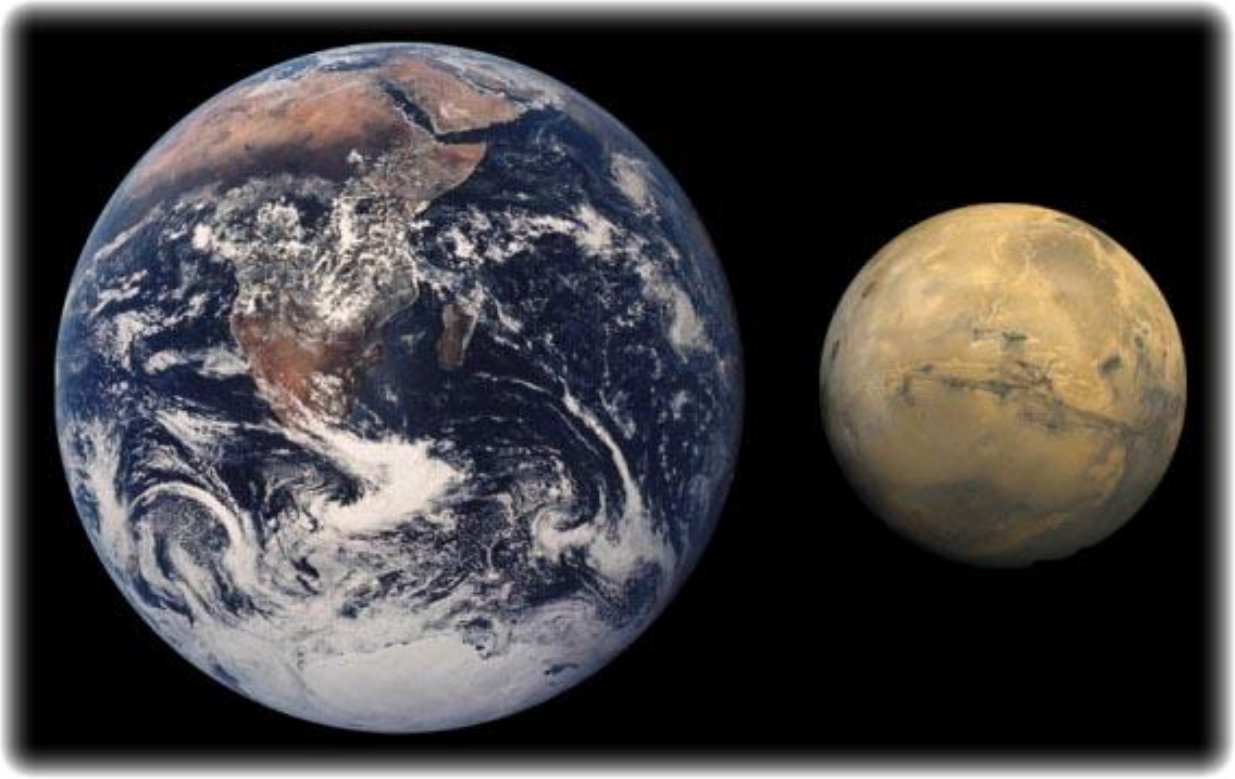
**Gáll Péter, 2014**

**An asteroid-group was closing in to Mars. Each member hit the planet. In order: Hellas, Argyre, Isidis, Chryse. It was so devastating that it changed the whole surface - and created those huge landforms that was yet visible to the Viking probes. These impacts were responsible for the characteristics of the planet and its environment in space, and caused further big changes in Mars' life.**

**1.) Table of contents**

## 2.) Preamble

For simplicity I write my findings as statements many times, but I'm aware of that these are not scientific facts, and if these are worthy, these must be confirmed by researching, computer modelling and simulations. At the same time I'm confident in that this following mind-game could be important to Science. I'm an amateur and always will be in astronomy and geology, so I cannot publish this paper in an official way – so this writing is my publication.



*2.a.) Comparing our brother planet to Earth*

In the following I will go through the Mars' surface forms. I will skip the universal characteristics, the raw data about the planet, because it can be found in nearly every writing, like its place in the Solar System, diameter, weight, air pressure, mean temperature, etc.

My findings are contradict a lot to the official scientific conclusions. But it's important that only to the conclusions, because I used the same base material for my own research. Photographs, maps, measurements, and others, taken by pure instruments, which recordings must be looked at as facts on their own. Notwithstanding today's science my research draws new discoveries because I'm connecting the big surface characteristics all over the planet. Not one by one, as I can see in a lot of theories.

As my theory is so far away from the official ones, the rightful question arises: what kind of evidences can I show that I'm right? I can only say that the evidences show themselves on the maps taken of the planet, forming a uniform logical structure, with clearly observable surface forms. Which logical structure will be unfolded through this paper.

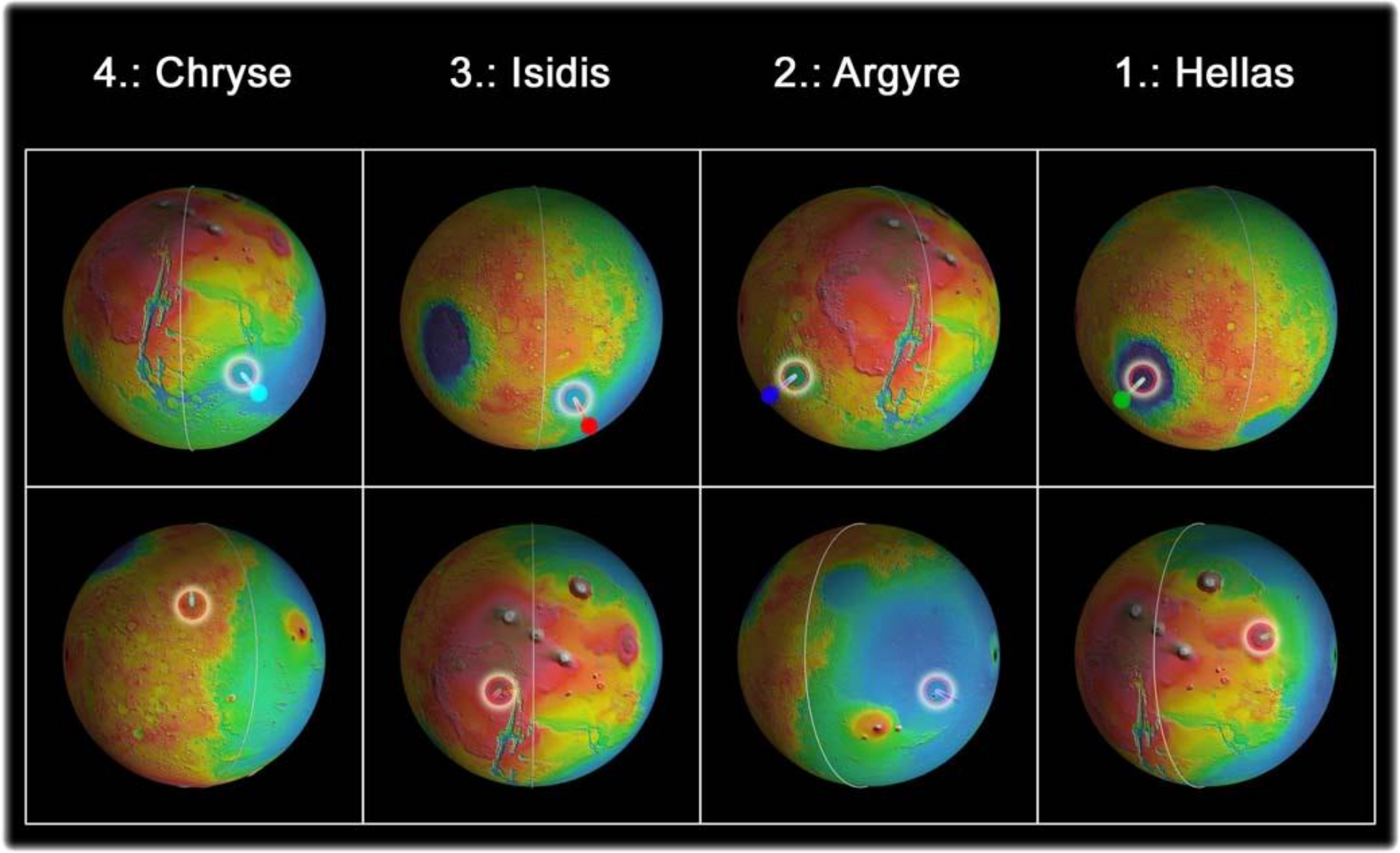
## 3.) Reader's guide

I suggest reading this with persistent internet connection, because I use links in the text showing the surface forms in the Google Maps database with the Mars heightmap, centering the formation. From there the Reader can zoom in-out, look around for better understanding.

If the internet is not persistent, the http://pubs.usgs.gov/imap/i2782/i2782_sh1.pdf map can be used, which contains most of the names mentioned here. These names can be searched in PDF readers, and it can be very helpful in addition to the small pictures inserted in my document. If the link might be dead, do a search for „Topographic map of Mars".

I mention the colored heightmap of **MOLA** (MOLA Shaded Relief - Colorized Elevation), because it served as the greatest help in my research. By the way this database is opened most of the time by clicking the links in this document. As the impacts created craters, elevations, cracks, wrinkles, ridges, certainly these are mostly observable on elevation maps. Again, this whole database most simply can be found at http://www.google.com/mars/, clicking „Elevation" in the upper right corner. In the text field found on the top of the map, the names mentioned here are also searchable, and it jumps to it, or lists the results on the left. Installing Google Earth this database also can be reached, among a lot others. On the icon-list on the top the User can choose if he wants to observe the Earth, Sky, Mars, or Moon. This way the map can be viewed in 3D, even with elevations, which gives the opportunity to get a better picture about the things written here.

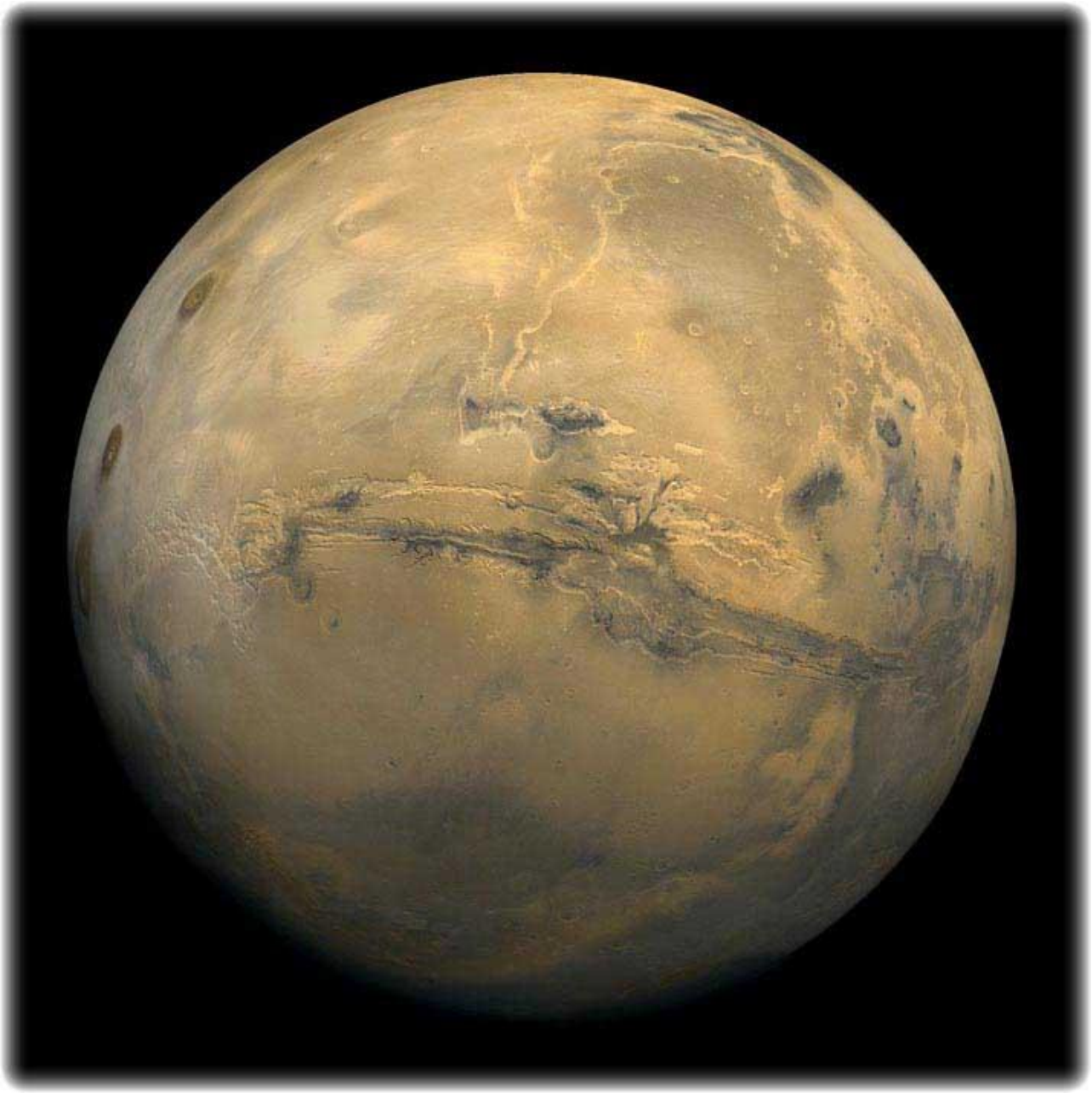

*3.a.) Changing to Mars view in Google Earth*


4.: Chryse
3.: Isidis
2.: Argyre
1.: Hellas

## 4.) Introduction

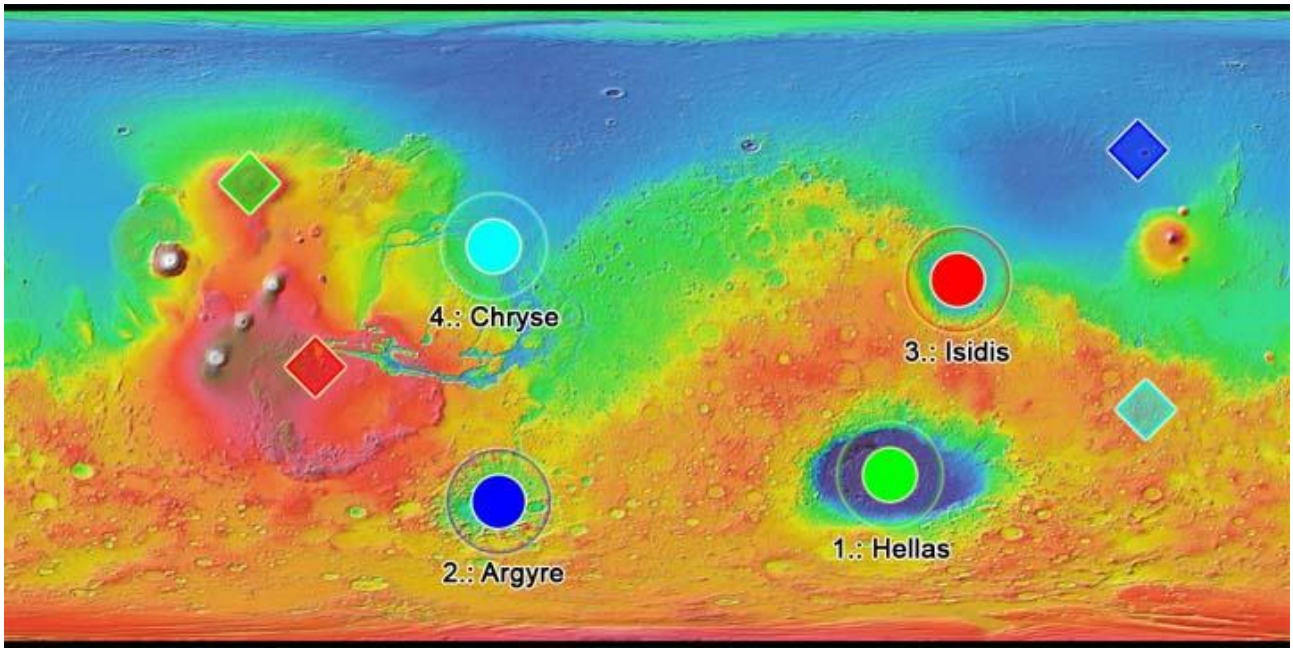
I describe briefly how my theory was born, for better understanding the thinking what drove me through these sightings. And to be able to catch up who is not familiar with the Martian surface.

In 2002 I got a book in my hands in astronomy, and in the Mars' chapter I saw an image which caught my fantasy. This is a common picture anyway, from the images stitched together taken by the Viking 1 and 2 probes. On this image we can see Mars' largest valley-system, the Valles Marineris, and to the West three of the big Martian „volcanoes: Ascreaus Mons, Pavonis Mons and Arsia Mons.



*4.a.) The image that caught my fantasy*
*A spherical mosaic of the pictures taken by the Viking probes*

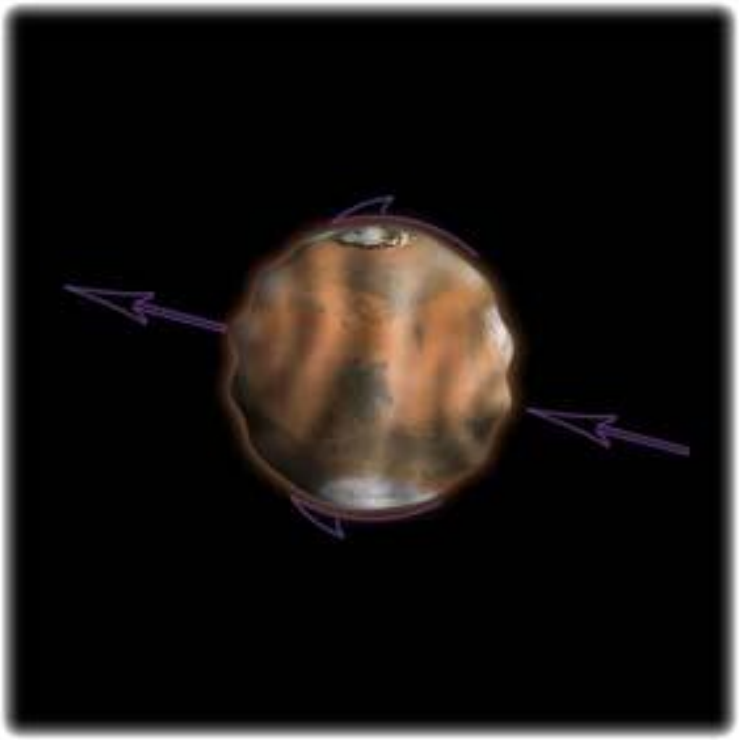
This giant and spectacular valley is 4000 km long, at some places 200 km wide, and its deepest point is 7 km. This was the formation that I started to think about. Driven by curiosity I downloaded a map of the whole planet, and in a 3D software I wrapped it on a sphere. In the beginning I thought an asteroid hit the planet at the point where the valley is the widest, and from there it cracked to the sides. Then I looked behind the planet – on the other side I noticed the planet's largest imact crater, Hellas Basin. If the giant impact cracked the valley on the other side, it should be directly opposite to it – I thought. I took a straight line through the center of the sphere, and it hit exactly the center of – not Mariner Valley, but Alba Mons, exactly at the highest point of that area.




*4.b.) Spheres: big impacts*
*Rectangles: antipodes of the big impacts*

Investigating further I found two more big imact craters, and a fourth one later – as I had no clue of the Martian surface characteristics. From these I also drew lines through the center of the sphere to the opposing side. Only Hellas Basin gave the result what clearly showed the connection between the two sides' formations. Opposing Argyre-, Isidis- and Chryse Basin we cannot find a high mountain.

But first of all how a volcano can form on the opposite side? The shockwaves started in Hellas Basin passed through the planet, and because of the density differences inside they can bend, drift, even focus, and on the surface their densed energy can pierce through the crust, lifting the surroundings. Let's take the case of the surface waves: if I throw a cobble in a lake, rings start running away from the impact, spreading their energy in space getting lower and lower. If they would spread on a sphere, they would lose energy locally only as long as they reach the middle of the sphere. From there they start concentrating until they reach the antipode. There their energy is met in one single point, causing a whip-like action, effecting outwards, so upwards, to be able to lift up a mountain.

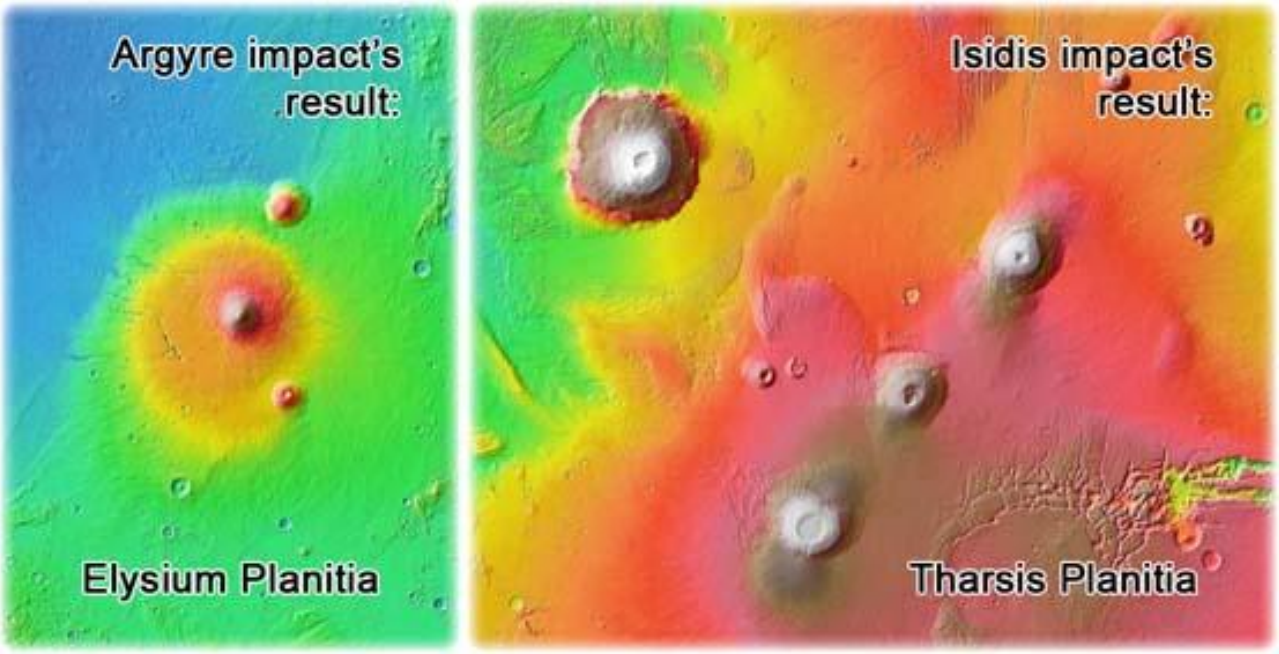


*4.c.) Waves spreading on a sphere, and evolution of their height (local energy)*

Waves inside the planet is more complex. They reflect and bend, diffract, get partially covered because of the differences in density, aggregate, and wave-directing ability of the material layers. This depends on how many and what kind of layers are inside. We even experience these phenomenons on Earth, but on a far smaller scale, not nearly as big as they would be able to lift up volcanoes.

For ease in the future I reference the impacts and their bodies by their land formations. For example in the *Hellas* impact the *Hellas* asteroid arrived in *Hellas* Basin.

I couldn't find such mountains opposing the other two inspected crater, Argyre and Isidis Basin, like Alba Mons. But to South East from the antipode of Argyre Basin we can find Elysium Mons, Hecates Tholus, Albor Tholus. And behind Isidis Basin there is Noctis Labyrinthus. At first I couldn't realize why isn't there mountains exactly opposing every big impact location, but slept on it a few times and got the following:




*4.d.) The first and second impacts effecting their antipode*

I could find one explanation for the regular positioning of volcanoes on the above picture, which is connected to wave behaviors. These elevations could be the meeting positions of the wavefronts. The waves in the irregular-shaped planet's body propagated in a not-perfecty symmetrical way like they would in a sphere, on their way they spreaded more complex. This way a more typical interference picture formed with more superposition points. In these points where were the biggest focus of energy of the waves interfering, these volcanoes were formed on the crust. Besides, the chaos-terrains, giant cracks, and landslide-areas also formed. These landslide-areas today are known as lava-flow terrains and tropical mountain glaciers.

So the regularly positioned Elysium-volcanoes are the interference picture of Argyre impact. Their position is shifted from the antipode because there was another impact before misshaping the planet, breaking its spherical symmetry. This was the Hellas impact. And this deforming was also the reason for the interference pattern. This concept also can be used for the Isidis Basin: opposing that there is also a terrain with a regular pattern of volcanoes, and smaller hills. This interference picture on the Tharsis Bulge is more complex, which tells about a more deformed planet.

From these we can conclude the following: because the Mars is in similar distance from the Sun where the Earth is, we can suppose similar inner structure, as a thin, solid shell floating on melted, hot rock – crust, mantle, outer core, and dense, solid inner core. We can conclude for this structure from the injuries of the crust. The marks would probably be different in the case of a planet with a totally rigid body, or with a much thicker solid crust in relation with focusing, interfering waves of impacting bodies. We can also observe the stretching of the crust, which excludes the thick upmost crust. By the way on Mercury there is also a similar formation-pair noted by astronomers – an impact crater, and cracked land on the antipode.

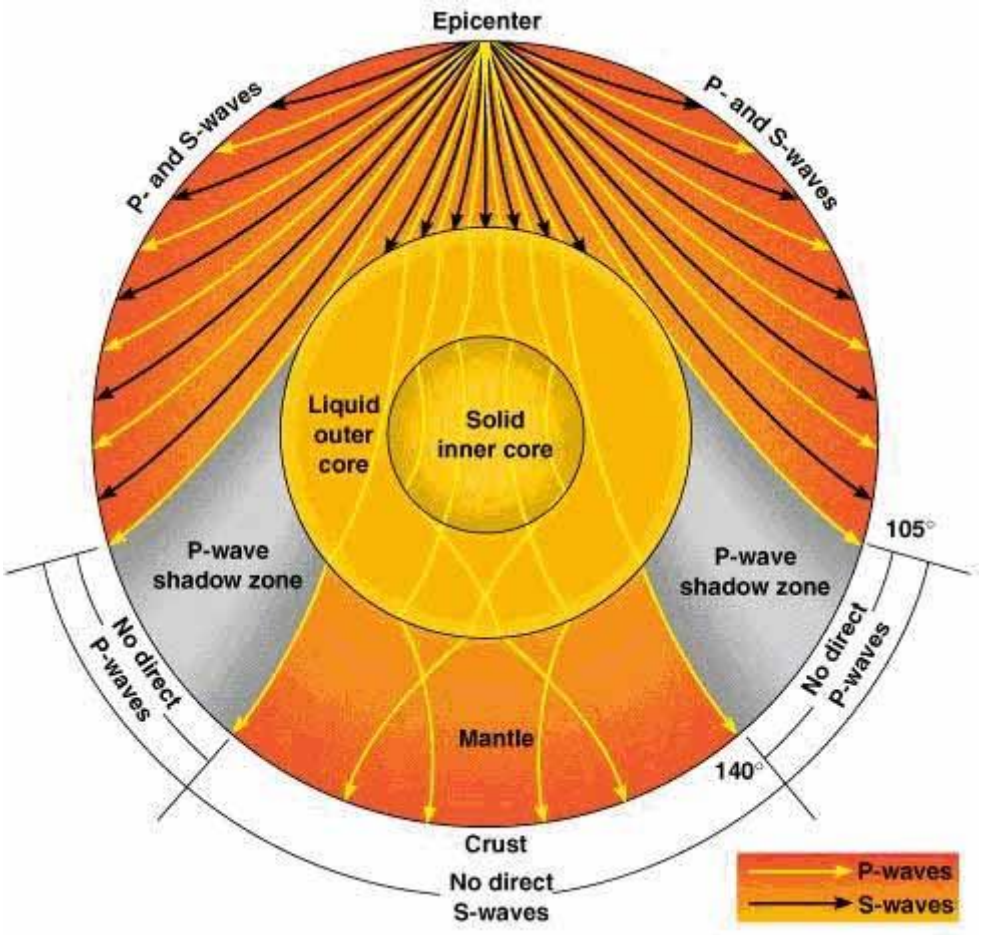
*4.e.) Caloris Basin (on the left) on Mercury, and*
*Chaotic Terrain, Weird Terrain (on the right) on the antipode*

If we consider Mars as a planet with an Earth-like inner structure and an impact happens with a magnitude of Hellas, the nearly perfect spherical shape of the planet is greatly deformed. Later this deformation disappears because of the melted inside material, and regains its overall shape as it is today. So if another impact happens in a much later time, an interference pattern couldn't appear as it would also find a spherical body. So we can tell that these impacts happened close in time. They order can be told by the complexity of the interference pattern. And the order is: Hellas, Argyre, Isidis, and later we will conclude to the fourth one, for which there are indirect evidences mostly: Chryse. We will see, that this last one does exist, came in with this group, and it was the fourth one. If these impacts followed each other close in time then we can assume an asteroid group, what could be basically one whole body, what was likely parted up by the Mars' gravity. More on this later.

I shortly mention here for conspiracy theory fans that these are not an atomic war's craters from the past. The hardest evidence for this is the Hellas Basin, from which we can clearly see that a big body with great energy hit the planet in a low angle. In this case we can tell that this was a natural event, and as the impacts followed each other close, we can say each of them were natural impacts.

Also later on we will clearly see that the „Hollow Earth" theory also crashes in the case of Earth-like planets because with a hollow inner structure we wouldn't see these kind of signs on the crust.

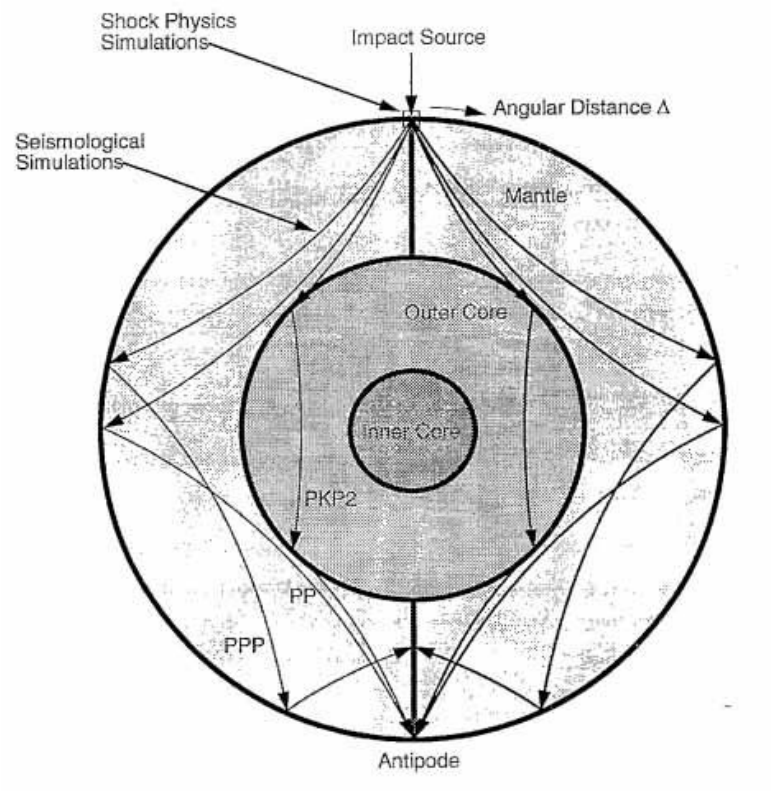
So far I sketched up the way of thinking I followed, and with what I took the upcoming establishments as well. I didn't familiarized with official scientific explanations of these landforms so I didn't hold on to them. I read on the fields what I felt like I need, as articles on Mars, Martian maps, and geology, seismology mainly, and what I already knew about the behaviors of materials and physics, on these strings I let the kite of my imagination to rise high. I stared many hours at my main database, the map constructed from the measurements of Mars Orbiter Laser Altimeter (MOLA) with colors by height and shadows, the map to be more apparent. I also took most of the pictures from this database, and drew on it the things I wanted to highlight.



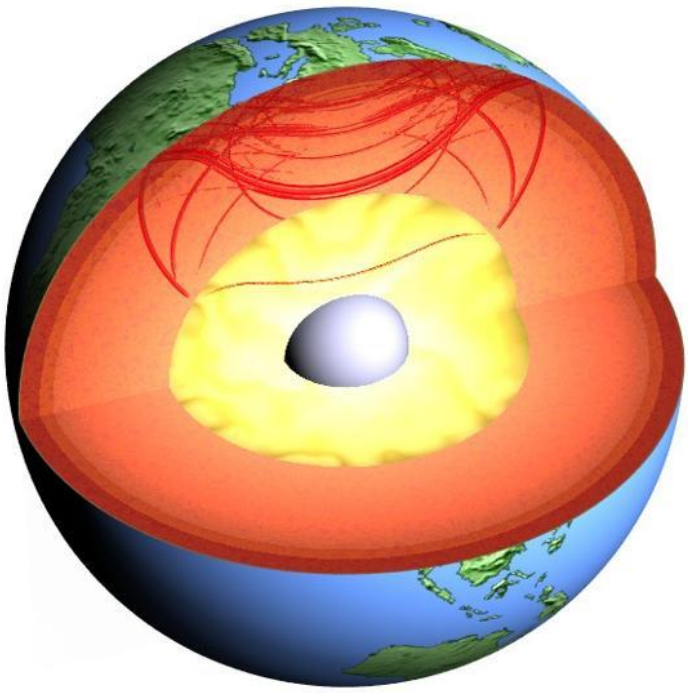

*4.f.)*

Here we are facing with a new phenomenon – to be more precise with a known phenomenon but in a cosmical order of magnitude, great shockwaves propagating in an Earth-like planet. With these we meet mainly in the shape of surface deformations in this paper. On the Martian landscapes and formations we can clearly see that they have been caused by violent seismic activity. And what else could be the origin of this than giant impacts, what created the mentioned four basins – especially with no tectonic movements in Mars' case, as far as we know it.

From seismology we are aware of that seismic waves inside Earth propagate in a complex way – in the form of transverse and longitudinal waves basically, on surface and inside the planet. Transverse waves, like on a rope for example don't travel in liquids, neither in melted material. The inner density differences drift the waves, on the border of different mediums their direction is broken, or reflected, shaded, so things are pretty complex. In the following few chapters we will see how separated waves create different kinds of patterns with different behaviors and energy-focusing, as they draw on the crust. I will list the wave types and their features.

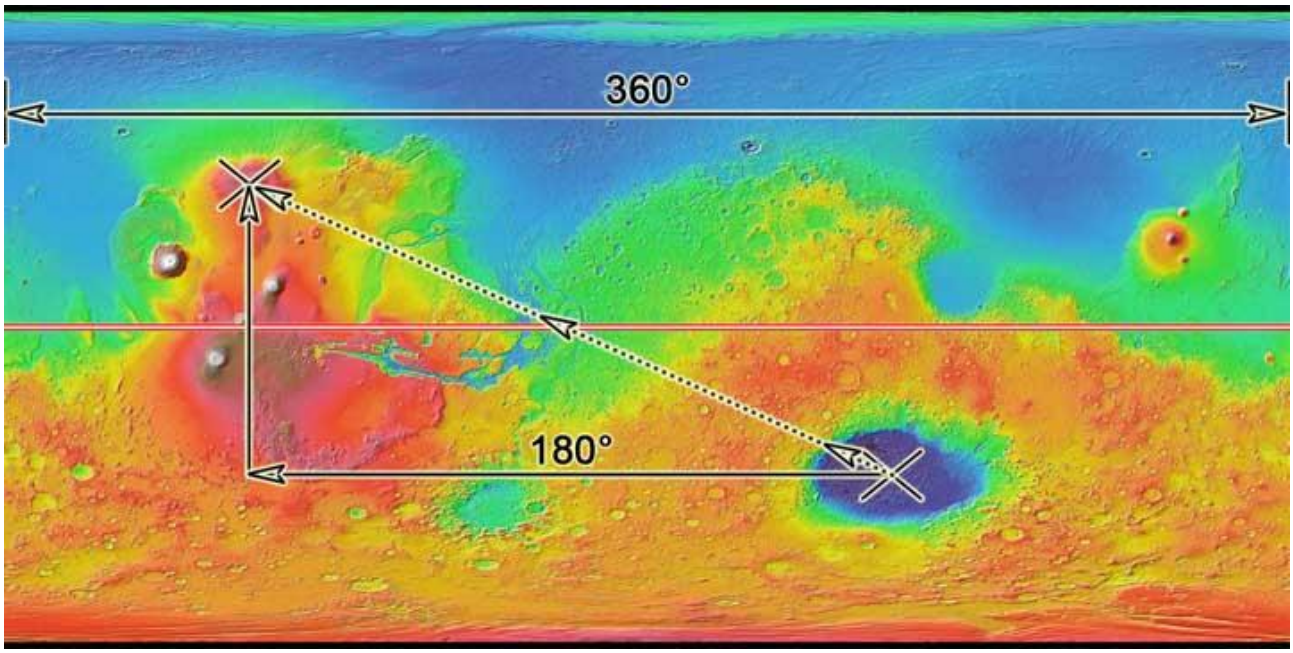



*4.g.) How shockwaves can focus to the antipode in an Earth-like planet*



*4.h.) In a planet with complex inner structure the wave propagation is also complex*

Before we continue let's see how the antipode can be found easily on a full spherical map unfolded to a rectangle.

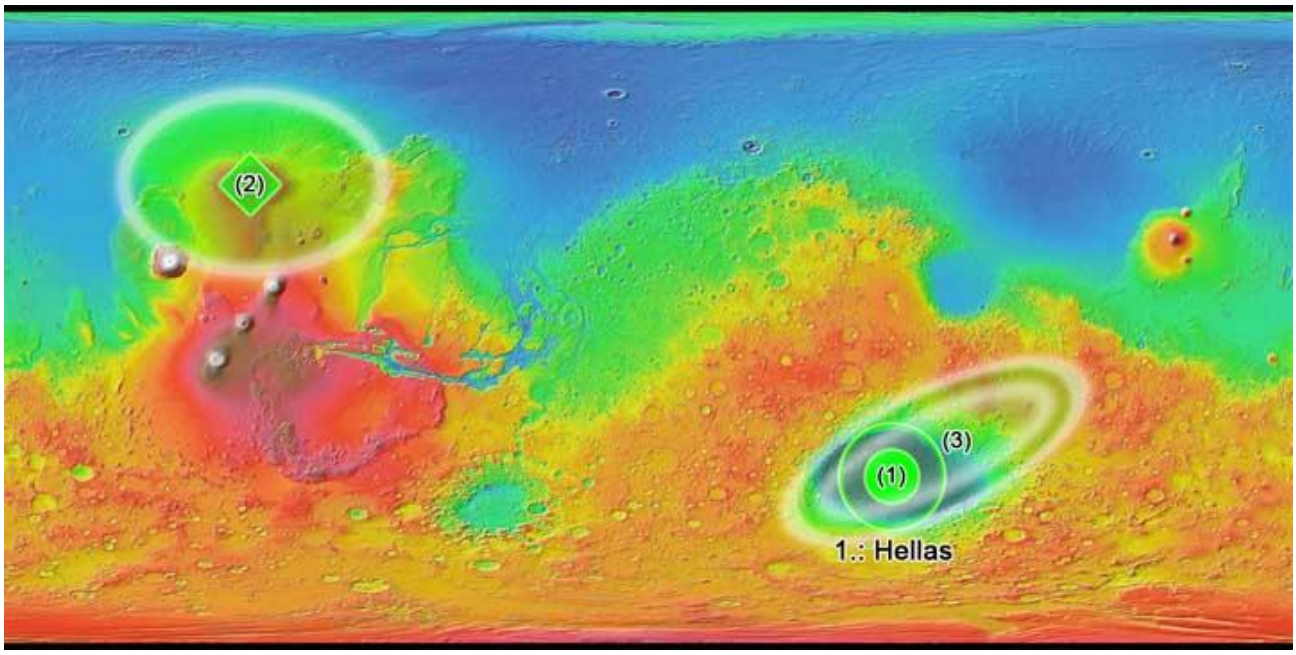



*4.i.) This is a spherically-continual map, so if we run out on the right side, we come in on the left at the same height. If we exit on the top, we enter on the bottom. The upper and lower border means one single point, the north and south pole. If we go from the left border to the right, we made it around the planet, so it means 360°. From the north to the south pole the trip is 180°.*
*If we want to reach the antipode of one point, we must go 180° parallel with the equator, so half of the map's width, then we must mirror our location to the equator.*

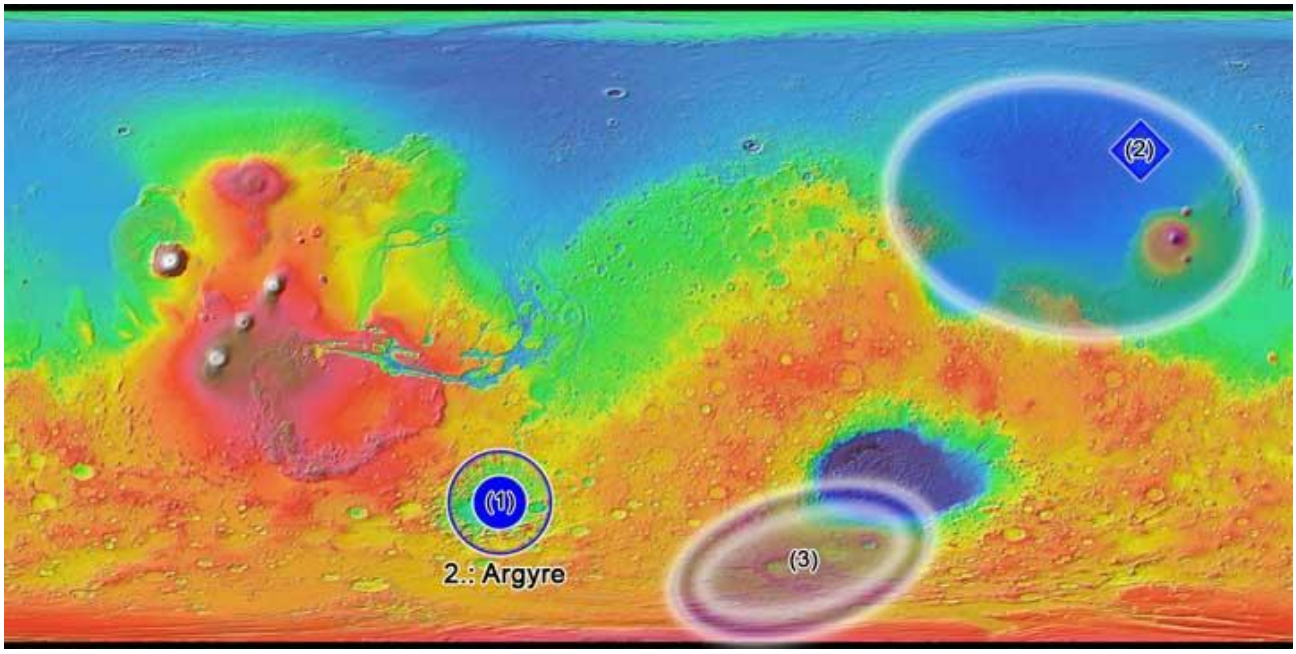
First let's look at one by one all the positionings of the impacts and their effected regions on the opposing side, and their reflections!

On the following group of pictures the double-spheres mark the impact locations, the tilted rectangles mark their antipodes – in the case of a perfectly spherical projection. The antipodal effect regions are drew with white bordered ellipses, their reflections on the impact side are drew with double bordered ellipses.

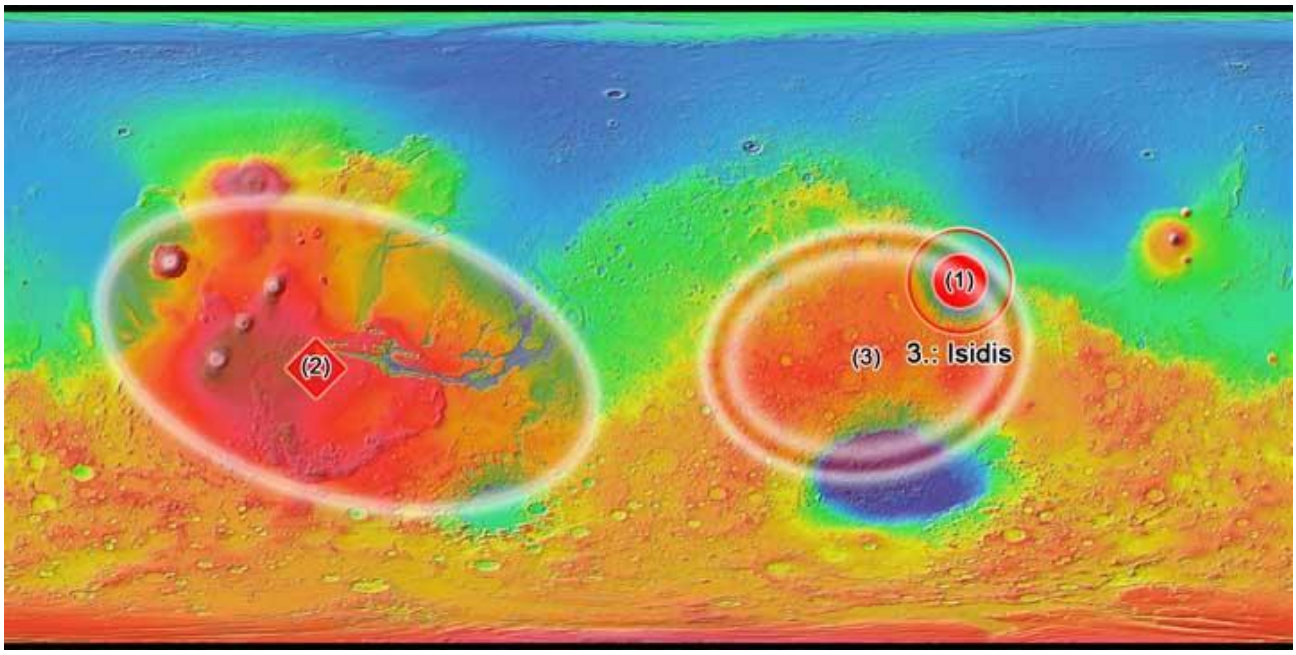
These pictures should be looked at in the following way: we should imagine the impact at the marked place, then our eyes should be carried to the antipode and the direct waves' effect zone. Then back to the reflected waves' effect zone. Meanwhile analyzing the features. This way by following the play of waves we can better imagine the happenings.



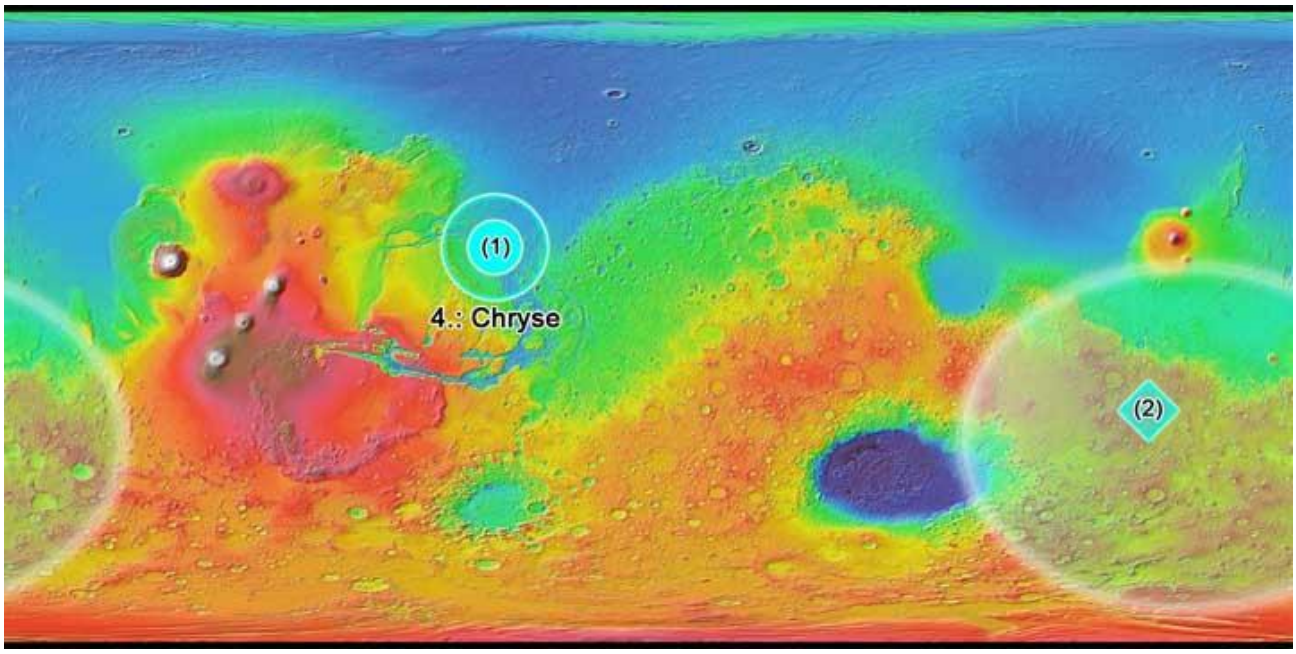

*4.j.)*




*4.k.)*




*4.l.)*



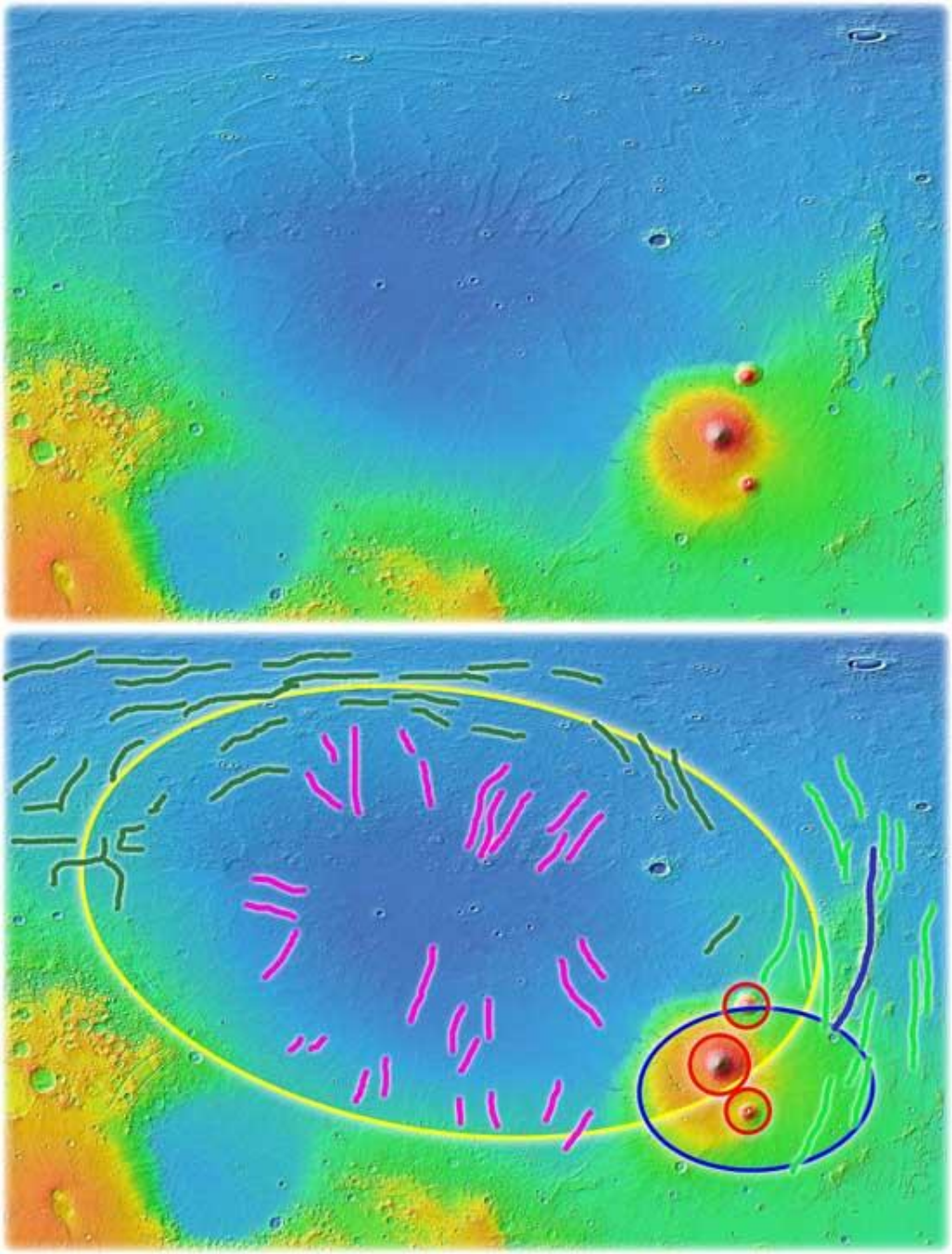

*4.m.) The reflected waves' zone isn't marked here (point (3.)) because I couldn't make out their direct signs on the crust.*

## 5.) Shockwaves' effects on antipodes

In the case of the first (Hellas) impact because of the almost-symmetrical shpere shape of the planet the wave types didn't separate well. So I will start with analyzing the second (Argyre) impact. The third (Isidis) was even more complex because by then the planet was greatly deformed.

In analyzing the Martian surface my guiding principle is that every formation of this scale could be in connection with the impacts, because if they can create an Alba Patera or Tharsis Bulge then they could also create the smaller features. What's more as we will see later these impacts' enormous energy, we should also keep ourselves to this guiding principle in other aspects as well, like planet magnetism, atmospheric components, asteroids and comets in the Solar System, and even in the case of Martian meteorites found on Earth.

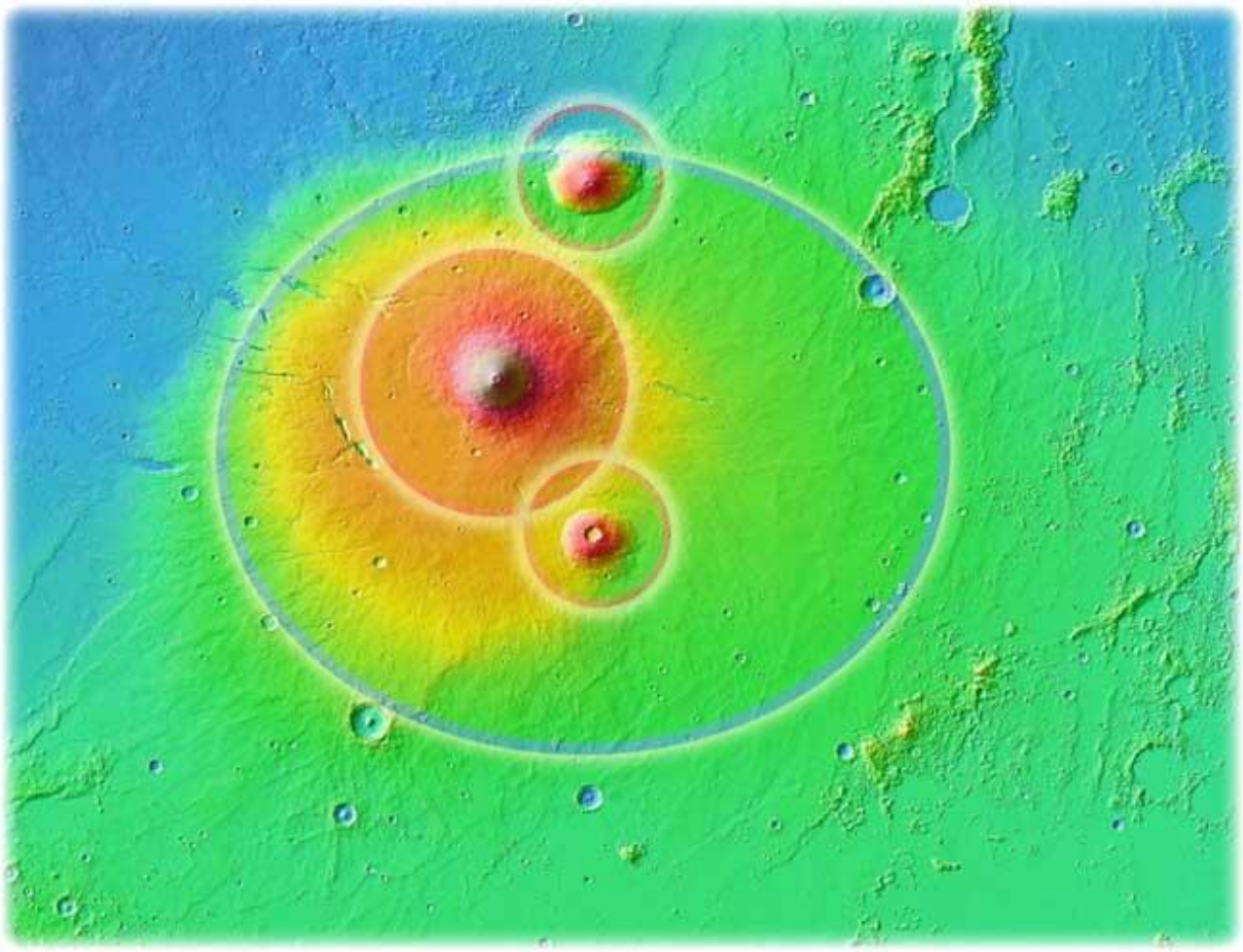
### *5.1.) Argyre impact*



*5.a.) The opposing side of the planet to the Argyre impact.*

***1.)*** *Red spheres: first tpye of surface shaping waves*
***2.)*** *Big yellow ellipse: second,*
***3.)*** *Blue ellipse: third type of surface shaping waves (central, non-interferring inner shockwaves)*
***4.)*** *Dark blue line: fourth type of waves (surface waves)*
***5.)*** *Pink, dark and light green lines: fifth type waves (surface waves)*

*(On other pictures these colors can differ by wavetypes for better visibility)*

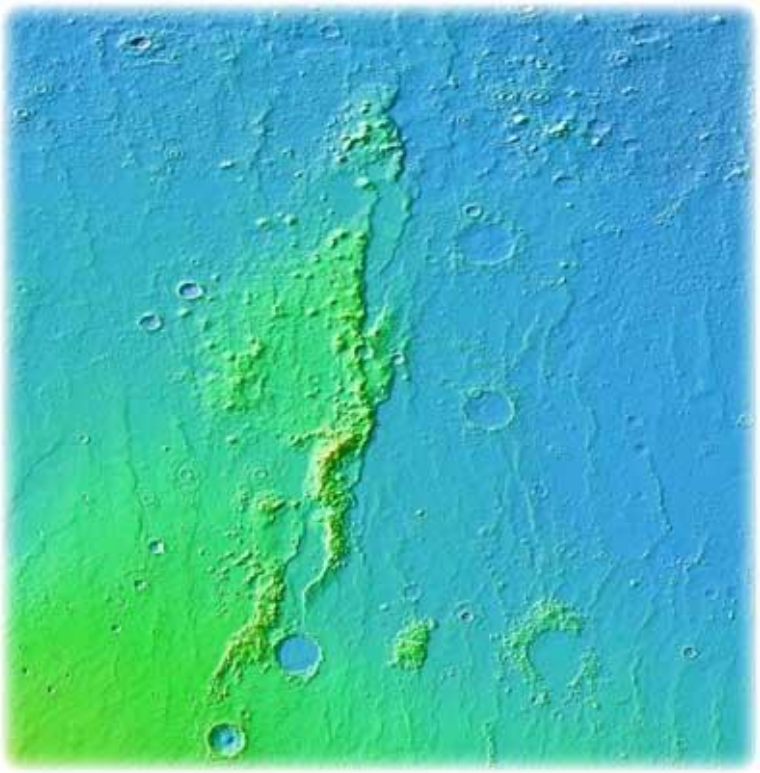


*5.b.) The „volcanoes" of Elysium*
*From North to South: Hecates Tholus, Elysium Mons, Albor Tholus*

**1.)** The most spectacular feature of the Argyre impact are the Elysium volcanoes (red circles). These were lifted up by shockwaves coming from inside the planet, and not by surface waves. I call these **first type** of surface shaping waves. The regularity in the positions of these features is because of the misshaped planet, as the waves travelled in it interferring in a complex way.

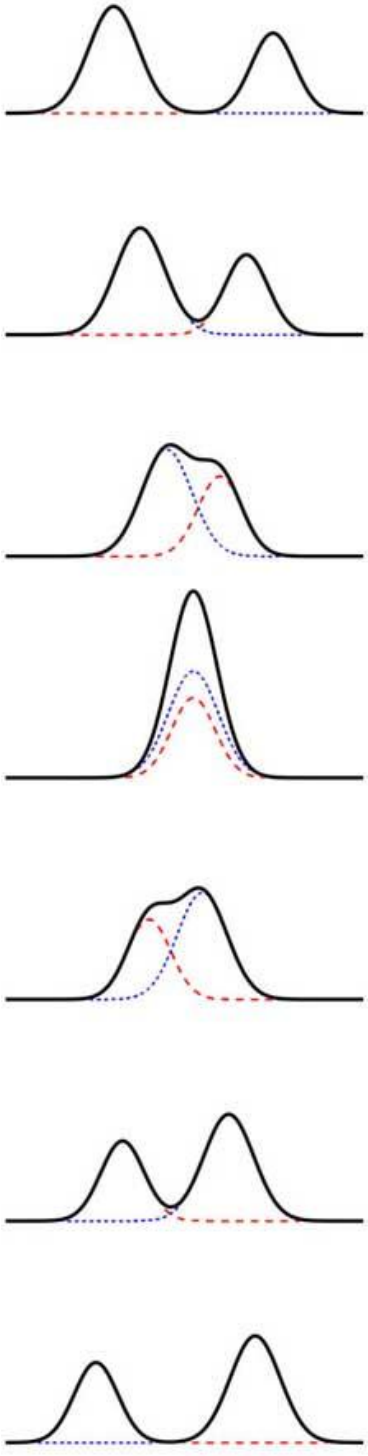
**2.)** Another kind of effect what is known nowdays as a big and ancient impact basin, a ring-shaped smooth elevation, what is fairly hidden among the Argyre features (figure [5.a.], big yellow ellipse) what can be found on Utopia Planitia. I only could realize this as the analogue of one of the Isidis features, because it blends so much into the surface (figure [5.n.], yellow closed line). I imagine the creation of this feature like in the center of the planet the shockwaves causing this formation must have been shadowed out in the middle, plus the outer layers focused the remained energy to a closed loop, thus a dense ring-shaped wave could reach the surface. This is the **second type** of surface shaping effect.

**3.)** We can distinguish another force, the **third type** of shockwaves what lifted a separate, smooth hill under the first type features. This is marked with a blue ellipse on figure [5.a.] and [5.b.]. At the Isidis features they also appear at the mean of the first type points (figure [5.n.], blue ellipses).



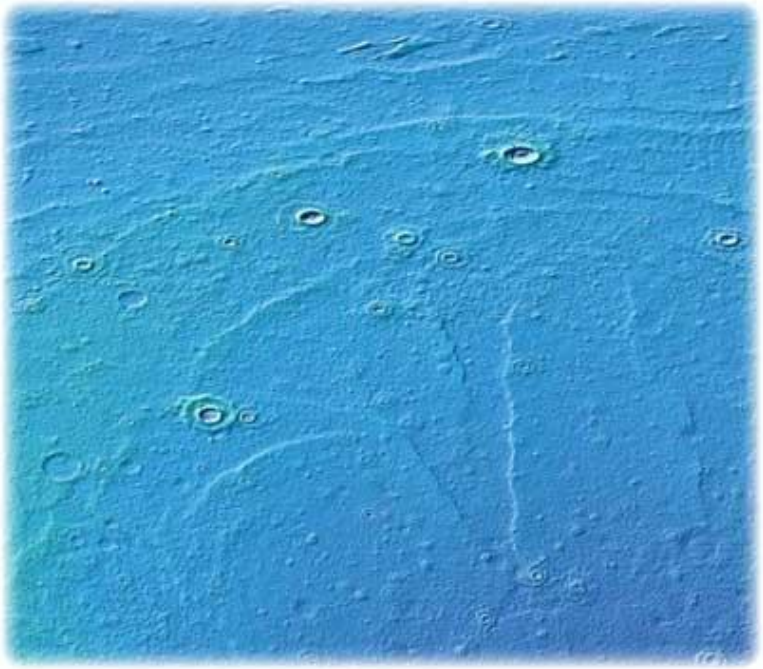
*5.c.) Fourth type of surface shaping waves met in a line of North-South orientation*

**4.)** We can suppose waves on the surface separately propagating on the planet's solid outer layers. These also meet on the opposing side, their energy is added up and this effect is preserved. These are the **fourth type** of waves, surface waves. I suppose meeting waves like these must be created the Phlegra Montes. The forces in superposition were great enough for the elasticity limit of the surface to be overcame, causing permanent deformation.



*5.d.) On this series of pictures meeting two surface waves is demonstrated. Their superposition state is on the middle picture. As they reach each other the local forces expand rapidly and they can exceed the elasticity limit of the local crust. This limit is from the layer's thickness and composition. This results different features on drylands and ocean beds. We can imagine similarly the waves spreading in space, not on surface. The difference is that the above pictures show transverse waves, and inside the melted layers longitudinal waves are more common. We will see that in the case of Olympus Mons two type of limit-breaking happened – first: in the forming of the volcano, and second: in the shearing of the crust around the mountain (figure [5.i.] piece 1.).*

The waves haven't met in one single point but in a line, because the Hellas impact deformed the planet before so the rings of the surface shockwaves are flattened to ellipses, and could collapse in a single meeting line. To the West and East from Phlegra Montes we can also discover smaller wrinkles parallel to it.



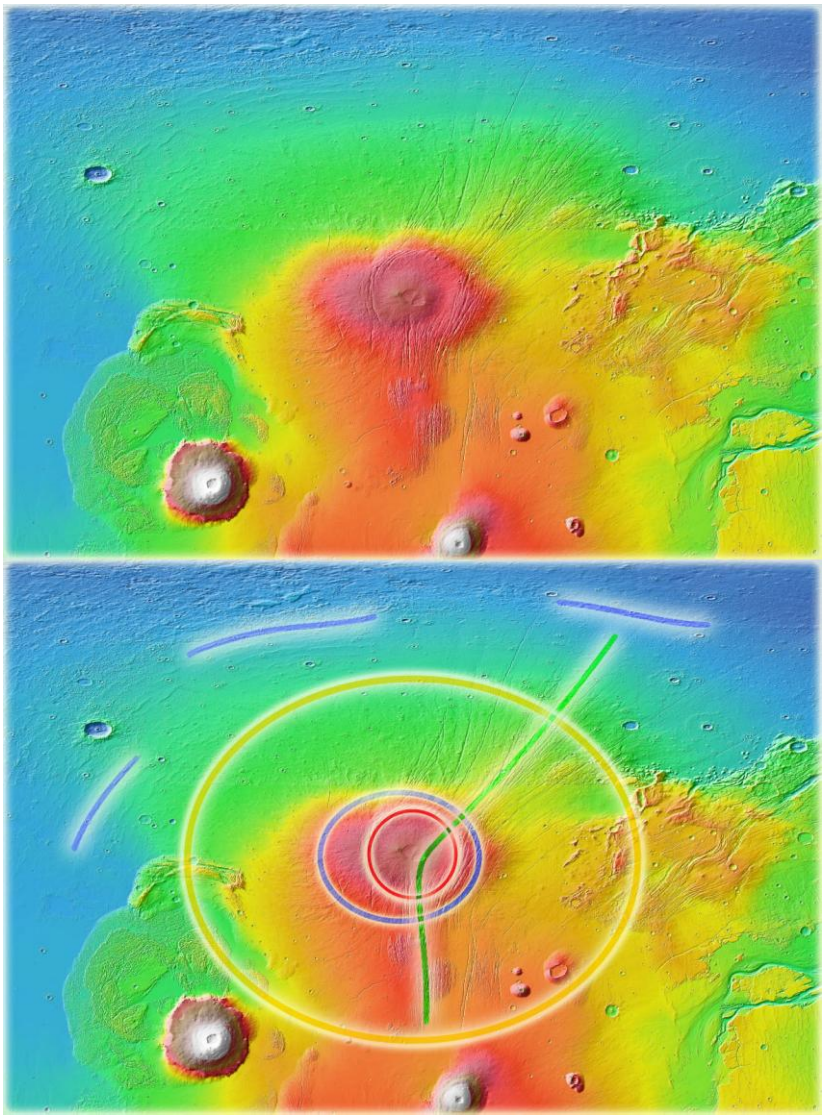
*5.e.) Fifth type of surface shaping waves*

**5.)** As the waves from inside reached the surface they shaked the crust and created new surface waves. These are the **fifth type** of waves. As they met with each other they created concentric wrinkles outside the ring of second type of waves (figure [5.a.] – dark and light green lines), and radial wrinkles inside the ring (pink lines).

**6.)** I must mention **reflected waves** as **sixth**, what created elevations on the impact side. These will be discussed separately.

### *5.2.) Hellas impact*

As I mentioned at the beginning of this chapter these wave types cannot be separated clearly in the case of Hellas. But we can give it a shot:



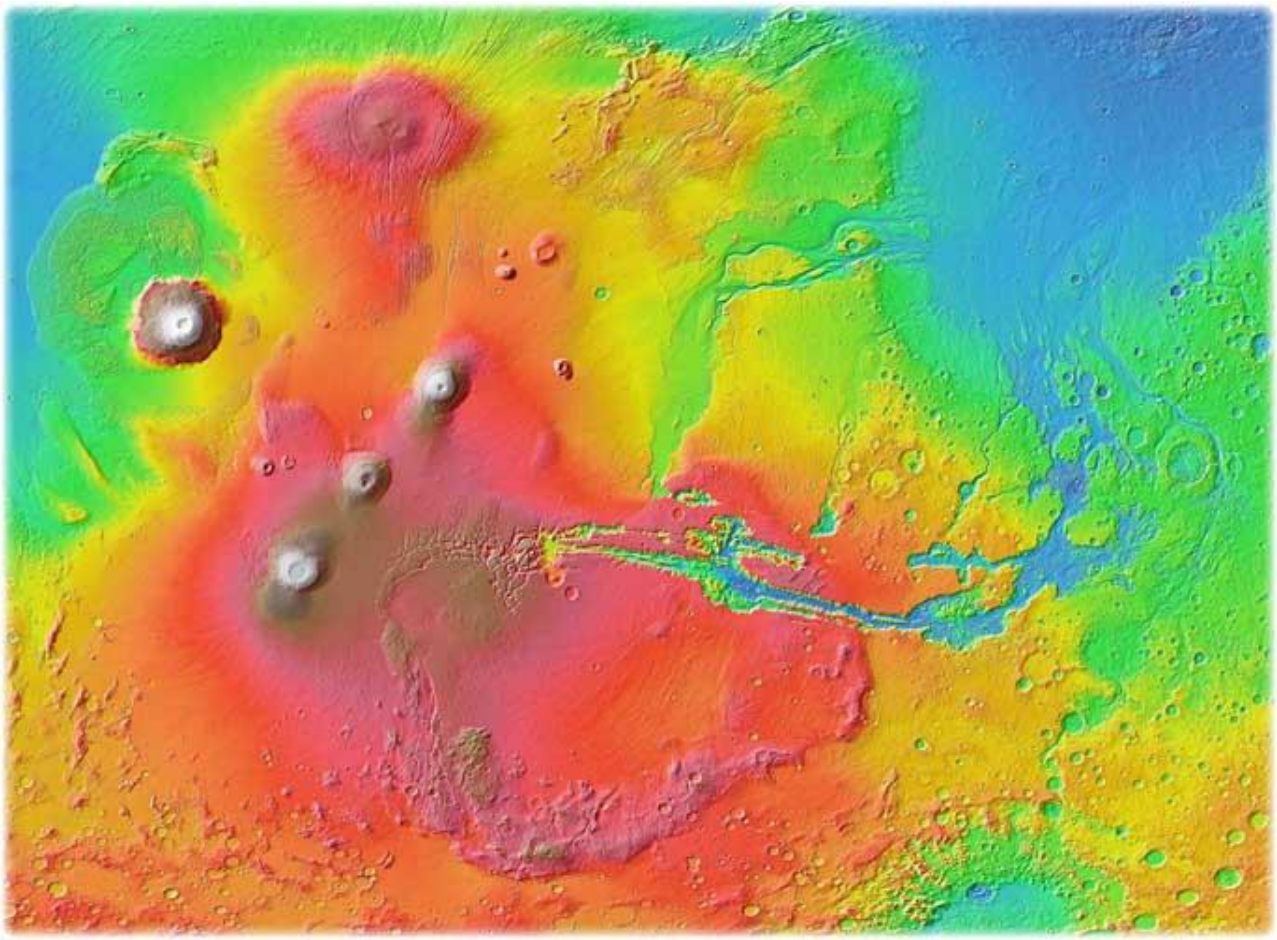
*5.f.) The features of Hellas. Only a learned eye can distinguish the wave types here.*
*If the Reader reaches the end of this chapter, he will succeed with this.*
*The markings of the wavetypes:*

***1.)*** *waves that can show interferring* - red circle
***2.)*** *ring waves* - yellow circle
***3.)*** *non-interferring, non-separating waves* - blue circle
***4.)*** *meeting line of the surface waves created by the impact* - green line
***5.)*** *surface waves created by the first three,*
*but mainly by the second type of waves* - blue lines*;*
*These last type of waves disappeared later from the Southern area*
*as the Tharsis Bulge rose there after a few hours*

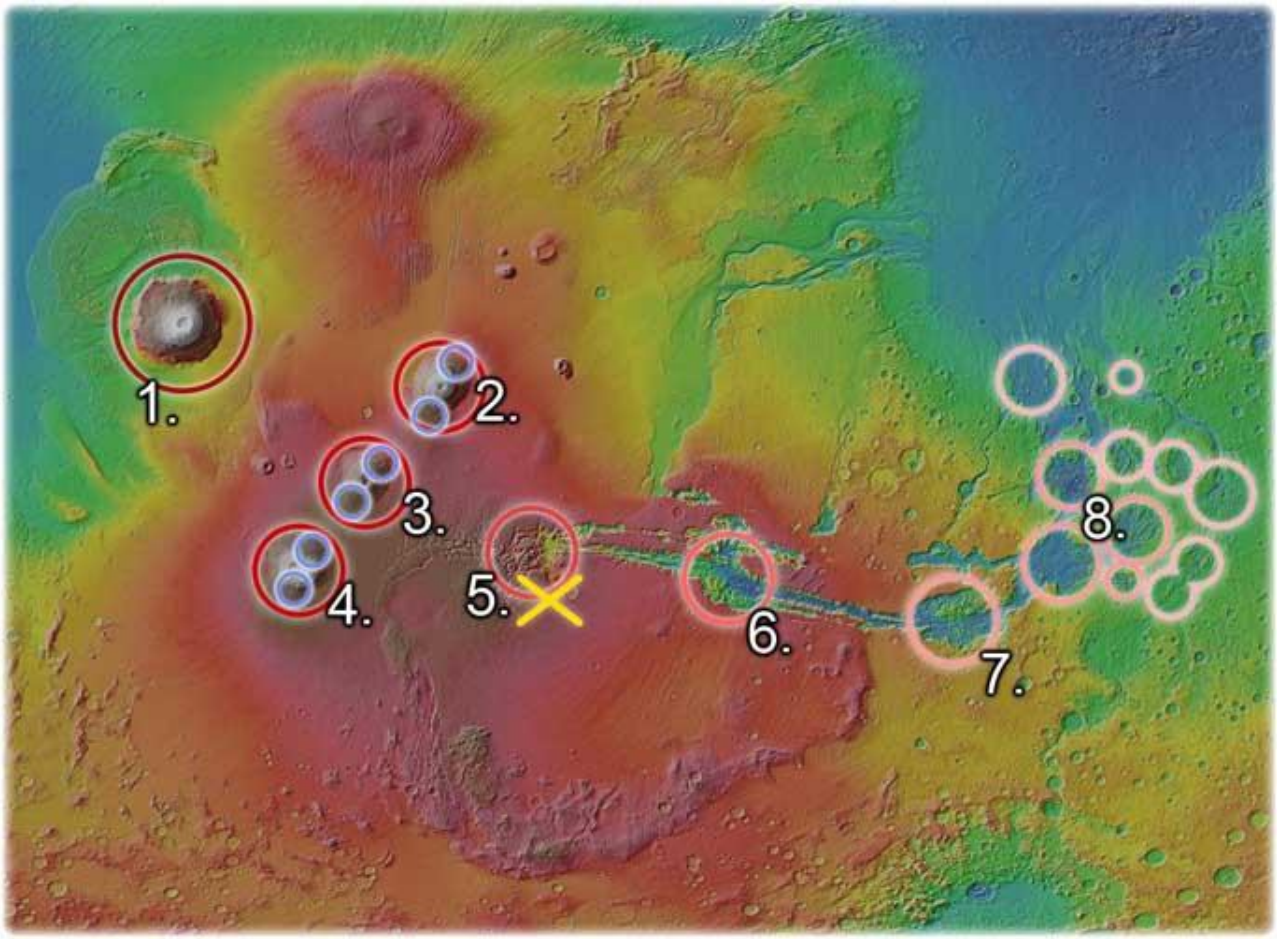
*(Circles near the poles appear as ellipses because the rendering type of the spherical map database to a plane. For example the yellow ellipse would be a circle if we would project the map on a sphere.)*

Now let's see how these effects show up in the case of Isidis! The following features are located on and around Tharsis Bulge. Unlike before I separated a few wavetypes to be able to get a clearer picture, because the third impact drew the most complex landforms due to the great deformation of the planet.

### *5.3.) Isidis impact*



*5.g.) Tharsis Bulge, opposing Isidis Basin.*
*Argyre crater is on the South East; Chryse crater, the meeting point of the giant riverbeds is on the North East; Alba Patera and surroundings, the area discussed before is on the North.*

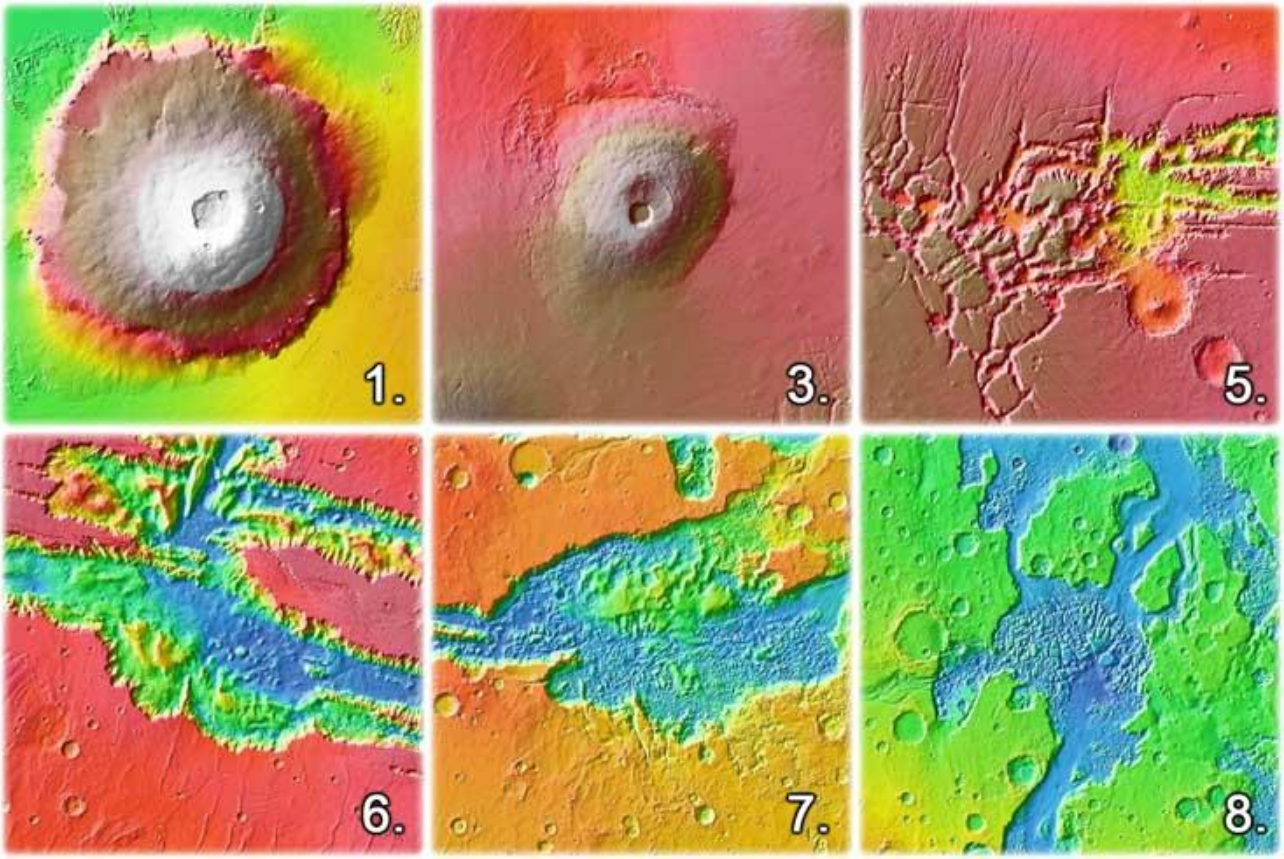



*5.h.) Superposition points of the first type of waves:*

***Circles with shades of red (foxy, red, pink):*** *main points.*
*Fainting of red means scattering of the waves, thus dropping of the local forces.*
***Dark and light blue circles:*** *secondary points.*
***Yellow X****: Isidis antipode (with regular spherical projection).*

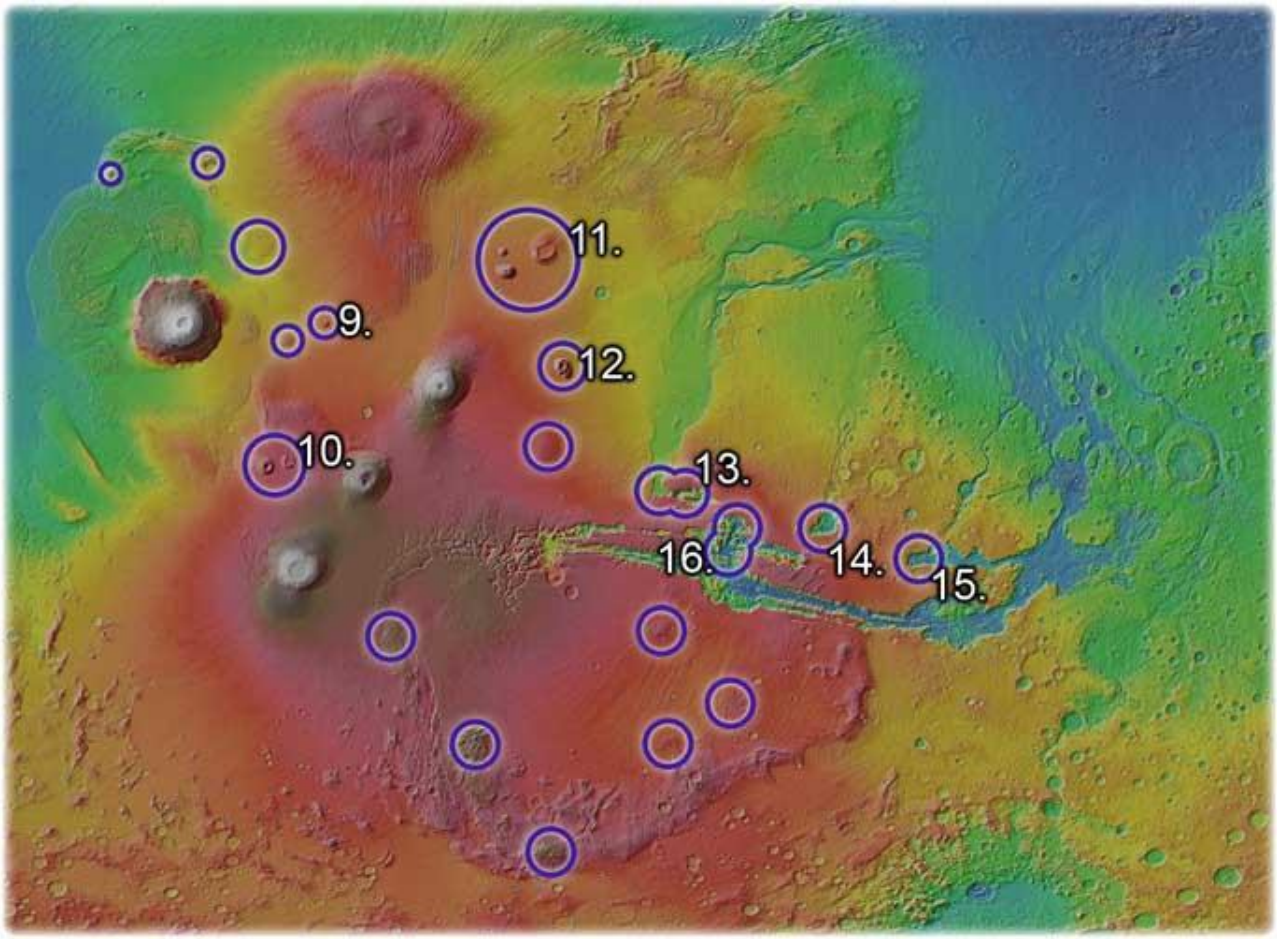
*It is interesting to note the main effect line of the interference. It curves from Olympus Mons from the North West through Valles Marineris, ending to the East in the chaos-areas.*

**1.)** The **first type of waves** lifted up the four mountains of the bulge, resembling to volcanoes. These are over 14 000 metres, marked with white color. The Olympus Mons (1.), what is the biggest known mountain in our Solar System, and three more: Ascraeus (2.), Pavonis (3.), and Arsia Mons (4.), from North East to South West. Additional points of these waves from West to East are: Eastern end of Noctis Labyrinthus (5.), where are concentric cracks, the center of Valles Marineris in Melas Chasma (6.), the Eastern end of the valley between Capri and Eos Chasma (7.). Then this main effect line spreads to smaller points, the Chaos-regions (8.). This spreading grows from West to East on the whole interference picture. The density is the biggest in Olympus Mons and the most diffused at the Chaos-regions. The focus points listed before and located on the main effect line are near-perfectly evenly spaced.



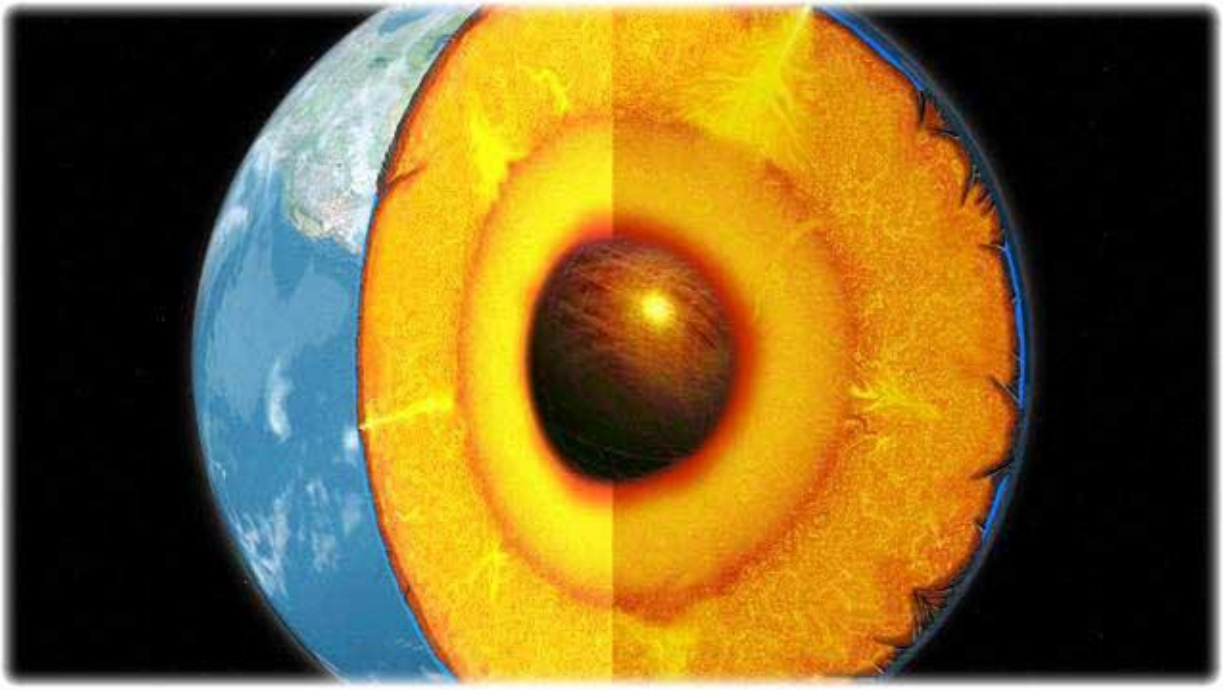

*5.i.) The main focus points of the first type of waves on Tharsis Bulge through the main effect line:*
***1.)*** *Olympus Mons*
***3.)*** *Pavonis Mons*
***5.)*** *Eastern end of Noctis Labyrinthus*
***6.)*** *Melas Chasma*
***7.)*** *Capri Chasma to the North, Eos Chasma to the South*
***8.)*** *Hydraotes Chaos, a spectacular chaos region*
*(The zoom of the slices are equal.)*

The differences in the characteristics of these formations comes from more factors: on the image slices **1** to **6** we can see formations created on ocean-bed crust, slice **7** and **8** were drylands. The **5** to **7** formations wanted to lift up on deeply cracked regions (while the just arrived ring waves are also quaked the surface), so the cracked crust here is rather broken up. Region **5** was under water until less time, so the cracks widened less, while at region **6** (what was similar to region **5** at the beginning of its formation, because other circumstances were also similar) its pieces almost completely melted up in the interaction of the magma and water. In addition looking through the slices the local concentration of the affecting force was dropping.



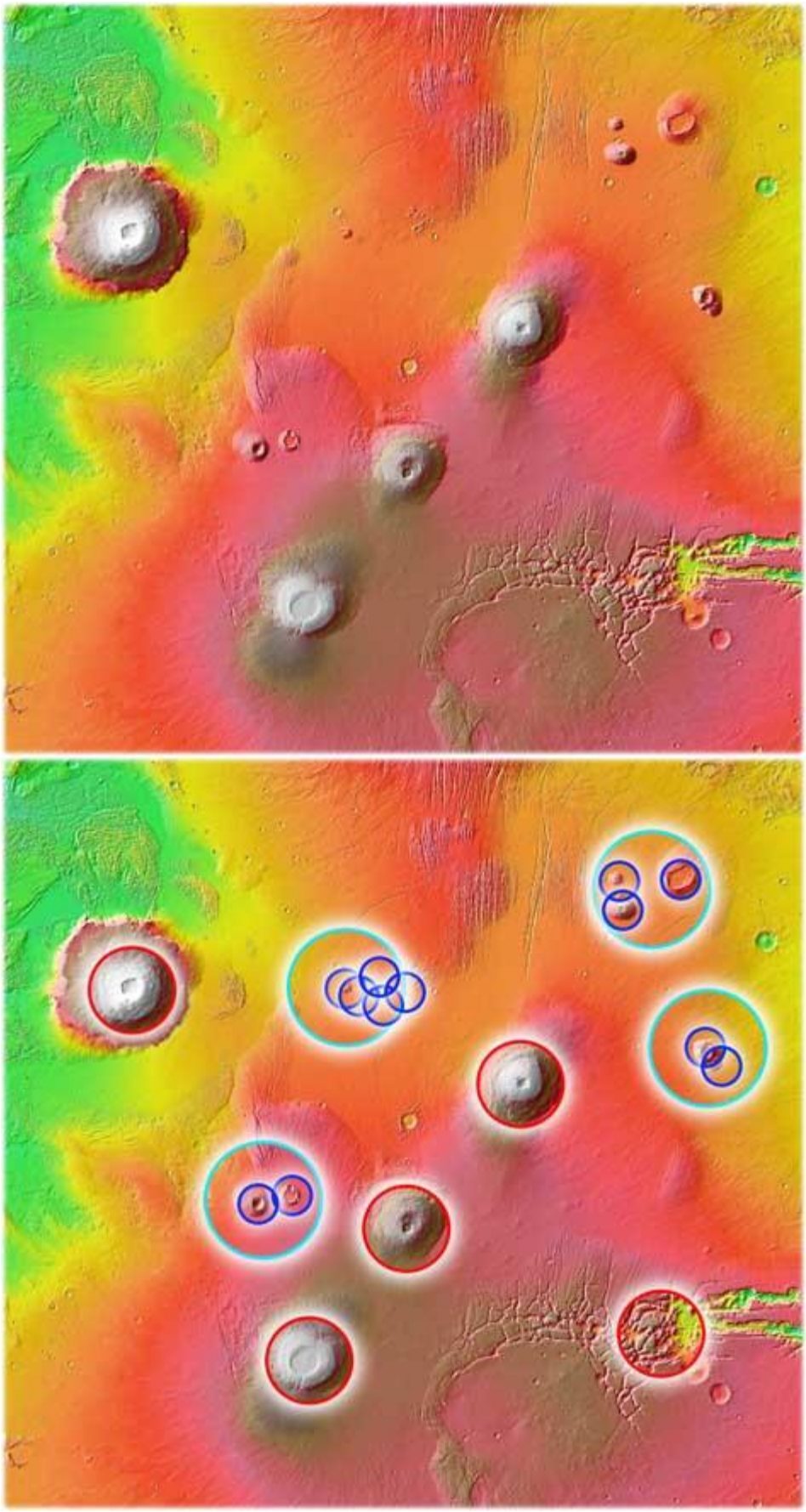

*5.j.)*

The secondary points, what are in a regular pattern with even spacing respect to each other are the following: Jovis Tholus (9.), to the East from Olympus Mons, Biblis and Ulysses Patera (10.), what connects with a regular spacing to Pavonis and Arsia Mons from the North West, Uranius Tholus, Ceraunius Tholus, and Uranius Patera trio of volcanoes (11.), and Tharsis Tholus (12.), what are connected to Ascraeus Mons from the North East. The smaller hills surrounded by the ring-shaped mountains, to the South of Valles Marineris, are also included in this picture, laced with radial cracks. Further points to the North from the Valley: Echus and Hebes Chasma (13.), Juventae Chasma (14.) and a smaller crack to the West from it, and the Western part of Ganges Chasma (15.). The Northern part of the widening in the middle of Mariner Valley, and partly Ophir and Chandor Chasma (16.), although these last two developed from the starting cracks of Valles Marineris, with the help of the interaction of magma and water. The line drew by the three evenly spaced points mentioned before (13., 14., 15.) is entering the Chaos-regions, and this effect line also takes part in shaping these areas.



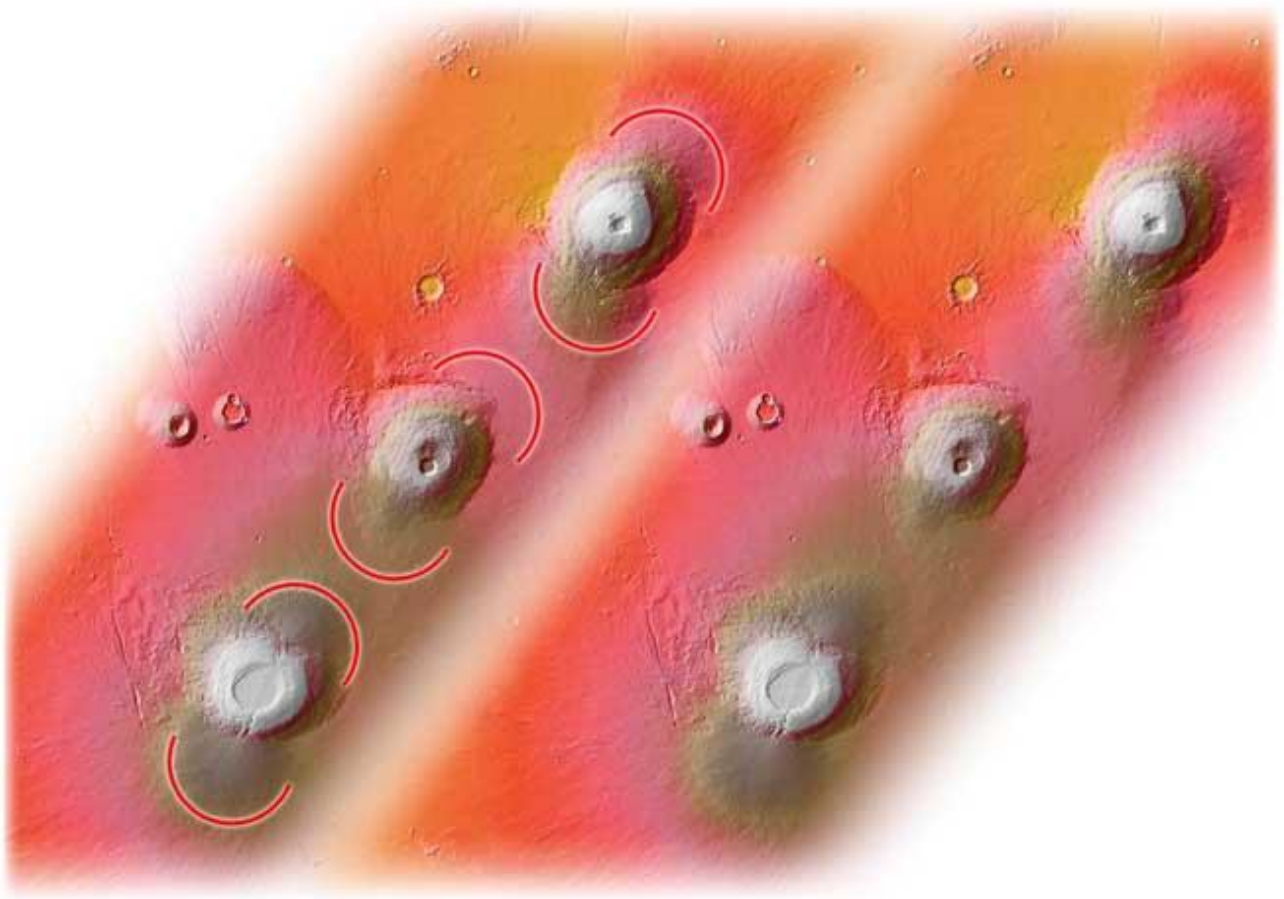
*5.k.) The suspected inner structure of Earth – the symmetry broken in various ways – with magma-currents and tectonic plates bending under*

Why the secondary superposition points near the big volcanoes are broken into smaller points lying on one another I explain the following way: today's models about the Earth inner structure describe it like a non-uniform mass with convection zones and currents, what also mean non-concentric (not spherically symmetrical) density differences. These objects can give wave propagation a bit randomness. The above picture shows us the suspected inner structure of Earth ([5.k.]). Mars could differ from this at least in the aspect of the appearance of tectonic plates' edges, because as far as we can see on the Mars maps there are no signs for tectonic plates.

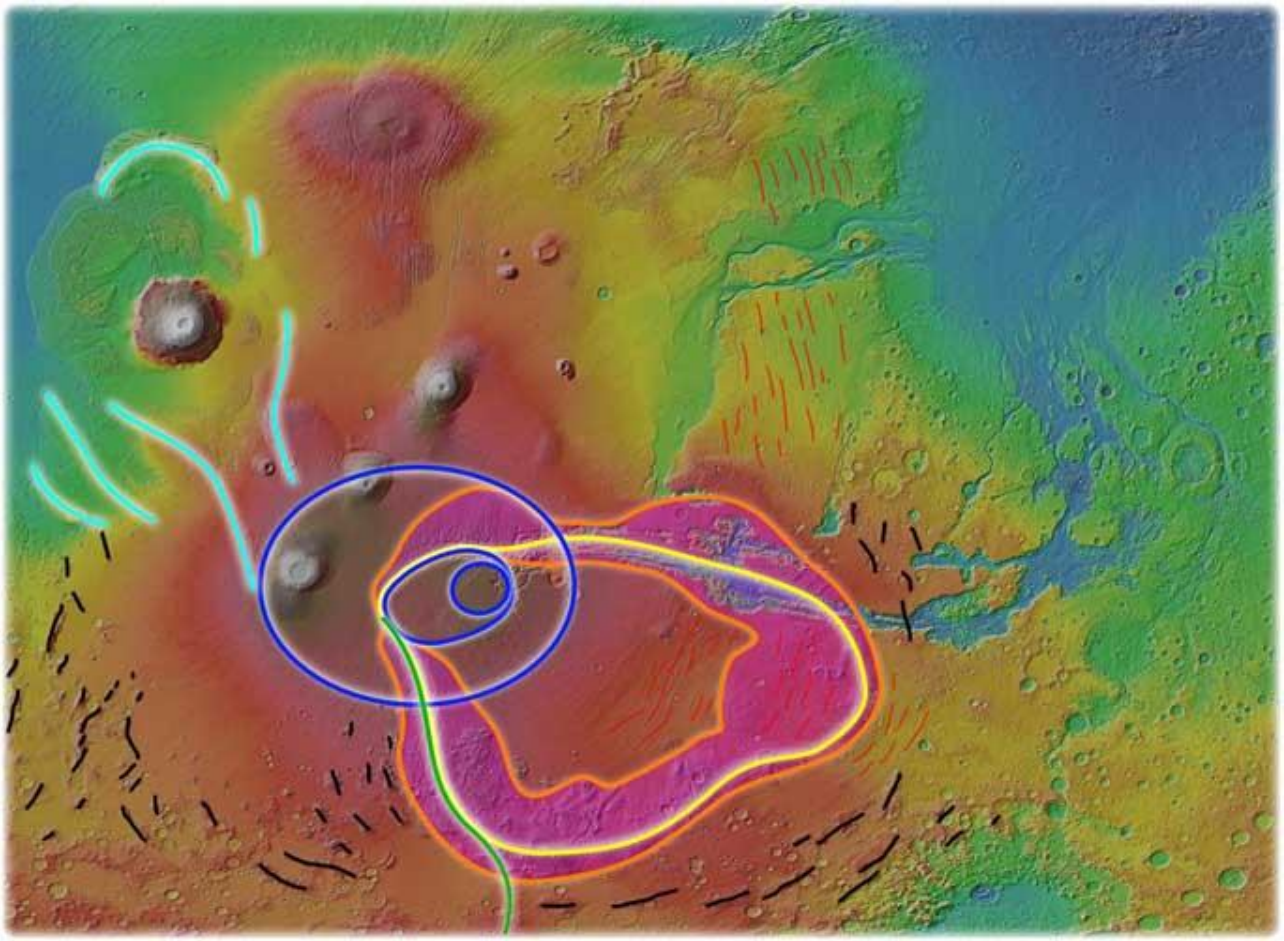


*5.l.) The breaking up of the superposition points on Tharsis Bulge (smaller, **dark blue** circles in **bigger, cyan** circles)*

On the three similar volcanoes we can discover secondary elevations: in the line of their arrangement, in the North East – South West direction there are cracks and bulges on each sides.



*5.m.) The secondary elevations are marked with **red semicircles**.*



*5.n.)* ***- Second type*** *of waves, ring waves: closed yellow loop surrounded by two orange loops, this area is colored pink – this mountain-ring is a spectacular formation of Tharsis Bulge.*
***- Third type*** *of waves: blue ellipses.*
*This is the center of Tharsis Bulge, the highest part of the area, not counting the volcanoes.*
***- Fourth type*** *of waves, what ran around the planet on the surface, and met on the opposing side; their meeting is: the green line. They also met with the affected zone of second type of waves.*
***- Fifth type*** *of waves: black, red, and maybe cyan lines – although the wrinkles marked with cyan are very special formations what cannot be found elsewhere, and I'm not confident in their true origin. The ridges marked with black lines are continued concentrically nearing the center of the bulge, but they were partially covered by land flows.*

**2.)** The **second type** of waves, the ring waves can be made out more easily, unlike in the case of Argyre impact, because here they created a well defined mountain chain with the components of Claritas Fossae, Coracis Fossae, the Southern and Eastern side of Thaumasia Planum, and contradicting the pretence the Valles Marineris and Noctis Labyrinthus (closed yellow loop). The ring can be completed this way. Later we will see how these kind of waves helped to form Valles Marineris.

**3.)** The **third type** of waves can appear to us after a long lasting investigation with considering that every dominant elevation must likely come from some kind of shockwaves created by the Isidis impact. That's why we have to explain the spacious slope under the individual formations (blue ellipses). With the exact explanation of what kind of waves caused this and in what kind of inner layers it come through, we have to wait until the simulations.

**4.)** The appearance of **fourth type** waves wasn't obvious to me for a long time, as it molds

into the Western side of the mountain ring. From there it exits in the South direction (green line).

**5.)** The fifth type waves show up diversified depending on areal conditions, if they were formed on drylands, or on used-to-be ocean beds. The black lines to the South are on drylands, the finer wrinkles marked with red lines are on ocean beds. This area of Tharsis Bulge is rich in craters and mountains what are totally or partially filled up or covered with landslide material. This can only be made out well by zooming in far more than what this picture can show.

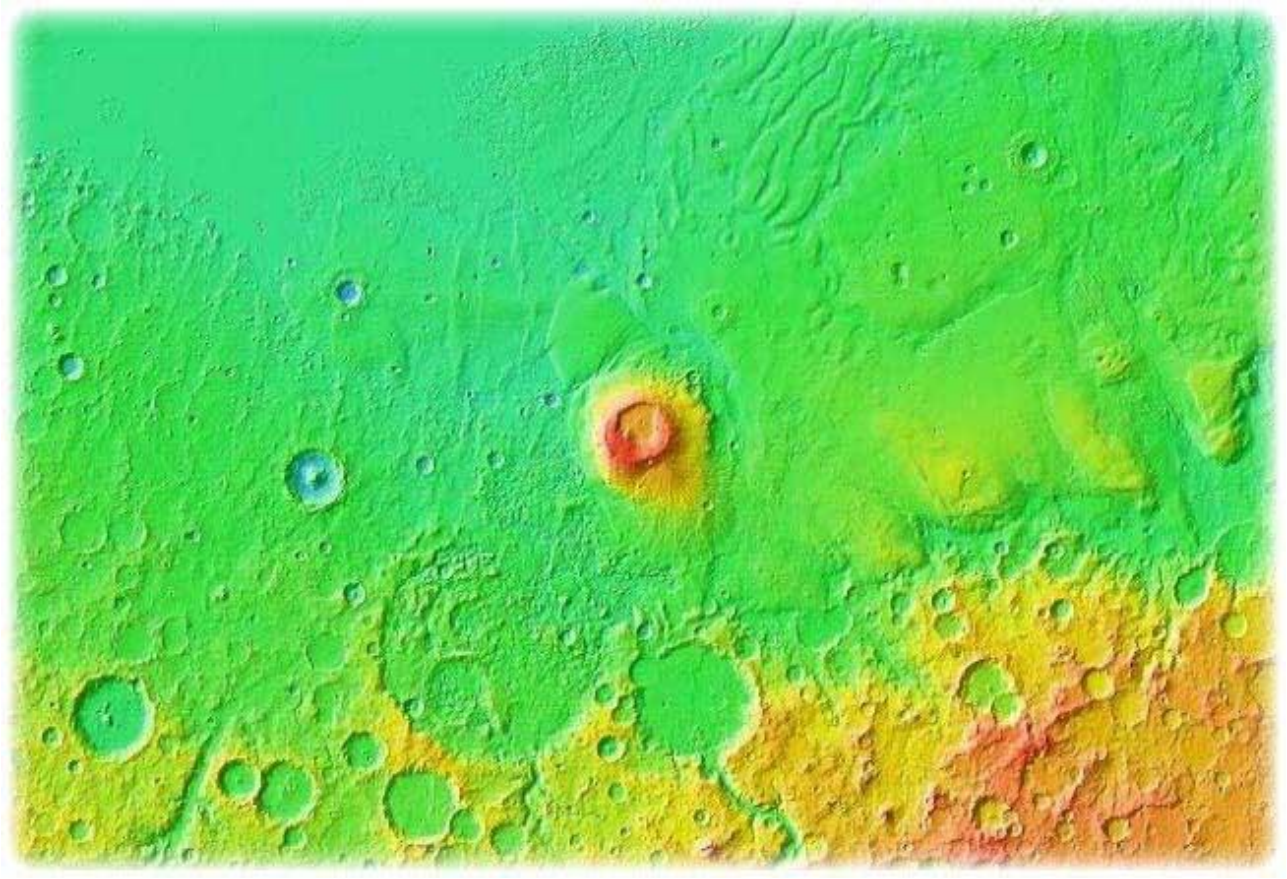
### *5.4.) Chryse impact*

We can clearly follow the evolution of interferring waves and reflections through the impacts in order. This has to be seen if we want to locate the signs of the fourth impact. The planet was so misshaped and its inner structure was so deranged that the shockwaves of Chryse impact (as the smallest of the four) were diffused on a larger area. While we can distinguish clearly the wavetypes at the other three impact, we cannot do it in the case of Chryse. Although we can see its crater and secondary clues proove its arrival. The most expressed are:

1.) the double structure of the landslide of Olympus Mons what tells us about two landslides happening; the second slide had to happen after Isidis by a big quake, and that could only be caused by Chryse

2.) at the Eastern outflow of Valles Marineris the dark material is washed away uphill in the South direction, in the opposite way to Chryse; the impact smacked in the dislocated ocean causing a tsunami

3.) the rivers flowing down to East from Tharsis Bulge suddenly turned in the direction of Chryse Basin because the relief changed.



*5.o.) Chryse – clues on the antipode*

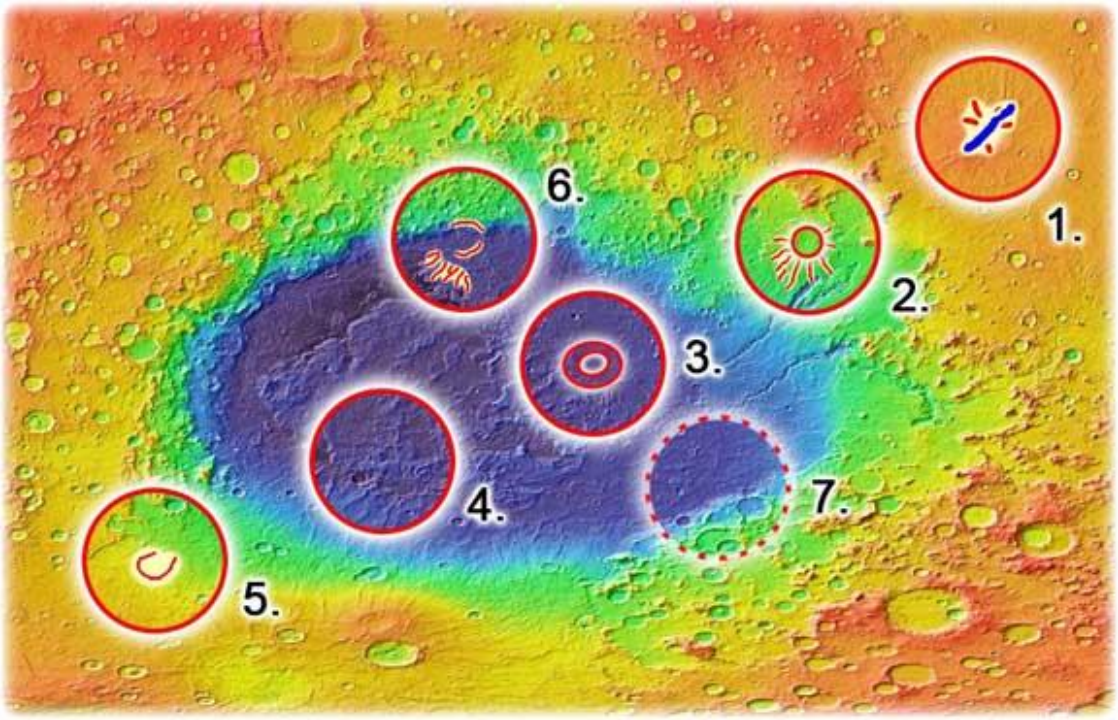
## 6.) Reflected shockwaves' effects on impact side

The reflected shockwaves showed up similar to the first type of waves forming superposition points. The only wavetype that was capable of forming these points is the third type of waves because these are the ones what haven't break up into rings or interference points but could be reflected as a whole, like another impact would have started them. After the wave separation to different types happened again but only the most visible type could appear on the impact side, with the biggest energy focus in it, the first type of waves.

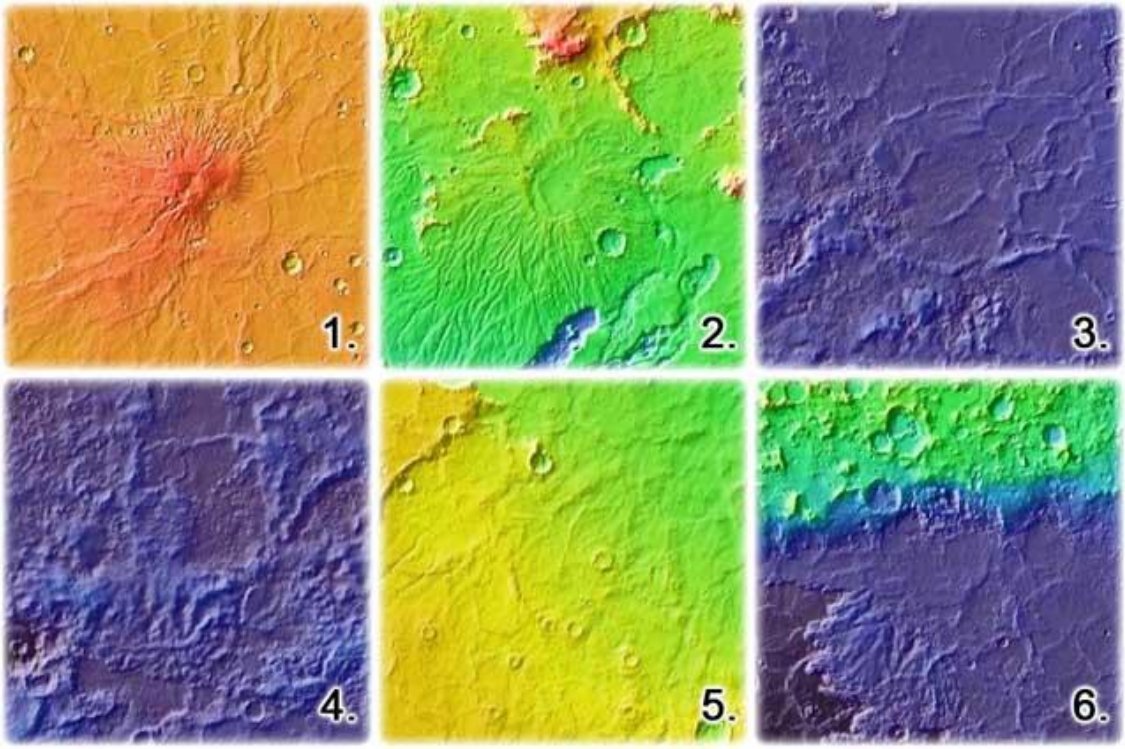
### *6.1.) Hellas reflection*

In Hellas impact reflection interference showed up, as first type of waves. The interference picture effect line cross the crater in a North East – South West direction. The first two points are Tyrrhena Patera and Hadriaca Patera, and that is the direction the energy of the reflection was dimmed. Measuring up the distance of these two volcano-like elevation continously on the effect line we get to two more points (third, fourth), what could be separated after careful visual analyzation of their surroundings. And maybe there is a fifth one, what only can be seen by strong imagination – still I mention this one because simulations - if they will be - might give it out. Seeing this fifth point could be hardened by the reflection of Argyre impact, as we will see later, because its shockwaves smoothed out the nearby terrain (figure [11.c.]).

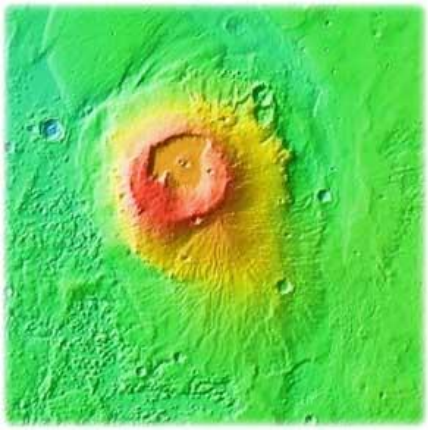
Another point can be suspected outside the main effect line in the middle of the Northern rim of Hellas Basin. This can be told by a typical characteristic, what I call „beard". I mark this thing on figure [6.a.] with lines at a few superposition points. This interference picture suggests a seventh point, the mirroring of the sixth point on the main effect line, crossing over the third point. I marked it with a dotted circle as I couldn't find any clues for it. But of course simulations also could show this one as well.




*6.a.) The Hellas impact's reflected shockwaves' superpositions.*
*The Tyrrhena Patera marked with (1.) got a crack parallel with*
*the interference picture's effect line (blue line).*
*Inside the big red circles I drew the wrinkle textures roughly.*




*6.b.) Closeup view of superposition points of the Hellas reflection. On the South West side of formation **4** and **6** there are close wrinkles, as well as on the formation **2**, at the same direction, as they would have a „beard". Formation **1** also carries this charasteristic. It shows a smooth extension to the South West and got cracks on it in that direction. This is also the direction in what the superposition points are lined up.*



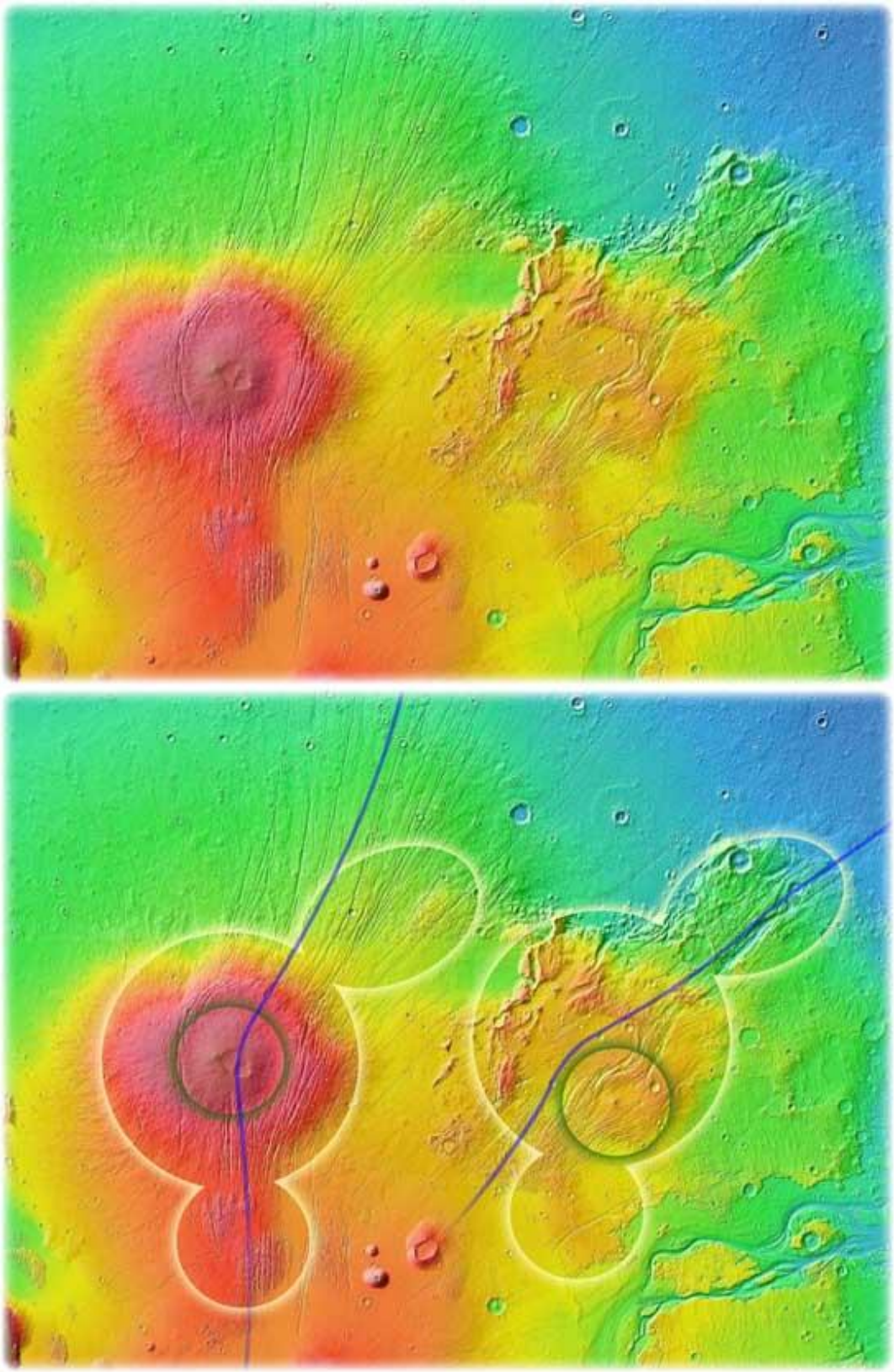
*6.c.) Apollinaris Patera – another superposition point what got „beard". This is created by Chryse impact's first type of waves.*

*6.d.) We can see such marks on the sides of the three parallel big volcanoes on Tharsis Bulge, what are drew by the Isidis impact's first type of waves.*
*(Arsia Mons, Pavonis Mons, Ascraeus Mons)*

The interference picture of the reflected waves of Hellas and the effect line's tilt can be defined by the planet's earlier rotation axle and the low angle of the impact, plus the geoid shape, which last thing means flattening of the sphere in the direction of the rotational axle, because of the centrifugal force.

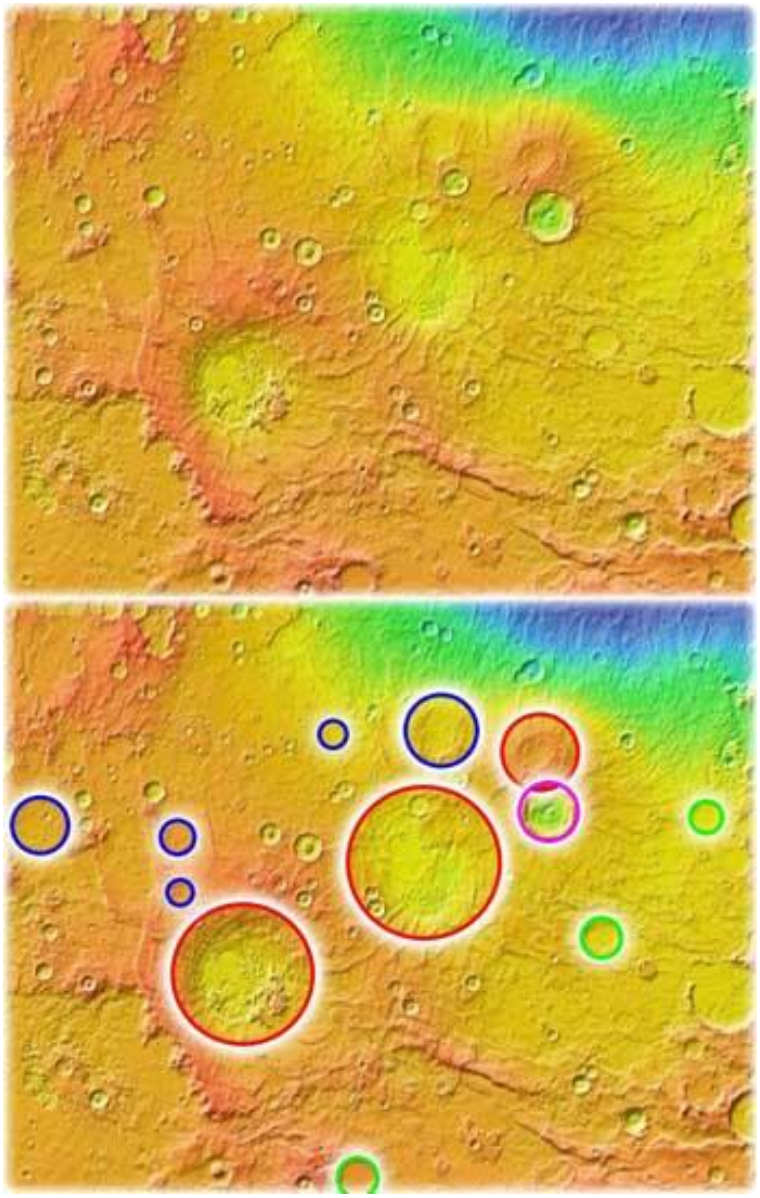
The imperfectness of the symmetry is showed also in the curvature of cracks running across Alba Patera and Tempe Terra (figure [5.f.], green line, figure [6.e.], blue lines).

It has to be mentioned here that there is a secondary reflection of third type waves to the East of Alba Mons: Tempe Terra. This area is the copy of Alba Patera. All the elevations and cracks running across it. Labeatis Mons is the analogue of Alba Mons.



*6.e.) On the left side of the picture: Alba Patera with Alba Mons on top.*
*On the right: Tempe Terra, with Labeatis Mons on it.*

### *6.2.) Argyre reflection*



*6.f.)* ***Red circles:*** *This interference picture resembles to the picture of Elysium with three elevations. These elevations are not the reflections of Elysium-volcanoes but the reflections of third type waves. The three-like behavior is because of the similar inner geometrical structure of the planet. The Reader with a good eye can see this is not a three-pointed interference picture really. There are additional ones looking like smaller craters – where the wrinkles are ordered as to form circles.*
*From West to East (left to right): Pityusa Patera, Malea Patera, Amphitrites Patera.*
***Blue circles:*** *relatively spectacular ring-like wrinkleages, new superposition points.*
***Pink circle:*** *Barnard crater.*
***Green circles:*** *craters smoothed out by the quake of Argyre reflection. These craters must had been hit by the debris of Hellas impact.*

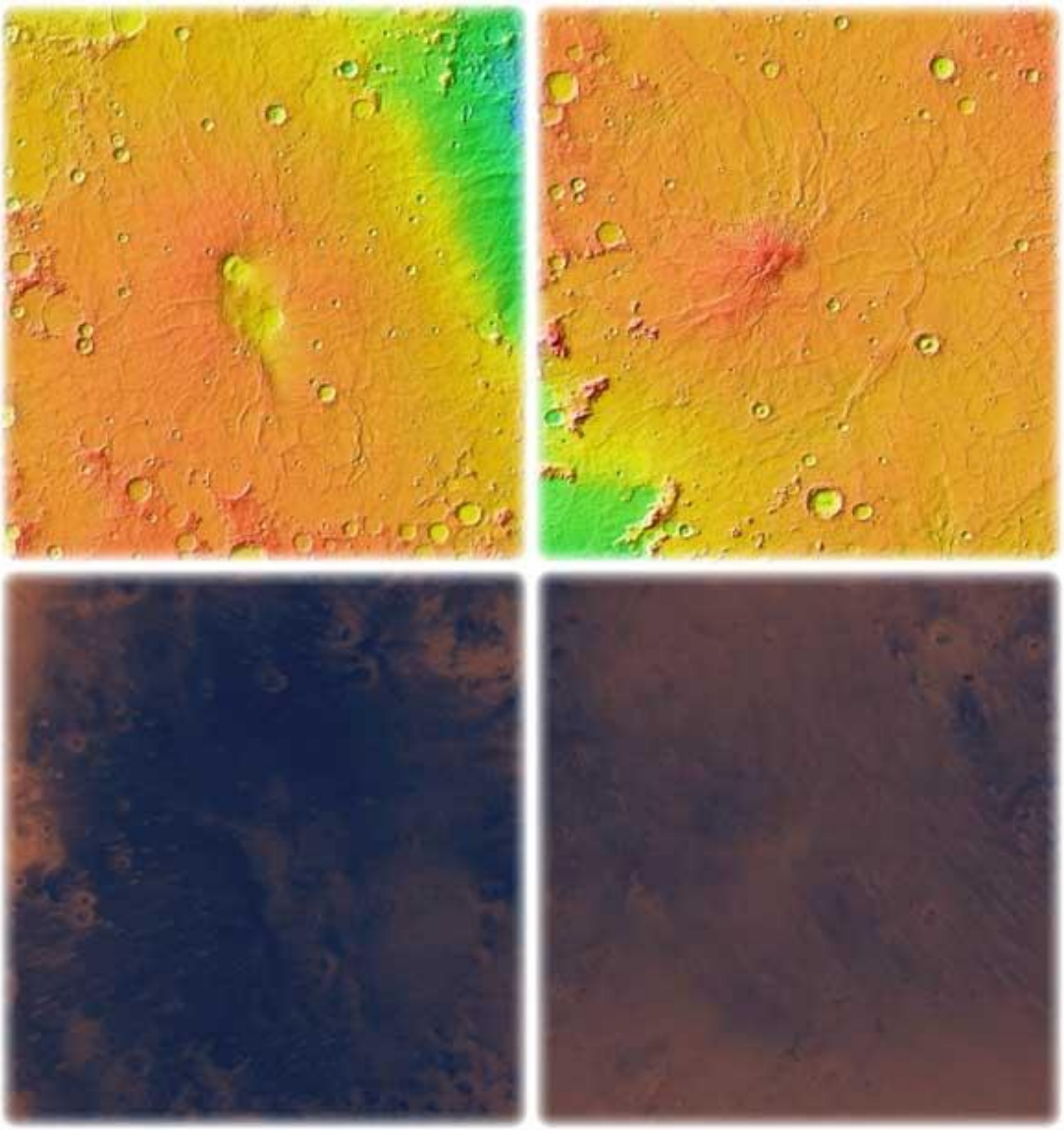
I assign the four mountains found to the South East of the Hellas Basin as the formations of Argyre reflection, today referred to as volcanoes, counting them from West to East: Pityusa Patera, Malea Patera, Peneus Patera, and Amphitrites Patera. Unlike Hellas and Isidis, Argyre reflection

shows a big shift from its impact crater. The reason for this is the great deformation by the Hellas impact what was a bit corrected, balanced by this Argyre impact. In addition it came in an angle to the Hellas impact in what it saw the least symmetrical side of the planet. On the other side the planet had a big dip (Hellas Basin), and on the other side a large protrusion (Alba Patera). The question can arise if we suppose that the four mountains' (Pityusa, Malea, Peneus, and Amphitrites Patera) arrengement should resemble to Elysium volcanoes why don't they resemble more? We have to take it into account that the symmetry system were changing all the time, so the shockwaves started to propagate in a body that changed shape because of this propagation, thus after reflection these waves found a different geometry to go through. This way they took a different orientation, and didn't arrive to the starting point, thus the interference picture also changed. This is exactly what we can observe in the case of Hellas: on the antipode we can find circular symmetry, and in the reflection's picture we cannot.

Don't be mistaken by Barnard crater, it isn't part of the interference picture. It could have been hit only by a bigger piece of ejecta.

### *6.3.) Isidis reflection*

I can match only one formation to the reflection of Isidis: Syrtis Major, a very prominent feature. Its slopes and periphery, the Syrtis Major Planum's surface is special. It shows features like Tyrrhena Patera's surroundings, the Hesperia Planum, and the Southern rim of Hellas Basin, and the area to the South from it. On this area we can see dryland landslides. Most of the impact signs on these regions were erased by the quakes and landslides, and these also filled up the craters at the base of Syrtis Major. Interestingly on these places the surface behaved similarly to impacts as the ocean floor, and produced splattered rim craters, unlike on other drylands where wasn't so big a groundshaking.



*6.g.)* ***To the left:*** *Syrtis Major Planum, formation of the Isidis reflection*
***To the right:*** *Hesperia Planum, formation of the Hellas reflection,*
*similar to previous in characteristics and in forming.*
*On each one the craters are less than the surrounding area. Although not lava,*
*but landslides filled them up as quaking and rising high.*
*By the way this effect is observable on the Southern edge of Hellas Basin,*
*what was smoothed out by the Argyre reflection.*

Syrtis Major is the only formation that should be referred to as a real volcano. In the visible spectrum of light we can spot dark material, and a texture what tells us it was originating from the vents. This superposition point can be divided to two smaller points. These vents named Nili and Meroe Patera. The main vent is Nili from where a part of the the dark material could exit what covered the planet in red and darker areas, probably mainly volcanic ash.

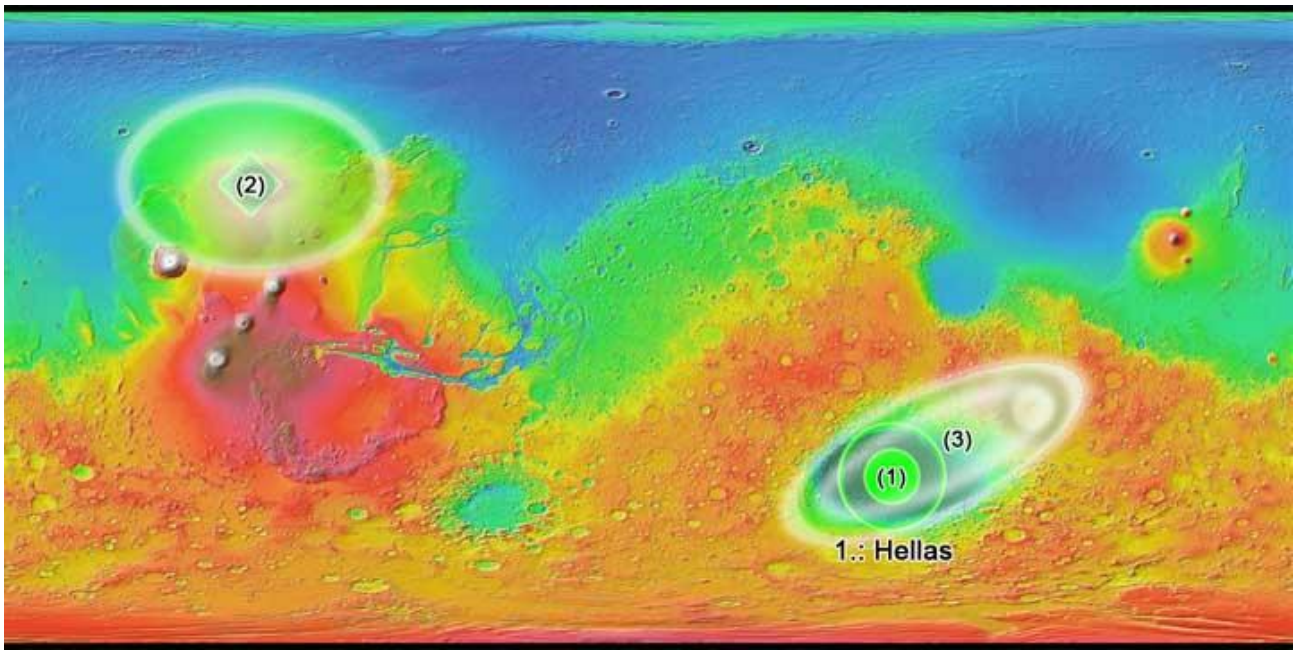
The reflected waves of Isidis could lift up other regions what are not meet the eye, for example the Southern part of Terra Sabaea, or the Northern part of Tyrrhena Terra.

As to Chryse, I couldn't find a formation what could be exclusively connected to its reflection.

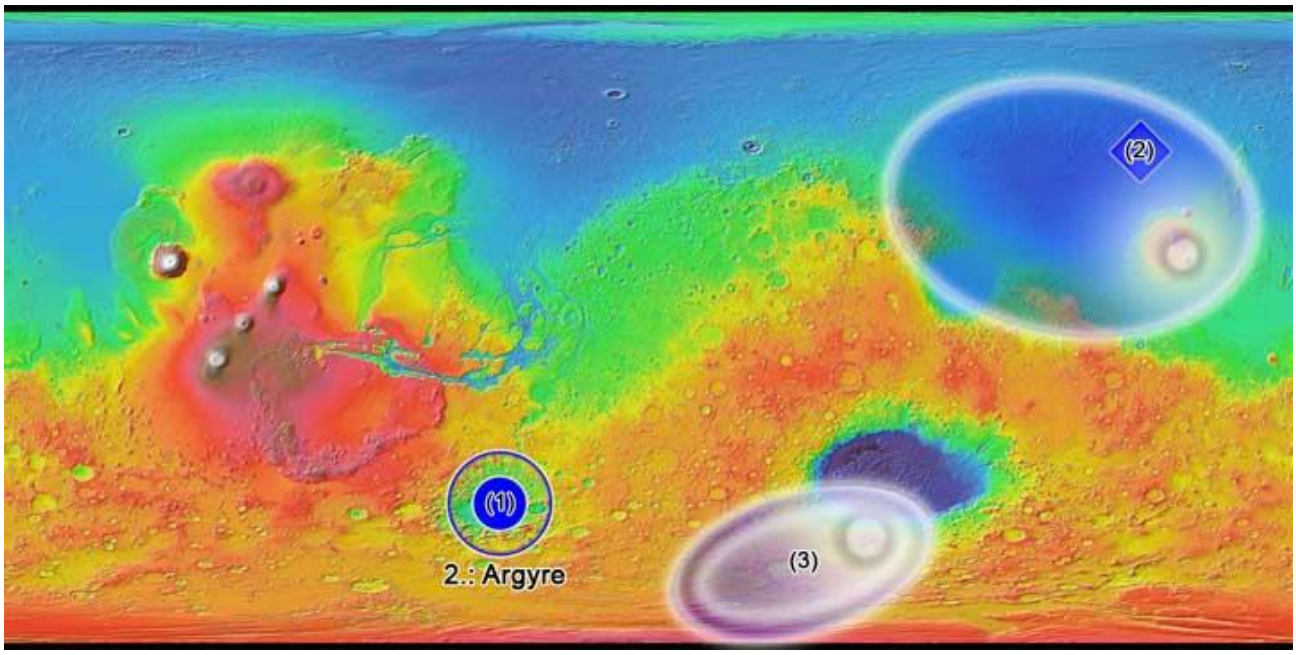
## 7.) Changes in the picture of first type shockwaves

As the shape of the planet was deforming and its wave-breaking and -focusing structure was changing, as a complex multilensed camera's objective, the formations created by the waves passing through this medium also changed. This can be catched in the case of first type of waves' interference pictures - on the antipode as well as on the side of the impact as reflected waves.

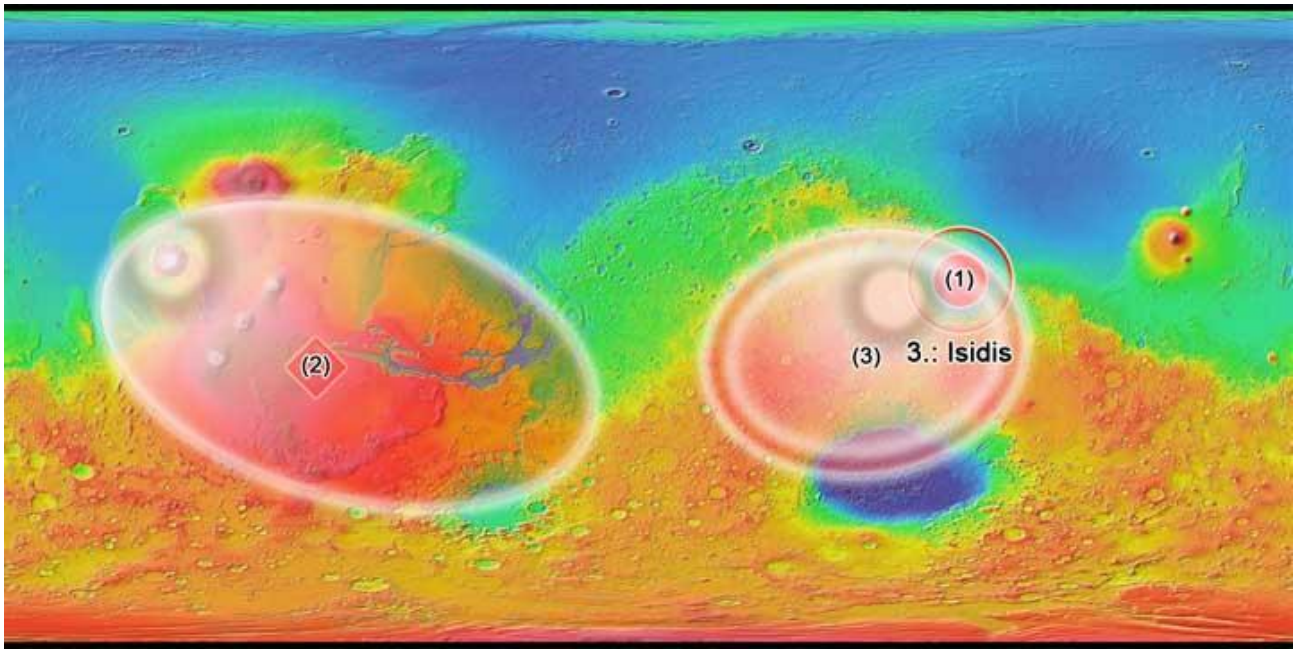
I already showed the following two pictures, but I added a few more marks to them. The diffused, smaller white circle inside the ellipses is the point where the energy was the most dense and from where the force was falling off.



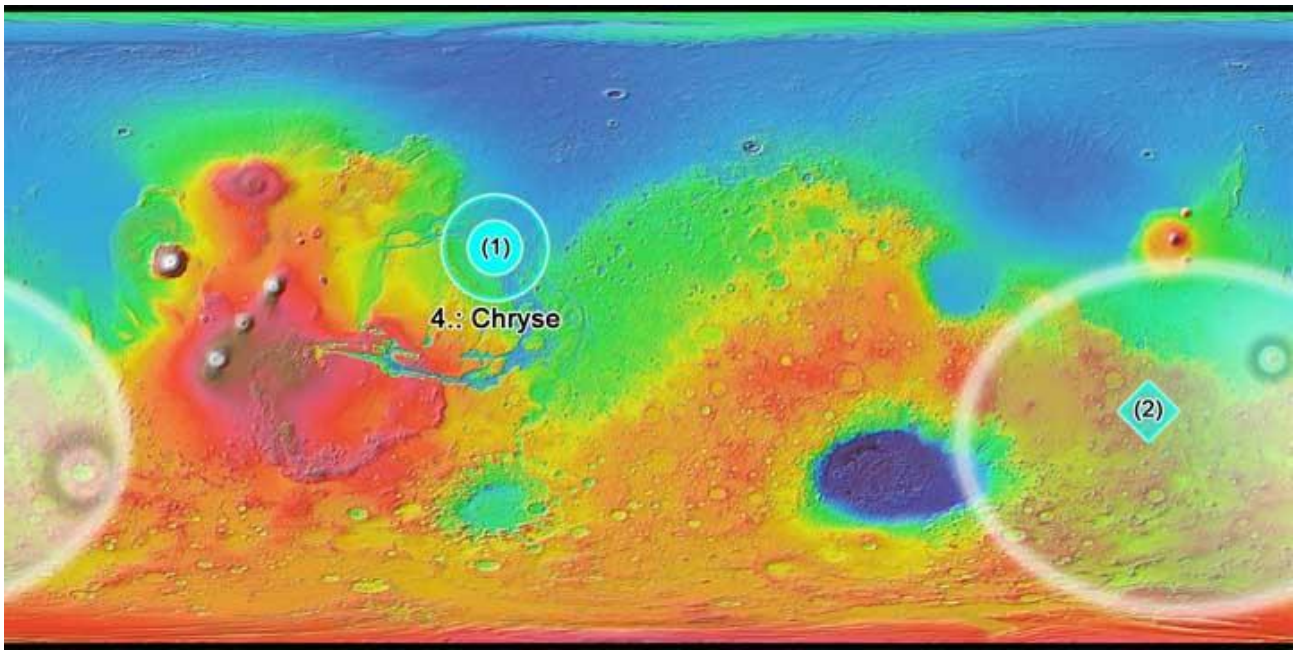

*7.a.)* ***Hellas impact:***
***Antipode:*** *all of wavetypes are gathered around Alba Patera.*
***Reflection:*** *The most dense superposition is Tyrrhena Patera.*




*7.b.)* ***Argyre impact:***
***Antipode:*** *the wave types separated, but the greatest energy density was in Elysium Mons. But considering the whole surrounding I put the energy center between Elysium Mons and Albor Tholus.*
***Reflection:*** *Pityusa, Malea, Peneus, Amphitrites Patera.*




*7.c.)* ***Isidis impact:***
***Antipode:*** *The greatest energy density was in Olympus Mons.*
***Reflection:*** *in Syrtis Major there was the peak.*

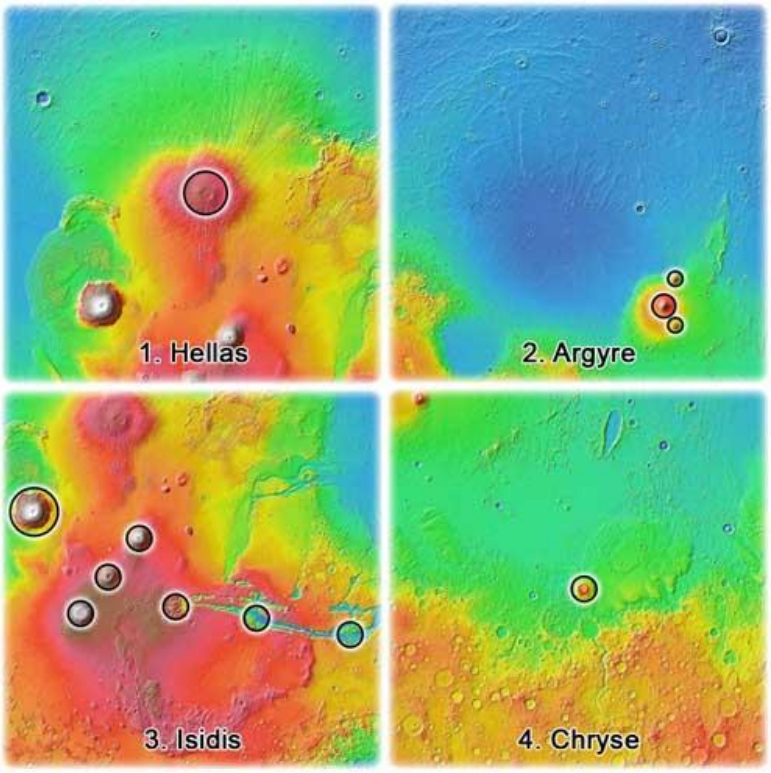



*7.d.)* ***Chryse impact:***

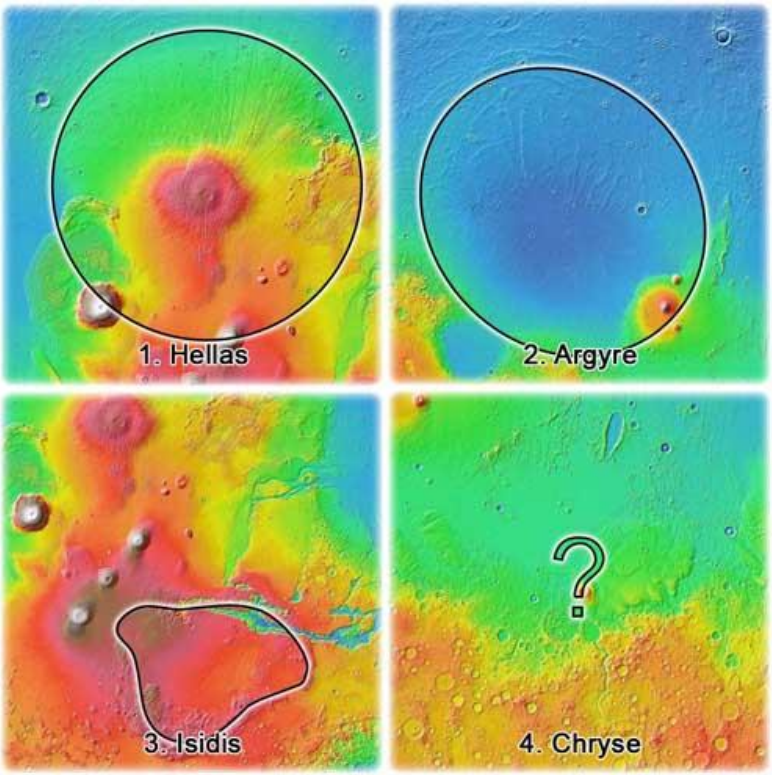
***Antipode:*** *An interesting phenomenon appeared at the fourth impact, what I marked on the left side of the picture, in the Newton crater. This is like a negative superposition point. Positive superposition point is in the Apollinaris Patera, on the right side of the picture. (As this picture is spherically continuous the two points are close to each other.)*

***Reflection:*** *There are no direct observable clues to me. Tempe Terra is not the formation of Chryse reflection, but is the second reflection of Hellas, a second show up of Alba Patera.*

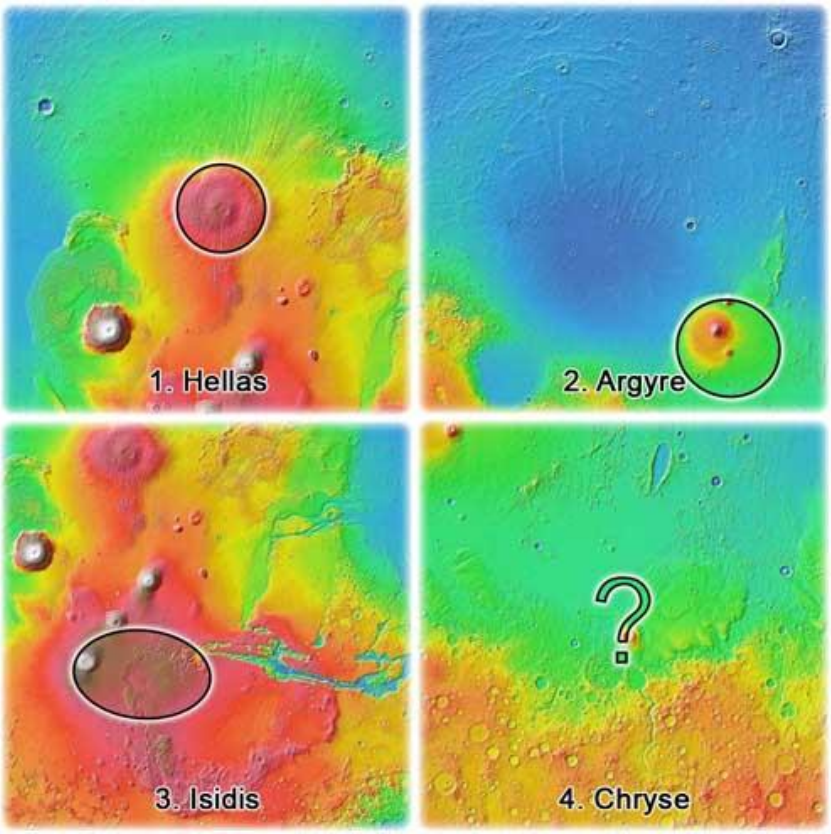
## 8.) Summary of wave types



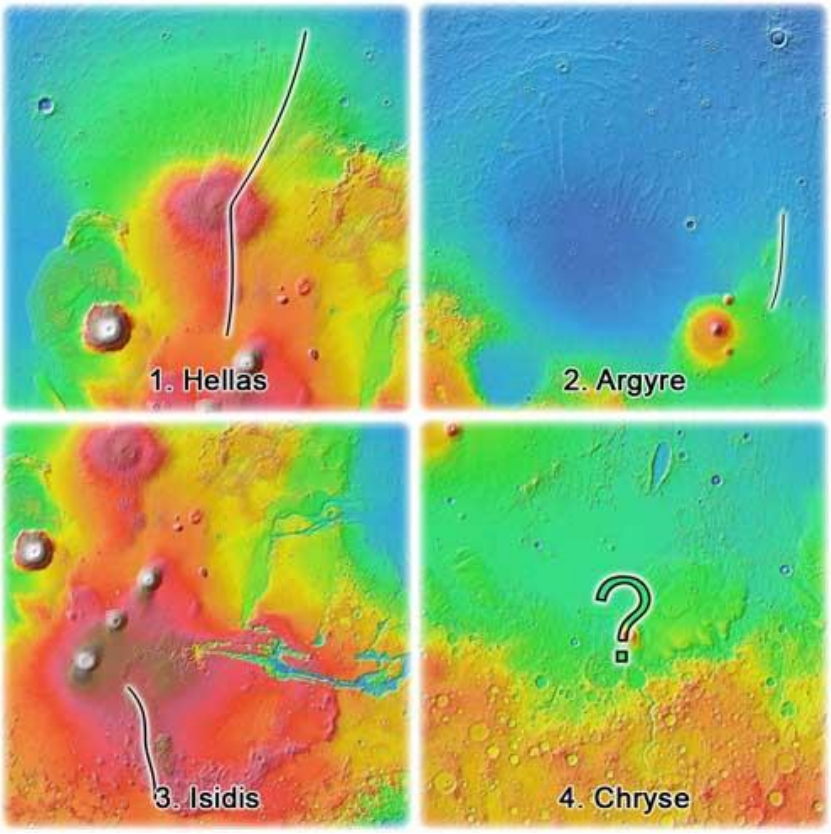

*8.a.) Tpye one, interferring waves*



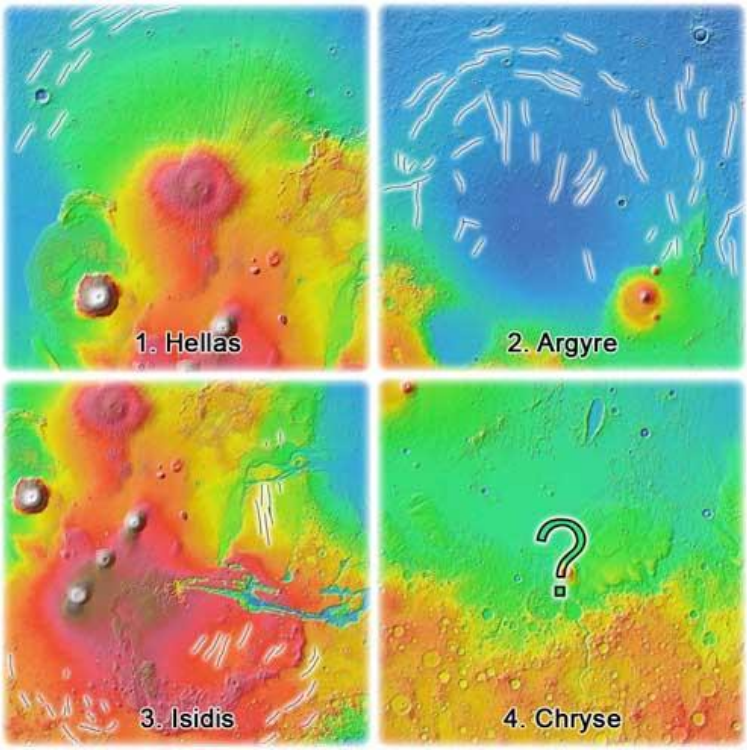

*8.b.) Type two, ring waves*



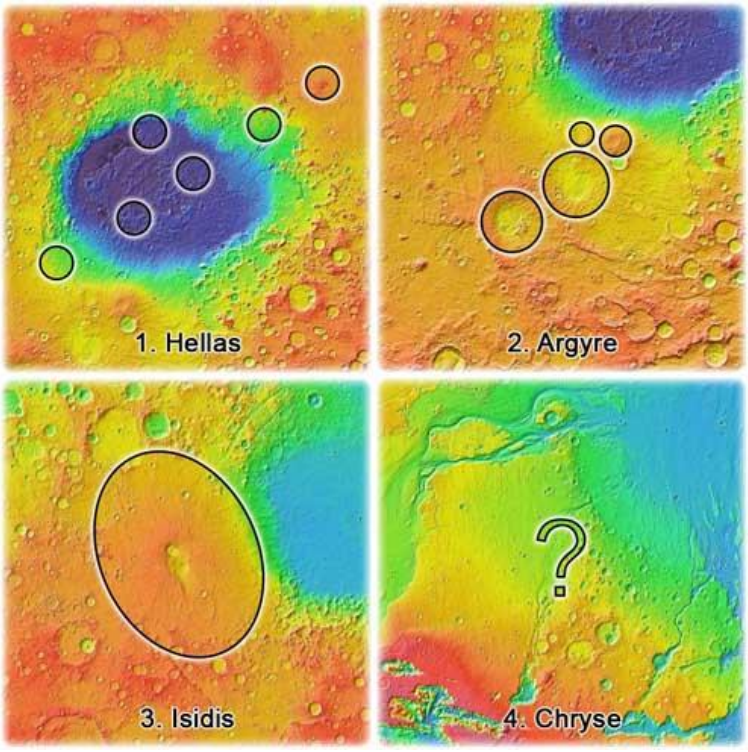

*8.c.) Type three, center waves*




*8.d.) Type four, main surface waves*




*8.e.) Type five, secondary surface waves*




*8.f.) Type six, reflected waves*

Investigating the summary of the first and sixth type waves, the first and last figure of this chapter we can make out how the *focus* of the layer structure of the planet's body changes. This can be caught in the shape of the formed volcanoes' slopes and calderas.

## 9.) Effect of the water coating

Looking over the elevation map we can establish that the created formations are caused by the same phenomenon, by shockwaves – meantime they show great diversity. This is because of the small irregularities of the inner material layers (convection channels, else possible systems), density differences of these layers, and the deforming of the planet. But there is one more great factor that is responsible for shaping the created formations, and gives solution for a few Martian mysteries. Its clues can be found on the whole surface of the planet in smaller and bigger scale, on the images of the first Martian probes as well as on the microscopic snapshots of rovers. This factor is: water. We can see its marks on crater edges and cliffs, valley system of rivers, wavy sanddunes, water ice, minerals suggesting presence of water, and so on.

The big impacts mentioned in this paper could eject great amount of material what would cover the whole planet and should have been causing millions of craters everywhere. On the other hand we see that the Northern hemisphere is far less cratered than the Southern. Only one thing I can imagine that can explain this: thick covering of water. An ocean, what blocks the debris to reach the ground. One thing could contradict this, namely Tharsis Bulge, the highest region of the planet on what couldn't be found a lot of craters neither. But I assumed that it was lifted up by Isidis impact with all the other smaller formations on it. Accordingly nearly all of the Northern hemisphere could have been under water with Tharsis Bulge, Alba Patera, and with the most part of Elysium Planitia. These were lifted up later, after most of the debris fell back to the ground following Hellas and Argyre. Alba Patera was covered with the ancient ocean from Hellas ejecta because it took time the ocean to ran off of it. At the time of the impact with the most ejecta, the Hellas, the other two formations was also under water. Elysium, evolved after Argyre impact could mainly get bombing from its own debris – but here it was less material, and the ocean was also there for a time. At this moment Alba Patera was covered, or the Argyre ejecta couldn't reach it. From this bombarding Tharsis Bulge was yet protected. Then the Isidis and Chryse impacts followed. But these two arrived to flooded, thick ocean shield what made their crater much more smoother and also reduced their amount of ejecta. In addition the water here could react with the hot ejecta like it did at the forming of Valles Marineris, where the boiled water melted the ground.

It is a great help in locating the used-to-be wet lands if we look for splattered craters. Another help would be the characteristics of wave signs recorded by the surface. On the ocean floor these drawings are finer, whilst drylands rather cracked up. For this last case Margaritifer Terra is a good example, the superposition points on drylands of the Isidis impact.

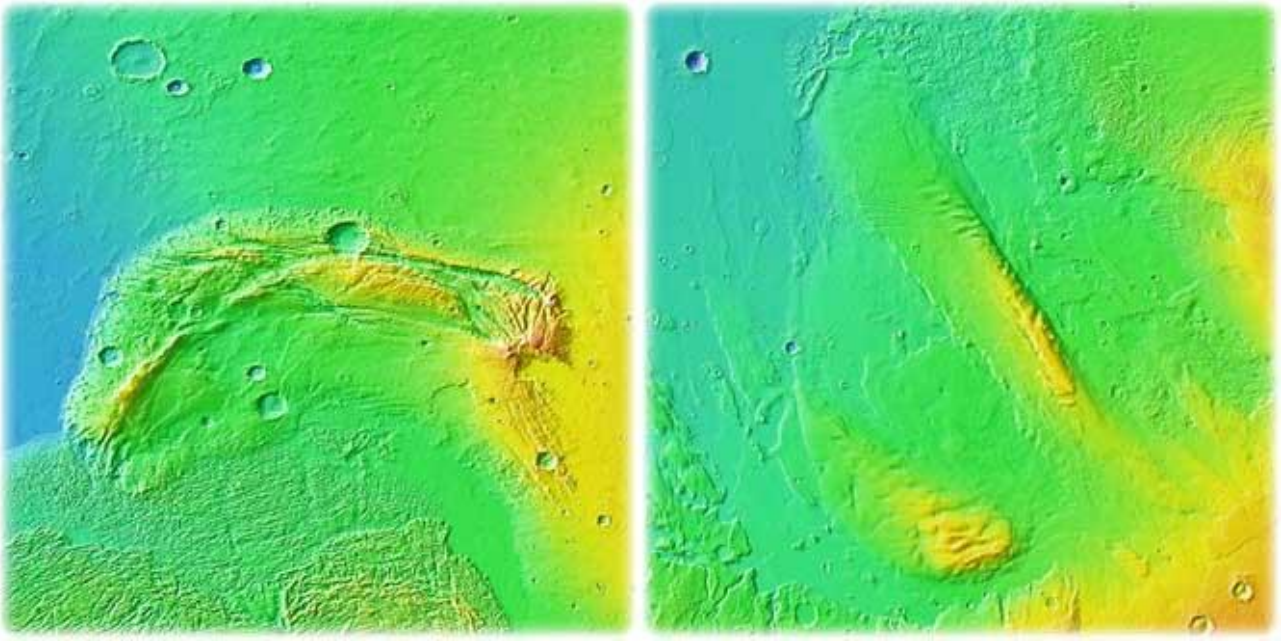
I must note that the MOLA heightmap used in this paper is accidentaly colored so that most of the ancient ocean floor is blue, like it would be water. This isn't true for some places like Tharsis Bulge and Elysium, so we shouldn't be mistaken by this coincidence.

From the things mentioned up to now other ones are concluding:

First let's take the big Martian volcanoes. Accordingly these are not volcanic formations, thus Tharsis Bulge wasn't filled up by the material from those, neither the bulge's surface was covered by them, so craters are not rare on it because it is a young volcanic surface.

The age estimations of the typical Martian formations are also incorrect, as well as the historical periodization, because it relies on these estimations. And the ages are determined from the theories how these shapes could born. According to my conception these formations were born due to giant forces almost at the same time, together, in a short amount of time. The only question rather is exactly when did this happen. I cannot give an exact answer to this, but as we will see later, the transformations of environmental parameters and states could be quite fast after the disaster, related to the age scale of the planet, and a balance could have been set, which lasts still. If we find non-balanced processes during the research of Mars, as in the atmosphere, in the movement of the

moons, what progressions would show great changes in a few million years, we must start thinking about that all of this might not happened so long ago.

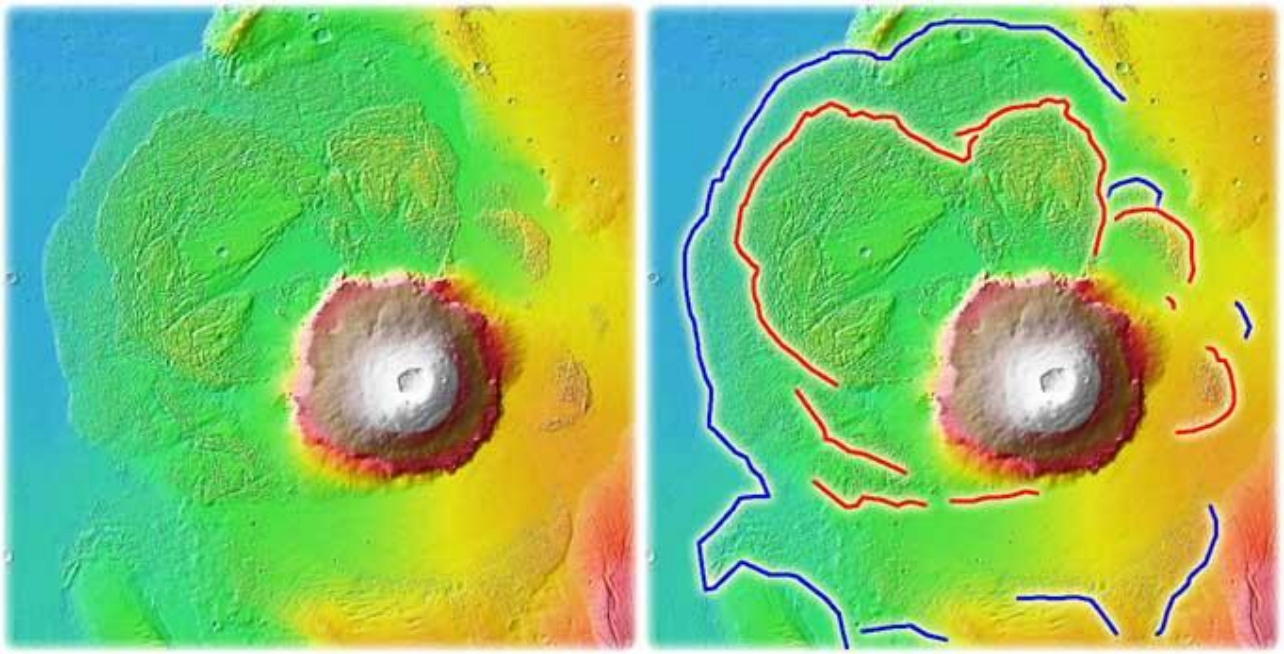


*9.a.) To the left: Acheron Fossae*
*To the right: Gordii Dorsum and the smaller one, the Amazonis Mensa*

Coverage of water is the cause of some deferred answers. In the environment of Olympus Mons, Acheron Fossae to the North compared to Gordii Dorsum and Amazonis Mensa on the South West is different because the last ones were washed away by the ocean rushing down from Tharsis Bulge. This can be seen on their wavy surface. The Northern formation avoided this because that area what it formed on was already lifted up by Alba Patera, and water had time to run down from it. Looking for clues of the ancient ocean, and its work on the terrain we must take into consideration that after the big impacts all the elevations were much higher than today, these deformations flattened a lot by now. Accordingly the ocean layer was much thicker and covered a smaller area for a short amount of time.

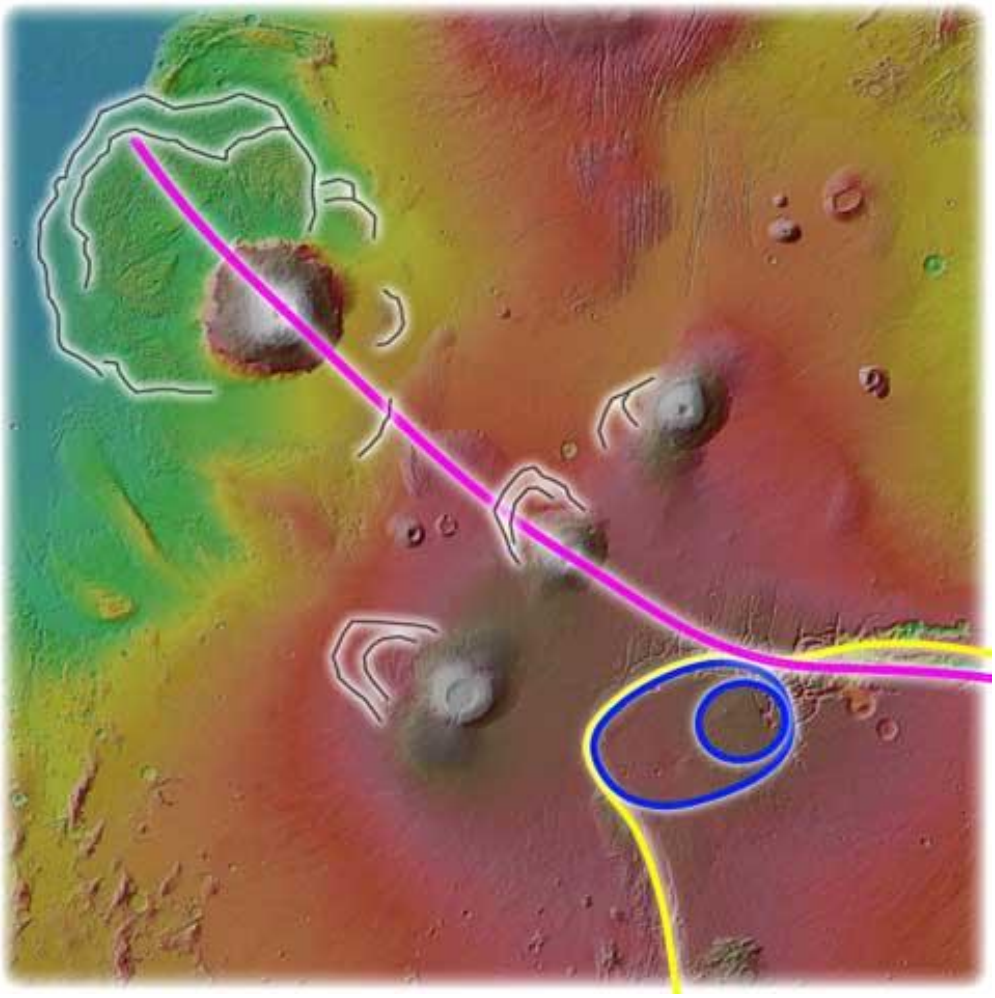
The energy of the big impacts could boil vast amounts of water, as well as the magma inside the opening deep cracks, and by this the atmosphere got filled up with vapour starting heavy rains all over the planet. Water reached all of the surface by this, and by the floods caused by the big impacts.

We can also find an answer for the characteristics found at the surroundings of Olympus Mons, today referred as tropical mountain glaciers.



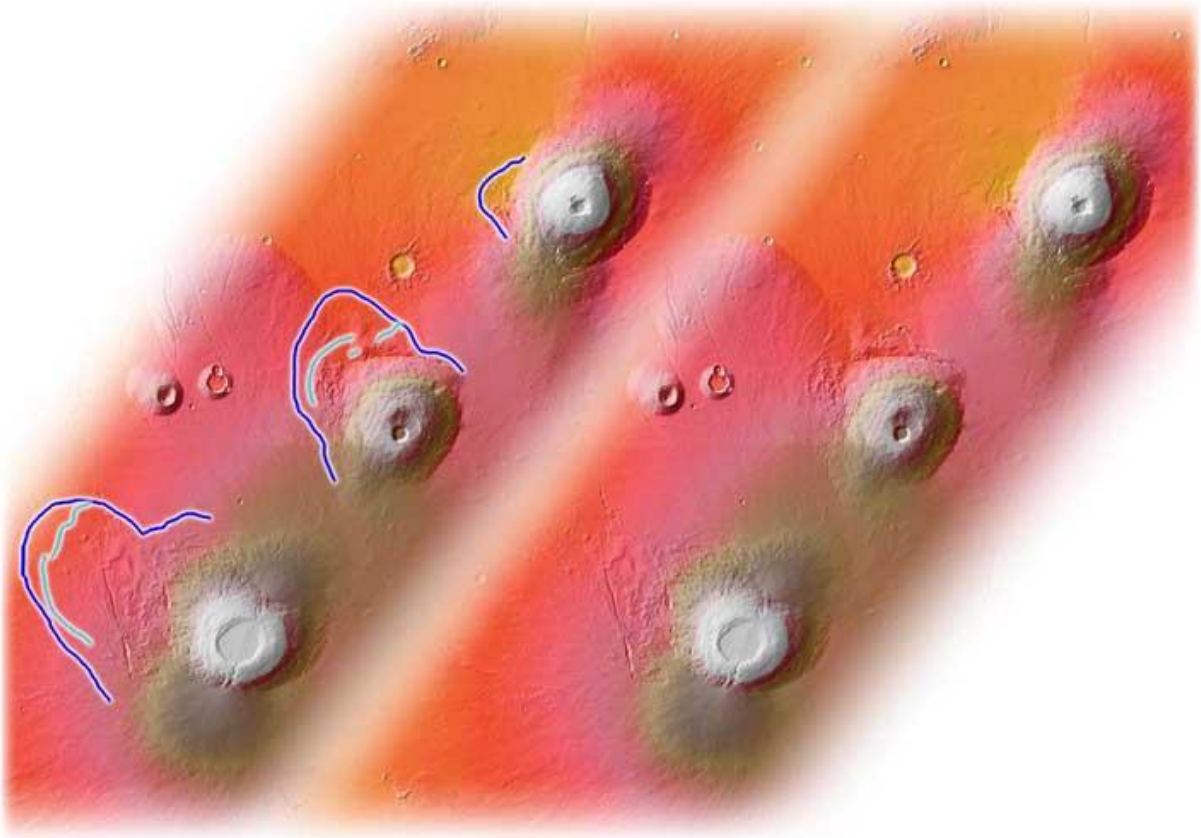
*9.b.) The tropical mountain glaciers - as we call these today - around Olympus Mons are landslides instead.*
***Red lines:*** *slides caused by the Isidis impact, when the mountain also formed.*
***Blue lines:*** *surface shifted at the arrival of Chryse. By this time the mountain was more evolved and its environment was higher and steeper. This way the quakes could start landslides on larger area. The Chryse impact could start again the first landslide areas as well. The finer texture of the second landslide areas can also be noticed. What's more the trimmed crust around the volcano is not continual because the edge came down on several sections – during its formation or by the effect of Chryse.*

As the elevation created by the most focused and largest forces it was an area with the steepest slopes. What could happen here is what we know from Earth as an accompaniment of earthquakes: landslides. On steep slopes due to the quakes the ground gets liquified and starts to run. We can see similar signs at the surroundings of the three other big volcanoes, but only from the North West, with a reducing rate in the South North direction (figure [9.d.]). This also tells us about the slopes' degrees in the time of the disaster. Because – especially in the case of Olympus Mons – if landslides would happen on the slopes with the current degree, it should have been happened many places elsewhere with similar intensity. The center region of Isidis impact was the Eastern part of Noctis Labyrinthus, all of the inner forces met at Syria Planum as the first, second, and third type of waves, the waves with the ability to lift the crust up. The highest point of the region was here, not counting the newly born volcanoes' pikes. But it's also possible that it was also higher than the peaks measuring the distance from the gravity center of the planet. So the gradient of the bulge must be counted from here.



*9.c.)* ***Pink line****: main effect line of the first type of waves*
***Yellow line:*** *second type ringwaves*
***Blue circles:*** *center area of third type waves*
***Black lines:*** *only the landslides around the big volcanoes are marked*

From here the volcanoes are exactly at the North West, in the direction of the slides. The extent of these slides are worked out from the factors that how high was the given elevation, and how close it was to the elevated region of Alba Patera. Olympus Mons is the largest formation here so the effect is the most extreme here. The other three volcanoes from the South to the North are located closer and closer to the region already elevated, so the effect showed less and less.



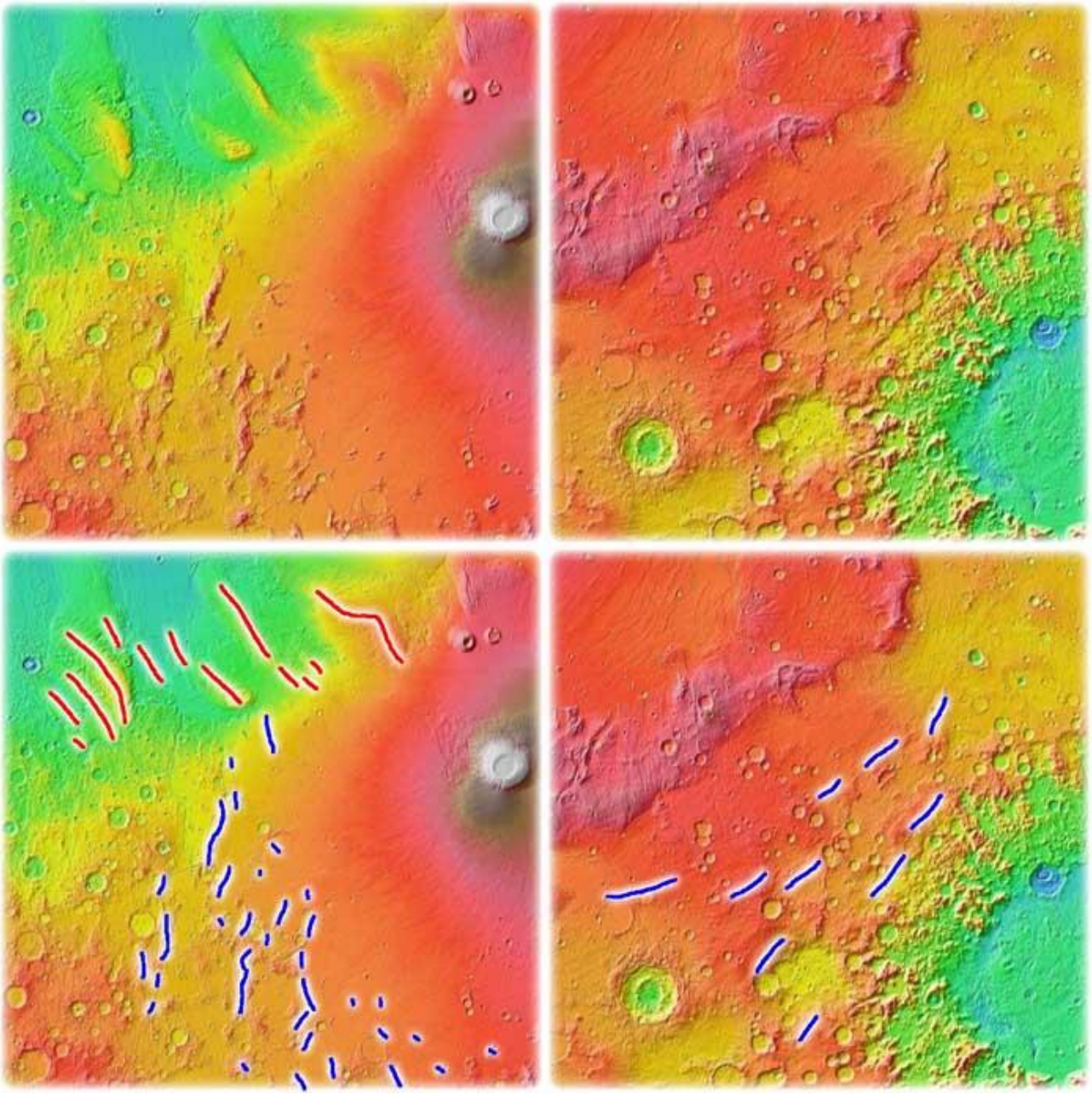
*9.d.) The cyan lines are the first, the blue lines are the second landslides beside the three volcanoes, South East from Olympus Mons.*

Although the whole Tharsis Bulge is covered with all kinds and extent of landslides, another, spreaded form of it can be found all around Tharsis Bulge and Alba Patera, with the most typical appearance around Arsia Mons a bit farther, starting from the West to South and South East, and to the West from Ascraeus Mons, and on its Eastern side from the South East to North East, and similar regions to the East and South West of Alba Patera.

*9.e.) South from Arsia Mons*

*9.f.) South West from Alba Patera*

The presence of the ocean had made another difference in engravement of the waves on the surface. We know that the crust under the ocean is much thinner than at drylands because the water pushes it down, and the bottom of the crust melts into the hotter mantle under it. It causes to be more plastic, which property is enhanced by the watery content. So for example if there were drylands opposing to Isidis impact, the Tharsis Bulge and its formations would appear far different, in fact Valles Marineris wouldn't be so wide, because water played a big part of evolving its current form. The strongest waves rippling the surface on drylands rather caused cracks, and on wetlands lifted seawave-like obstructions.

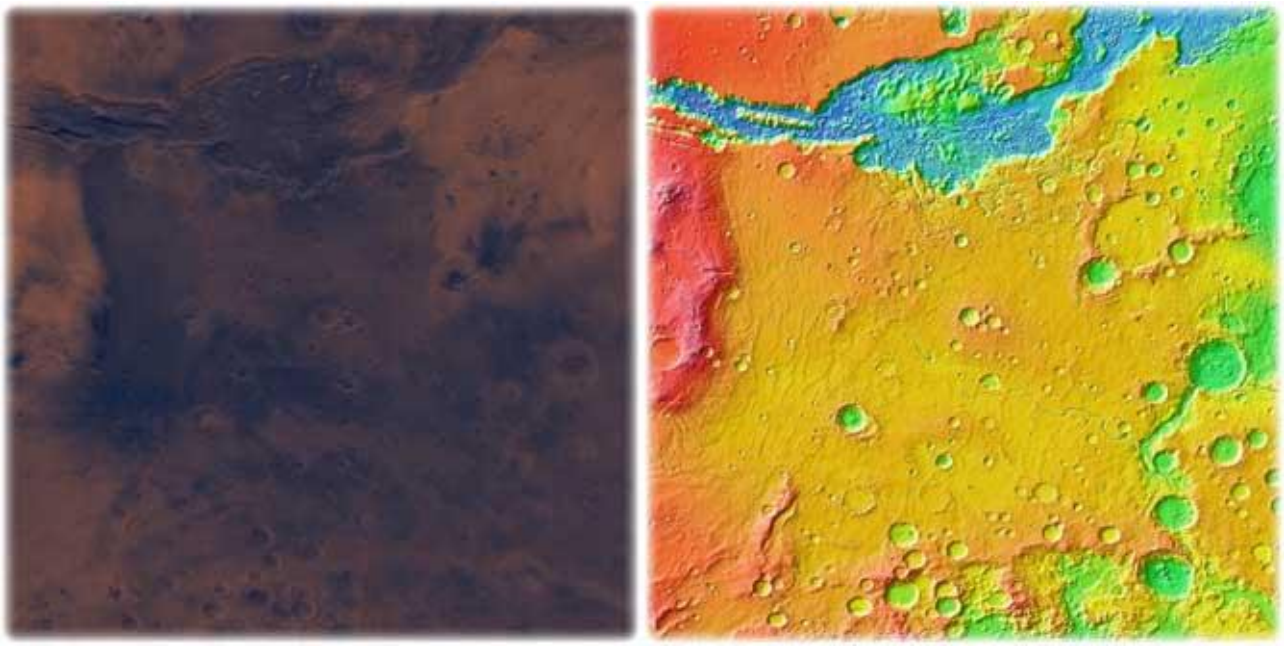


*9.g.) South part of the environment of Tharsis Bulge.*
*Pictures on the left: to the South West,*
*Pictures on the right: to the South East from the bulge*
***Blue lines:** mountain ranges lifted up by surface waves with mixed origin*
*(from various types of inner waves)*
***Red lines:** previous ones continued on ocean floor.*

Not only the debris falling back was swallowed by the water coating, but it also dimmed the shock caused by the asteroids. That's why the first two big craters differ from the second two. The Isidis and Chryse asteroid arrived in water. This circumstance strongly diffused their crater rim, and probably they haven't been creating so much ejecta like the previous two. This can be seen also on the areas that lifted up from the ocean just before the last two impacts, that they got just a few craters on them. Isidis shoud have been filled with craters the Elysium and Alba Patera. And Chryse should have been done the same at least on Tempe Terra and Lunae Planum found to the West. At

the case of Chryse impact we can see – and what it proves its existence as an impact – that the dark material exited on the Eastern corner of Valles Marineris washed away to the South, uphill, in the opposite direction of the impact. This can be easily made out on the Viking map taken in the visible spectrum.

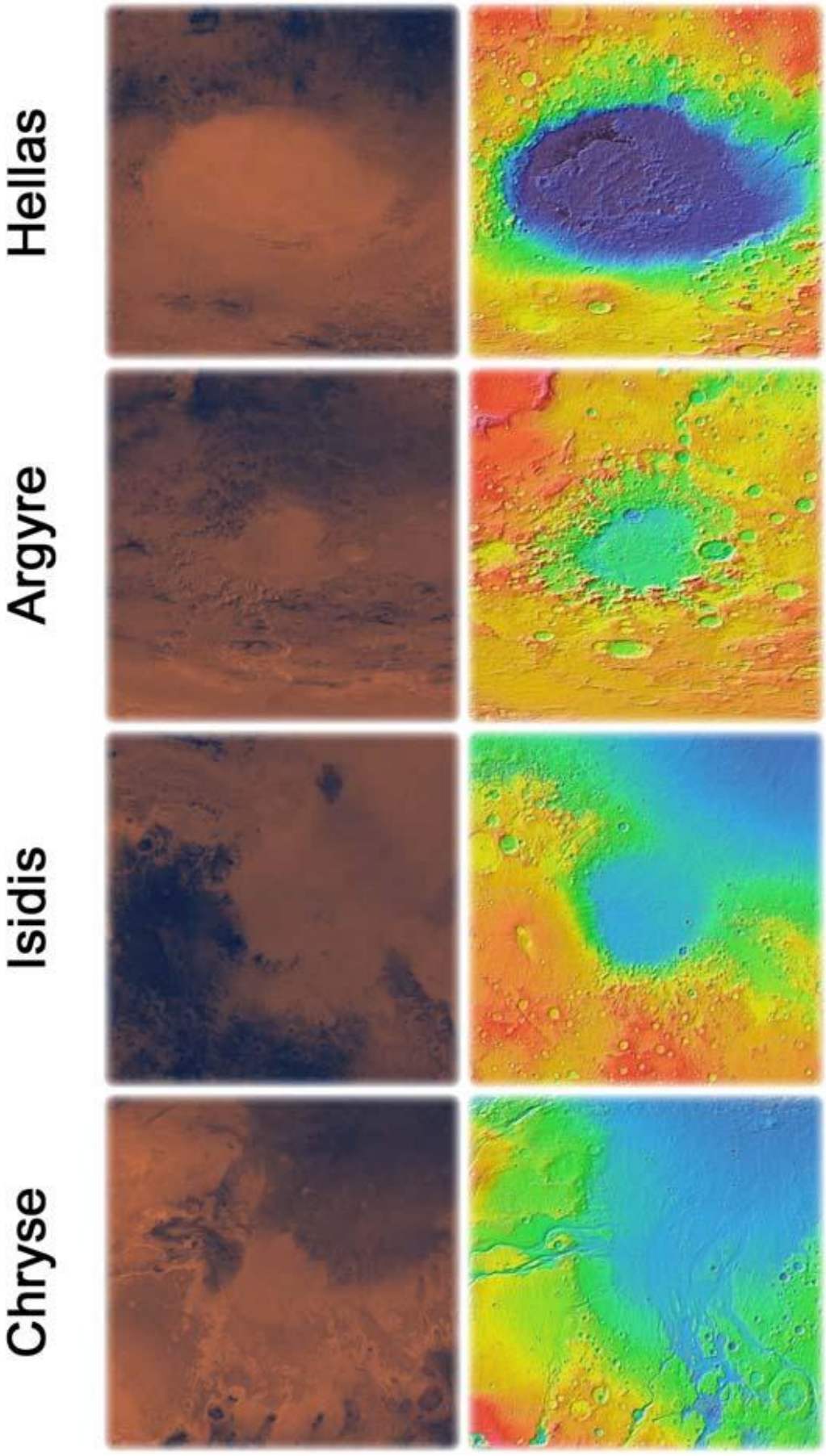
The heading of the floods can be nicely followed and reconstructed by the way of the dark material held up by the smaller craters, drawing lines from them. The uphill movement of the flood is caused by the momentum of the impact.



*9.h.) The outflow of the material containing lava mixed in it at the Eastern side of Valles Marineris. Nothing could cause this material to climb out from its channel. But let's not forget that to the North from this area the Chryse impact happened during the formation of these rivers, also during this outflow. Chryse hit the rearranged relief with the newby ocean on it, and pushed the water apart in every direction, even washing away the area shown in this picture. We can also observe that how the ring shaped mountain range on the left held up the running mass of water colored by the dark material. This height couldn't be climbed by the flood. The dark material gathered to the foot of the mountain.*

It can be noted that all the big impacts' craters are lighter in color than their surroundings. My explanation is that they were filled up by water, even the ones deep inside the drylands, as Hellas and Argyre Basin, and the black material from these impacts and from Syrtis Major, what could also spread in the atmosphere, and was carried later by the floods couldn't enter freely into the basins filled with clearer water.

As an additional effect the water moderated the volcanic activity of the vents cooling the hot magma.

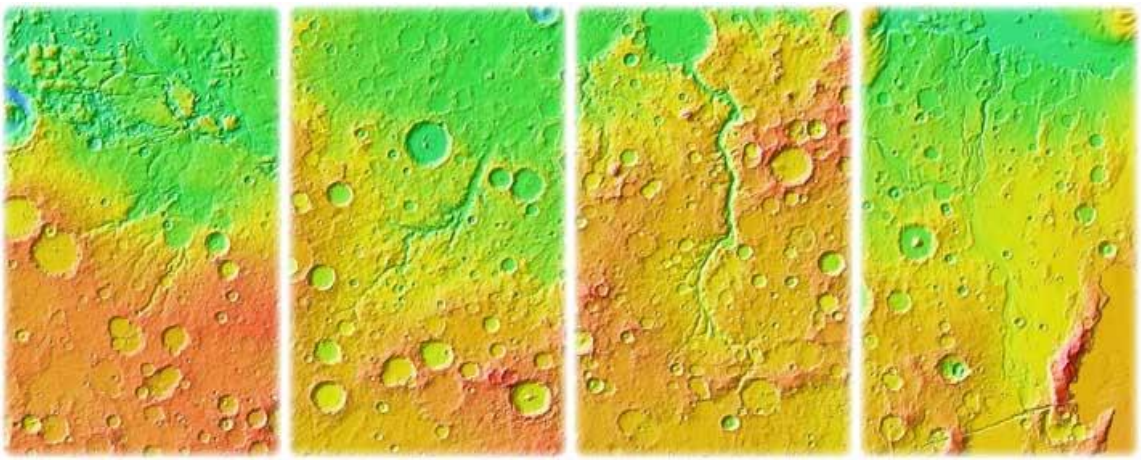



*9.i.) The dark material coundn't enter directly to the big impact craters.*

## 10.) Disappearing of water

Scientific theories assume a big event what they relate to the disappearing of water. I think my theory is just about this episode of Mars' life. After the impacts the heart of the planet what generated its magnetic shield stalled, or it weakened so much that the Sun started to blow off the rest of its atmosphere. With this the air pressure dropped and the water started to evaporate. A part of its water also left the planet, another part condensed at the poles and began to form the new icecaps. The rest was frozen into and onto the ground. This evaporation lasts still, but the temperature had been dropped and dust covered the rest of the water, this way slowing the diminishing and sublimation. Besides at the time of the disaster a big amount of water could be contaminated by volcanic ash, what could also help to aggregate and remain. This way also the air could clear out faster. With the floods and heavy rains the water reached every corner of the planet, and also sit in the craters deep inside the drylands. This can also be told by numerous river channels, many of them reaches the scales of the formations analysed in this paper, so they are visible on the MOLA elevation map.

*10.a.) To the North East of Dawes crater we can see bushy system of rivers. These channels get more frequent in their way heading to the North, where the ancient ocean was – at the areas what were (after the impacts) and are (today) on lower altitude where the floods could flush the terrain more (see next figure).*

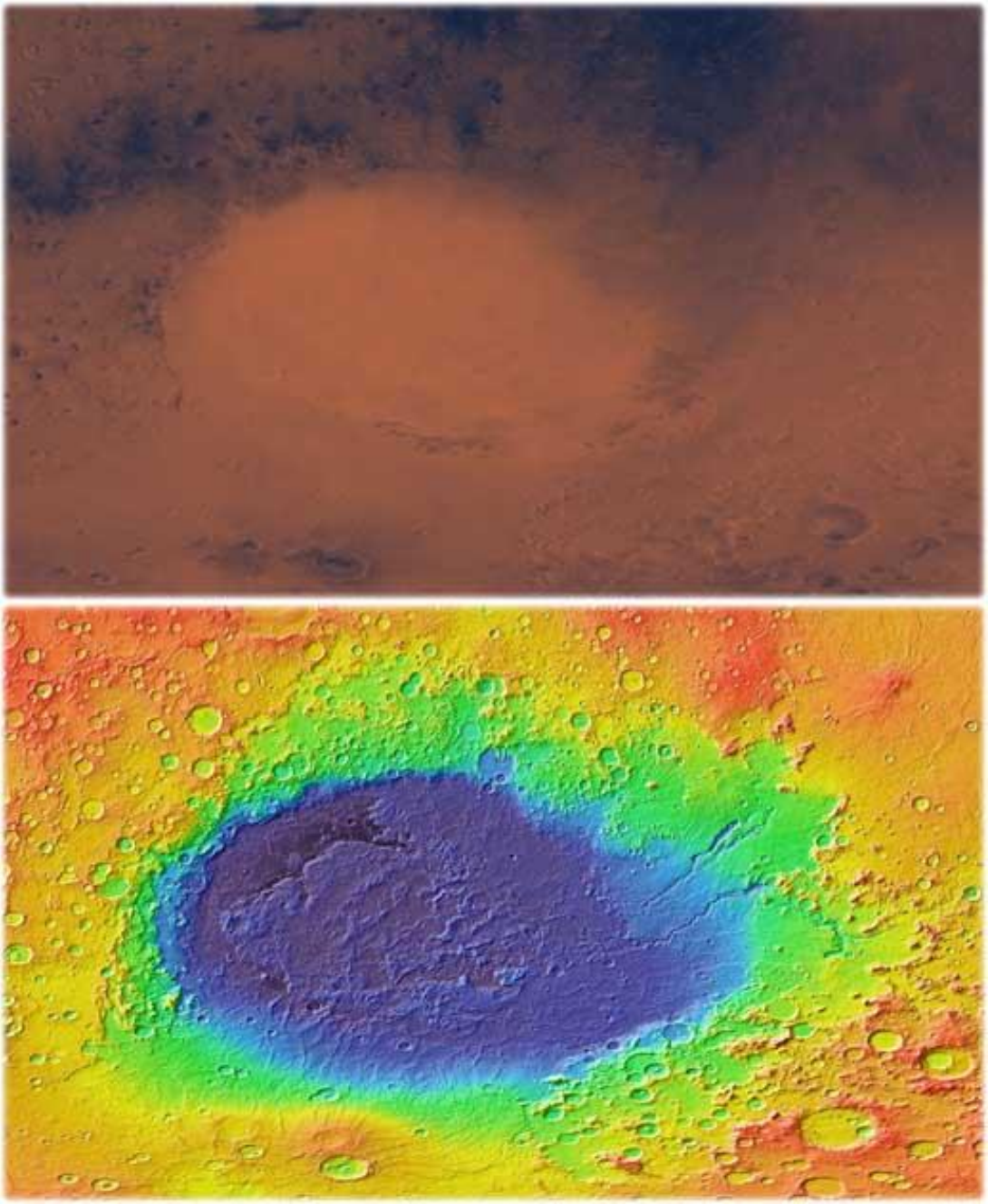


*10.b.) To the South of Elysium Planitia we can find the rivers what were carved out by the down-pouring floods from the drylands with higher altitude.*

## 11.) The large impact craters

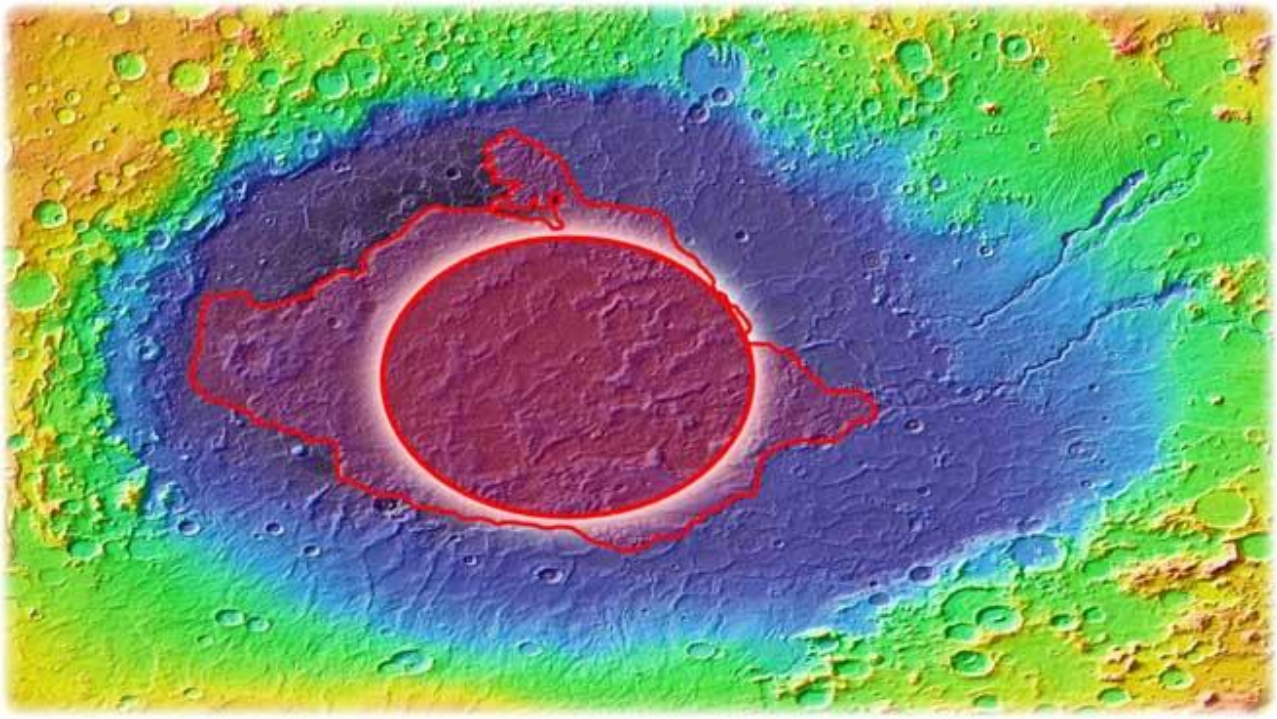
### *11.1.) Hellas Basin*

It's the greatest impact of all, given by the size of its crater. Although this cannot be told expressly from the marks on the antipode, as in the case of Isidis. Its energy was consumed by the breaking of the spherical symmetry of the planet and not in creating many smaller features. Thus this amount of work in distortion cannot be seen directly, but only in the broken symmetries of the following impacts' formations.



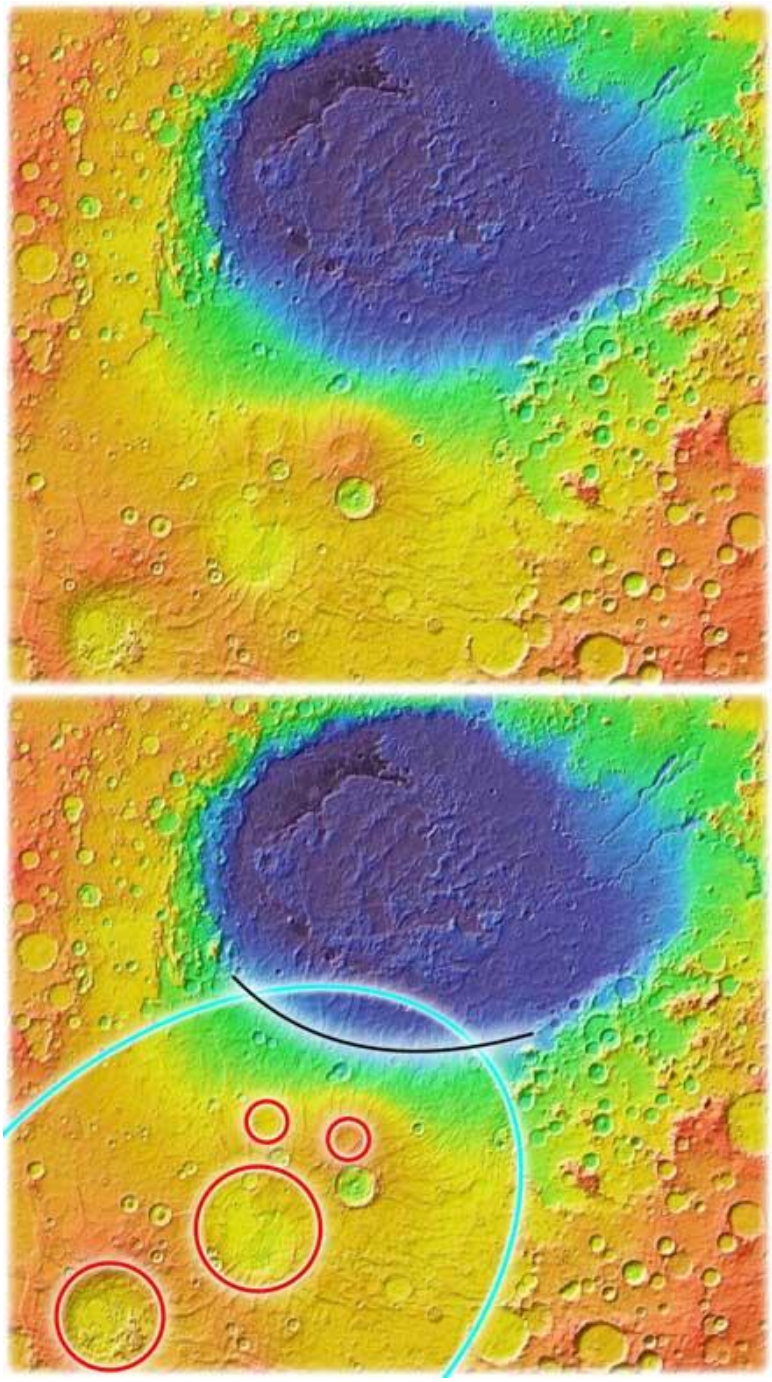
*11.a.) Photographs from the visible spectrum don't show much characteristics of Hellas Basin. Elevation maps are much more useable.*

The photos taken in the visible spectrum don't show much of a use here either trying to analyse the local events. Elevation data is much informative. At first we can tell that it was a very low angle hit from the East, and a bit from the South. The Western rim of the crater creased, on the Eastern side the crust got thin and got holed at a closer point of the reflected waves, and the „fizzy tablet effect" appeared. Looking at the patterns in the basin we can distinguish two types of regions. On this extent of resolution there is a surface with a system of threads what is on the Eastern side, and also around the crater's rim inside. Secondly there is the area what is in the center of the basin shifted slightly to the West. This is the part where the crust broke in. We can observe the edge on the relief where the magma flown out. A section of this is Alpheus Colles. This is the area where was the greatest underbent of the crust because of the low angle of the impact. As this was a surface with material of melted rock the waves couldn't engrave so clearly as on the environment. This is why this area doesn't hold thin creases. I assume that his material - before spreaded to the location where it was frozen - could rise high, and could give birth to some of the asteroids in the Solar System, even Mars' own moons what we can see today. So these moons could be consist of the material from the mantle.



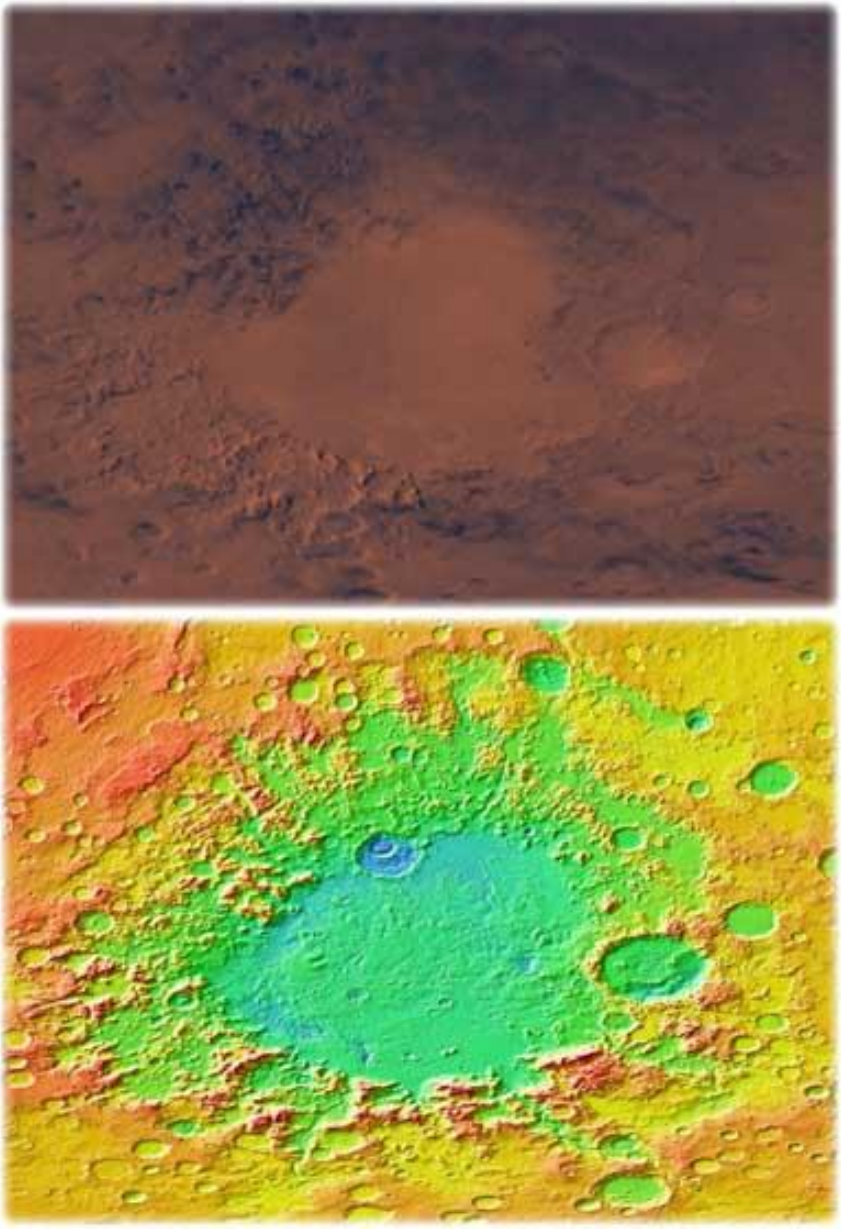
*11.b.) Structure of the Hellas crater:*
***Red ellipse with white border:*** *the area where the rigid surface could crash in*
***Red bordered outer area:*** *surface with a non-filamentous texture. It's probable that we can see the magma flown out here, today covered with red Martian dust. This can easily made out on its Western edge. The purple area to the West of the center is the crust what was bent under at the time of the impact, and the magma ran over it. This is good to see because if we sample this area, we musn't reach big depths through the crust to meet with the material normally found inside the planet.*

The Southern, South West part of the Basin was smoothed out later by the reflected waves of Argyre impact, and made a section dissappear what was resembling to the Northern crater rim.



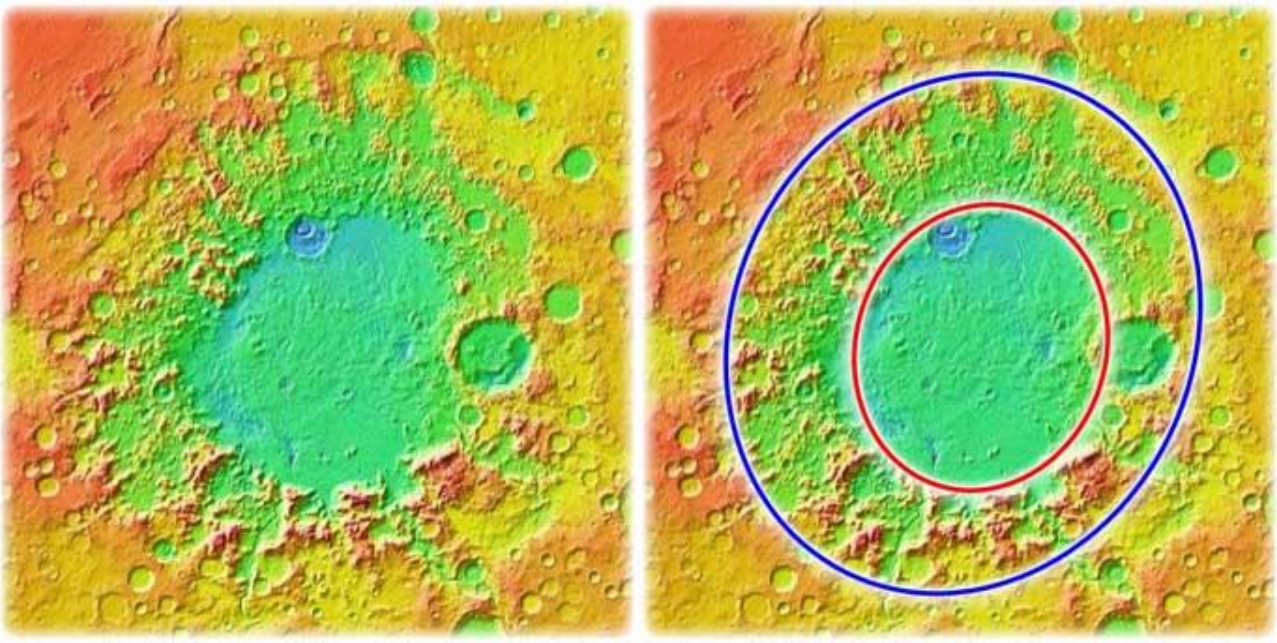
*11.c.)* ***Red circles:*** *larger interference superposition points*
***Cyan ellipse:*** *effect region of Argyre reflection*
***Black line:*** *crater-freed and smoothed-out border line of Hellas Basin*

### *11.2.) Argyre Basin*



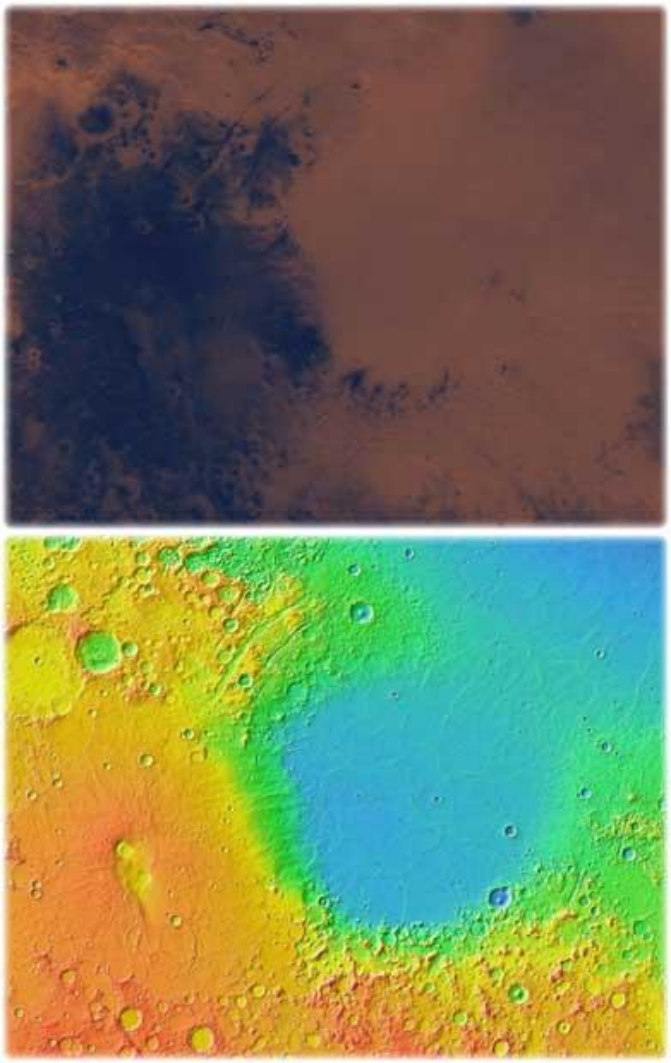
*11.d.)*

As the Hellas, this also was an impact on dryland. On the other hand it differs from it as well. This is given by that more of the energy could distribute on the crust, because it didn't brake it through or didn't brake it through so deep. I cannot see it expressly. Anyhow the center of the crater resembles to the Hellas Basin's center, where the reflected waves couldn't engrave like a system of threads on the melted material from the mantle. The impact angle is similar to the Hellas', what we can see from the distribution of the broken ground in the environment.



*11.e.)* ***Red ellipse:*** *impact crater*
***Blue ellipse:*** *mean border of local material ejection*

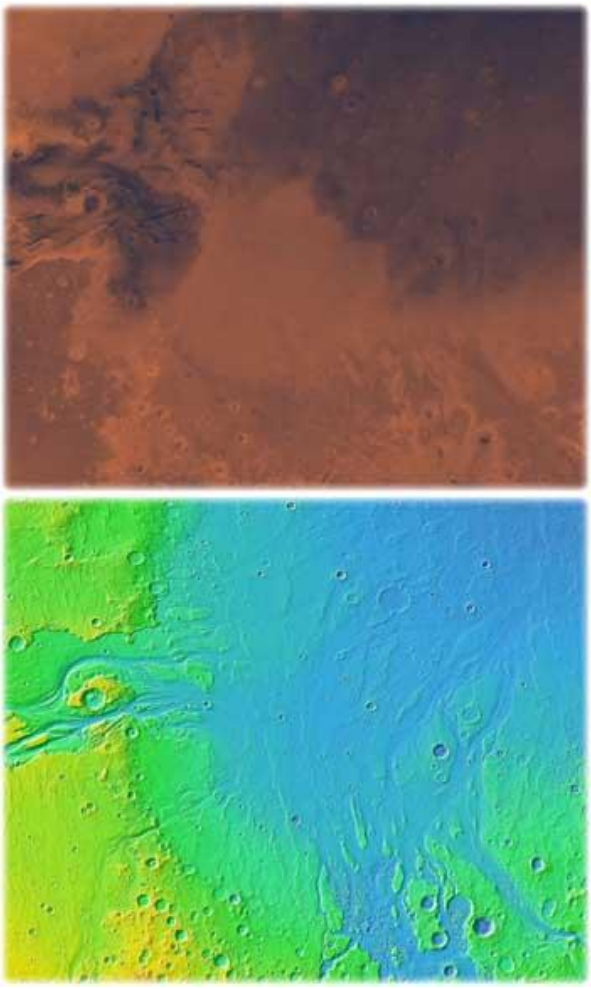
### *11.3.) Isidis Basin*



*11.f.)*

It cannot be said by looking at the crater itself, but this was the biggest impact after Hellas. We can tell it by summarizing the formations on the opposite side. The importance of the water's present is observable, as it handled the energy of a large asteroid with cosmic speed. Because as the Argyre showing formations with smaller elevations with a large crater, the Isidis Basin is a rather dimmed crater with no broken up crust surrounding it. There are only a few cracks. The bigger ones are: Nili Fossae, Amenthes Fossae. These were widened by the wobbling ocean. The energy of Isidis was held up by the flooded ocean being here just in time, which location used to be dryland. This can be stated from the craterization of the surrounding areas on the North West, and South, and South East. We can find the ancient ocean's floor to the North East.

### *11.4.) Chryse Basin*



*11.g.)*

The last three impacts destorted the shape of the planet so much that compared to Elysium, and the picture created on Tharsis Bulge it got another step more complex. The created superposition points are almost impossible to make out. I can list four causes for this. First: the planet was extremely distorted by that time, the different waves spreaded very much. Second: this was the smallest of the big impacts. Third: opposing to the impact there wasn't an ocean floor, but a less elastic dryland with thicker crust. Fourth: the focus of the planet could shift so far from the surface regarding the first type of waves (into the planet's body or over it) that enough energy couldn't be focused to the superposition points of the interference pattern. This was also an impact on dryland covered with flood, just near the old ocean bed, as we can also tell from the smaller crater signs around the basin.

Accoding to the wrinkles surrounding the basin it was also an impact from the East to the West. On the Western rim there is a slight crease.

The dip created here altered the direction of outflows from Valles Marineris and its neighbourhood. I cannot tell exactly where the front of these flows were at the moment of the impact, but it's for sure – as I pointed out before – that one of these flows could have been washed away by the flood started by the impact of Chryse (figure ([9.h.]).

## 12.) The asteroid and its pieces

### *12.1.) Time elapsed between the impacts*

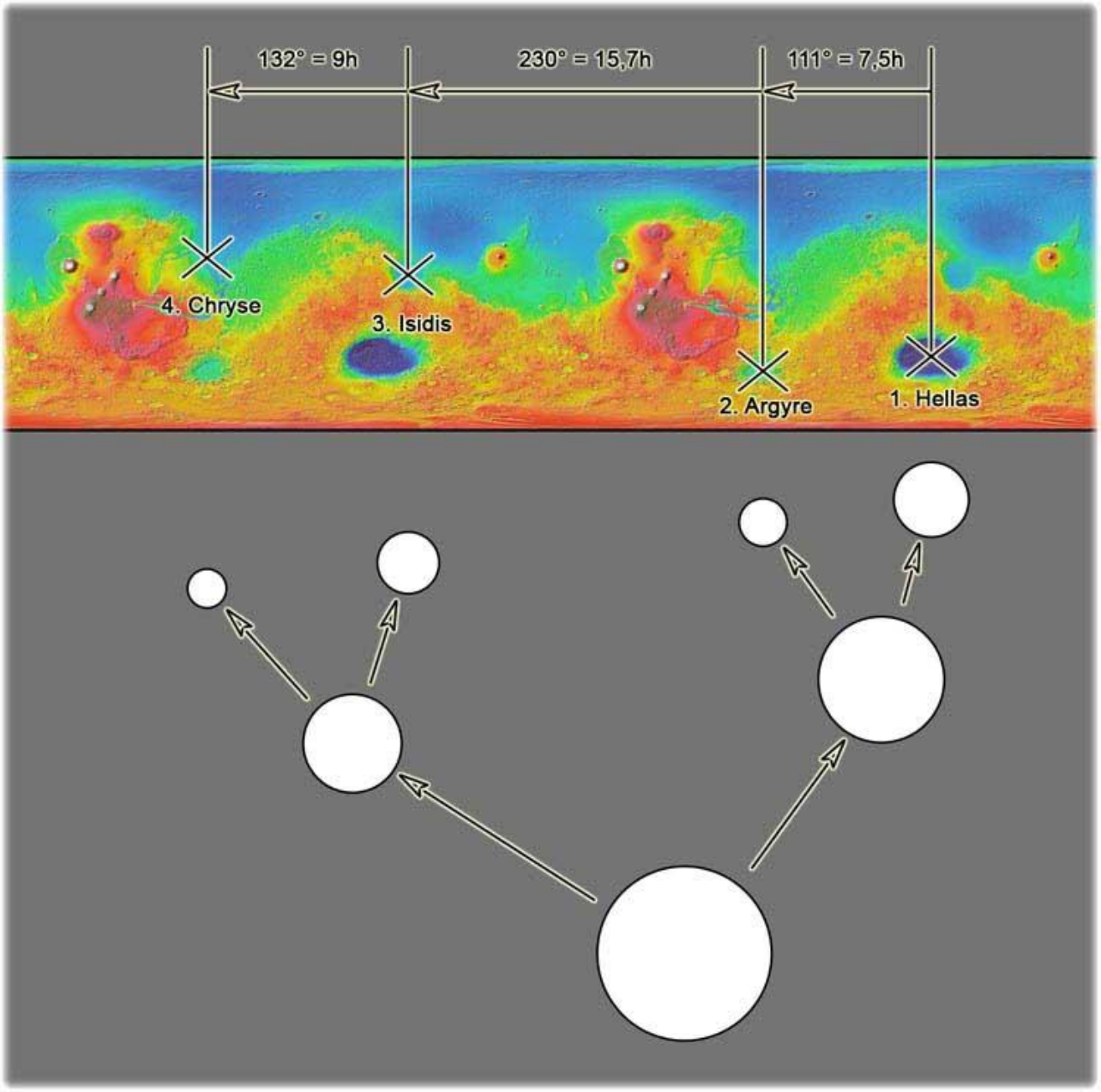
The pieces coming from nearly the same direction and at the same time reached Mars on similar trajectory. As the planet rotated around its axle, the pieces shifted in time hit different areas. From this a rough estimation can be made of the time shifts with what the asteroids followed each other. They also could slightly change the rotation behaviour of the planet (according to their orientation they could slow it down).

*12.a.) Shoemaker-Levy 9 comet*
*Hubble Space Telescope, 17.05.1994.*

First the direction of the planet's rotation must be determined that how we could see the terrain pass by under us from a fixed point above the planet. Mars' rotation is in the same direction as Earth's, so East and West is in the same way. Thus the terrain rolls from West to East, from left to right in front of us, so on a fixed map we must roll our sight from right to left. This is the direction in what the impacts must form a line. I suppose that all members of the asteroid group got an impact because Mars' gravity must have been defined their trajectory fair enough, thus they couldn't pass away from the planet, neither they could impact with a far different trajectory. For the calculation I take the case in which the pieces are spaced evenly and the closest possible to each other.

Mars rotates about the same speed as Earth, about 24,5 hours. So I take 1 Martian day 24,5 hours to count with. The distances I measured from the map are inaccurate, as I just estimated the centers of the impact craters and supposed the planet to be a perfect sphere. On a deformed shape a low angle impact could vary in location quite much. Also the pieces could drift from each other in a direction that they could get around the rotation axle a bit. So this is a very rough model, but at least it gives us something to look on.

The angle between the impacts from East to West: Hellas, Argyre: 111°; Argyre, Isidis: 230°; Isidis, Chryse: 132°. If the planet rotates 360° in 24,5 hours than it turns 1° under 0,068 hours, about 4,1 minutes. By multiplying these we get that between Hellas and Argyre 455 minutes, that is 7,5 hours, between Argyre and Isidis 943 minutes, that is 15,7 hours, between Isidis and Chryse 541 minutes, that is around 9 hours had passed. This can only be true if we suppose the pieces were the closest possible to each other, and about in the same distance, as we could see in the case of Shoemaker-Levy 9 comet hitting Jupiter in 1994 (figure [12.a.]). This way we get that all of the impacts happened in about 32 hours, less than one and a half day.




*12.b.)*

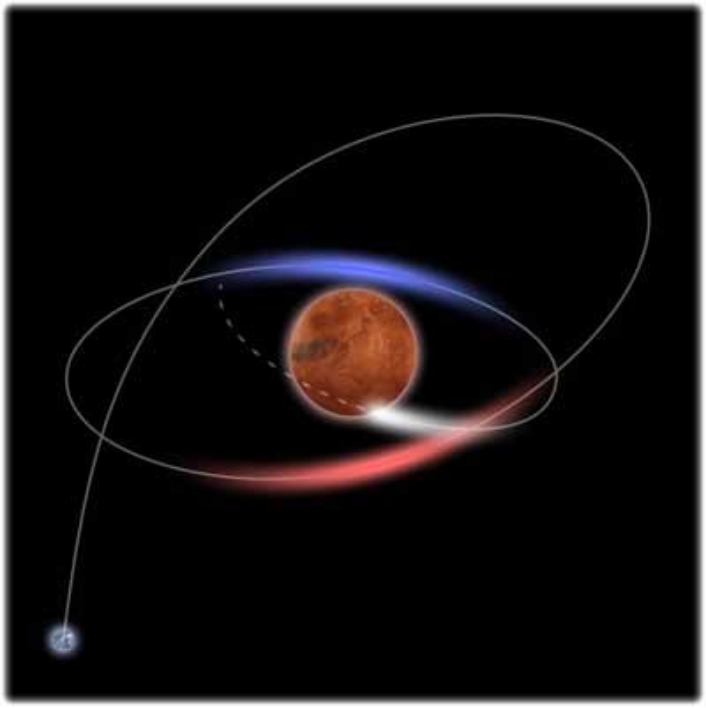
If the pieces were further away from each other then at least a time of one revolution must be added, that is 24,5 hours.

With this very simple method we can be wrong by several hours, but at least we can better see into the happenings. If we want more exact results we must make the detailed analysations, models, and simulations.

### *12.2.) The process of breaking up*

Investigation the pieces impact order and their sizes we can find more interesting regularities. Exactly to what proportions could the mother asteroid break apart. On figure [12.b.] in the lower part of the picture we can see the assumed scales of the pieces (it's just a rough estimation!) considering the factors and scales of: impact craters, water over big impact locations, quality of the crust (dry- or wetland), planet symmetry, formations and interference patterns on the opposite side, and reflected waves' marks. These proportions and directions show the following: first the mother asteroid broke apart into two pieces. In the point of the impact locations the smaller piece went to the West. The piece what was ahead, and crushed into the Southern hemisphere gave birth to Hellas and Argyre, from the Northern piece Isidis and Chryse were born. When these two larger pieces also halfed, the smaller pieces again parted away to the West in relation to the ground. With the gravitational acceleration increasing the mother asteroid could break up in the depicted way in the last figure. Another interesting thing is the behaviour of the smaller pieces of the second break-up. On the Southern hemisphere the smaller piece went to the South, on the Northern it went to the North. So they approached the poles. Their drift distance is similar. Also their positions compared to their sizes are symmetrical to the equator, which could tell us about the incoming direction and behaviour of the mother asteroid.

It should be used as another main rule that if something seems to be regular, it must be consistent. I think only one way the dual halfening could happen: with at least two close bypasses to Mars. If an asteroid is closing up from space it has the less probability to hit the planet frontally, or to spiral in on a near-circular orbit. I assume that the asteroid, asteroids had an elongated elliptical orbit. Getting close to Mars it turned back, and again it fell away closer to Mars, and once it caught the surface. And on an orbit like this it is very likely that it happens in a low angle. This is obvious on the Hellas Basin. The narrowing of the orbit could be partly caused by the breaking up, as the asteroid could loose kinetic energy.



*12.c.) The drawn orbit is not exact, but for demonstration only.*
*The **red** section is where the mother asteroid broke apart at the first time. On the **blue** section the breaking up happened again. Then the series of impacts could follow.*

It is possible that there were smaller pieces beside the four large parts. It's hard to tell where they hit in because numerous other larger craters are everywhere. It's possible to give an estimation for the size of the debris of the big impact, and if we find craters larger than the debris could possibly hit, then we can tell that there's a chance that they originated from the asteroid itself. Or they could have been created after the disaster. Not before, because the four big impacts erased and redrawed all of the Martian surface.

## 13.) Time course of the forming of the large landscape objects

In the case of the big craters the creation in just a few seconds is evident. The formations elevated by the shockwaves are created in not much more time, because the waves what created them dimmed quickly inside the planet and on the surface after a few reflections and runs around the planet. The volcanoes grew much higher in a short amount of time that they are today. After the inner pressure disappeared under them they crushed, and all the regions lifted up started to lower – the Alba Patera and its environment, the Elysium and Tharsis Bulge. This means for example that Olympus Mons with its 22 kilometers height above „sea level" must have been rose higher than this in less than 10-20 minutes. Meanwhile the ocean floor opened up radially in the center forming the mountain's caldera. Around the mountain there's an interesting collar. It was formed by the forces overcoming the limit what the crust could take and made it shear.

Because of the complex processes Valles Marineris was created over more time, but after the water ran down from the Bulge its evolution was broadly finished.

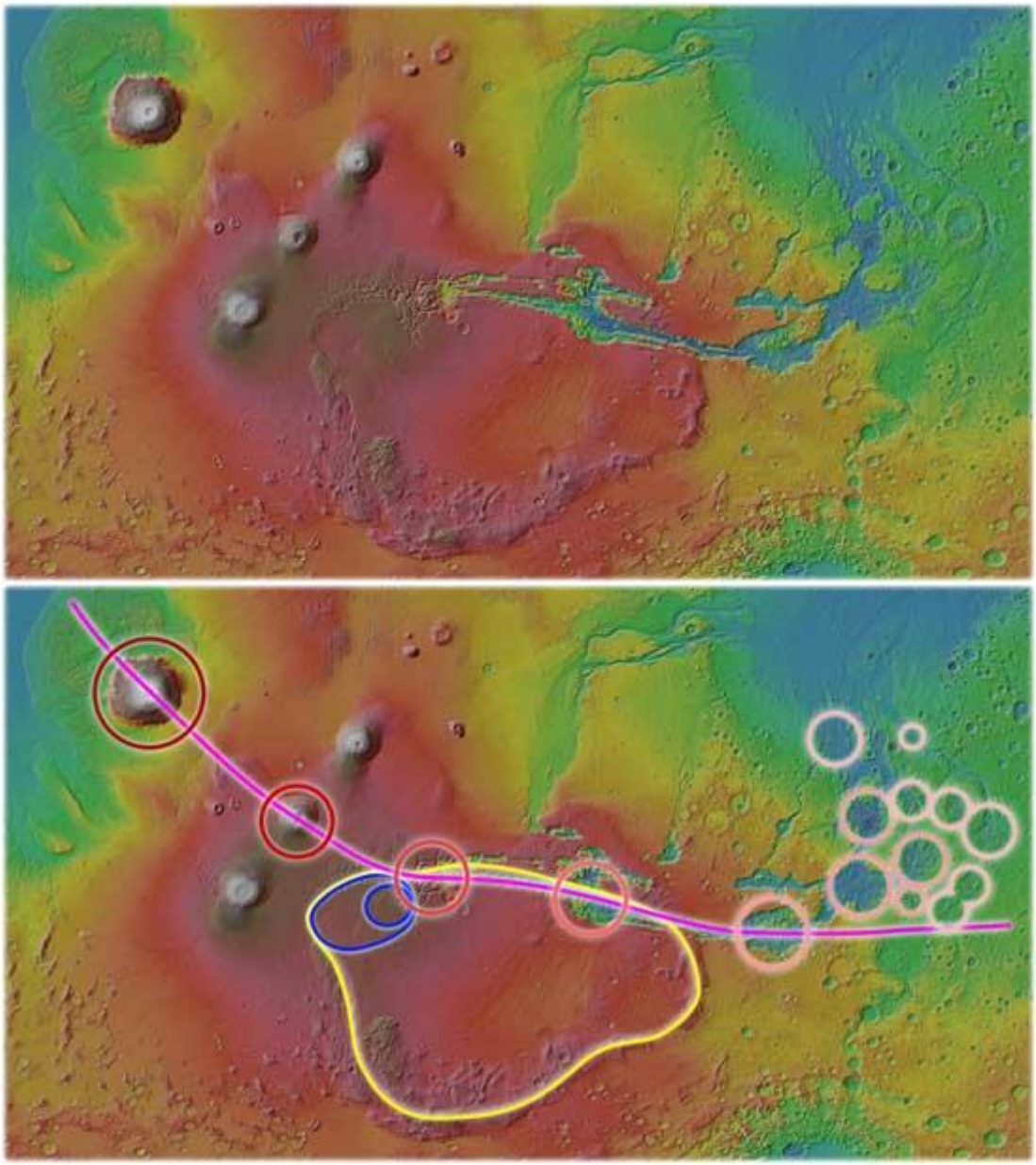
The wrinkles and landslides are the kind of formations that were created also in the first place by the shockwaves and by their upper harmonics.

There can be impact marks that can be caused by the smaller pieces of the asteroid fallen apart. The smaller craters are appearing constantly since the disaster. The surfaces also took hits from where the ocean pulled away or there weren't any water for a time. These are usually pieces fallen back later. On these areas we can see craters with splattered rims.

## 14.) Forming of the Valles Marineris

**The „fizzy-tablet effect"**

In this chapter this phenomenon referred to many times gets explained. But first what was the main reason for the valley to be opened, and why there exactly? At the region where two wave types met from the Isidis impact the surface was effected by multiplied forces. Where the first type of waves main effect line and the second type of waves' ring met the rigid skin of the planet cracked and broke up due to the inner tension and the quakes. This state is fairly untouched in the Noctis Labyrinthus, and remained with smaller, „underdeveloped" gaps parallel to Mariner Valley, and in its environment, in Coprates Catena, and on the Northern side of the valley, as the continuance of Candor Chasma.



*14.a.) Mariner Valley (Valles Marineris) is created from the starting cracks along the meeting section of the main effect line of first type waves (**pink line**) and the ring of the third type waves (**yellow loop**).*

Let's investigate the conditions! What happens if big forces effecting thin ocean crust open deep gaps, even through the solid layers, down to the melted rocky material? If there's water over that area then things happen differently. And as we can assume that Tharsis Bulge, Noctis Labyrinthus and Valles Marineris with its deep starting cracks lifted up together under the ocean, the only medium that could be sniffed in by the gaps was water. When the cold ocean got to the depth where the temperature reached a point the water was boiled up and steam started to develop. The cold water touching the hot rock resulted thermal shock crackings. The water also breaching to these rooms formed by the cracks the ground started to break into pieces due to the huge kinetic energy of the steam. In the mass of water heated from the bottom convectional flows were created, sucking in more cold water and washing out a part of the material with debris and hot water, and also mixed with them. This flow could also enhance the parting up of the rocks. Behind the gaps' walls exploded out by the steam new walls of hot rock appeared. The solid upper layer of the planet could melt like a fizzy tablet in a glass of water. That's where I named this phenomenon from. In the deep this reaction could also take place. In the meantime a part of the water could go away in the form of vapour. The ocean flowing from the rims' direction as a supplement washed in the borders to the boiling caldron. The border line washed under by the convection crushed down after a time. This was holding back the process as it covered the hot rock under. The mixture of vapour, hot water, and matter from the mantle, and different layers of the crust started to flow out in the only direction the relief made it possible: downwards to the East of Tharsis Bulge, reaching the chaos regions, one after the other. As these last ones were drylands, where the forces in the superposition points fragmented the crust, this hot river flowed into those cracks and widened them. The main direction of the flow spreads on these areas onto the cracked regions, leaving the larger cracked pieces' centers untouched.

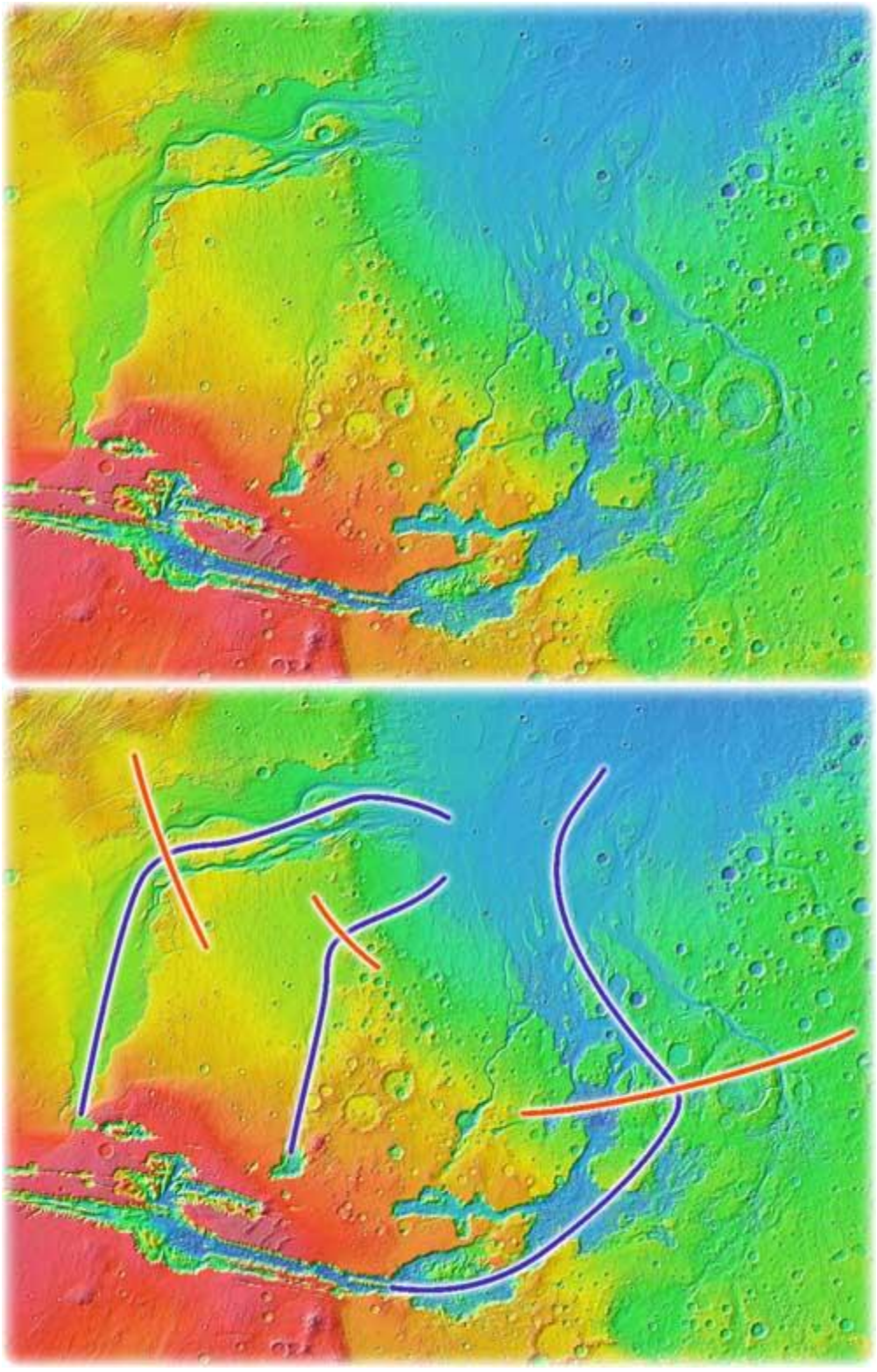
The effect described here can be the reason why the Mariner Valley is so wide. Its starting gaps weren't wide, only deep. In the beginning it could resemble the regions around Alba Patera, mainly the cracks to the East, made more complex by the superposition points of the first type of waves. A superposition point like this we can discover in the middle of the Valley at its widest part, to the South of Melas Chasma.

We can detect this phenomenon on a smaller scale on areas where also great inner stress was present. Mainly around Valles Marineris, Elysium Mons, and Alba Patera, where there are deeper cracks, and also at the Southern foot of Hadriaca Patera.

*14.b.) Deeper cracks on the Southern slopes of Alba Patera. Very typical appearance, some are like a pearl necklace. The pearls are the points where the hot, melted rock and the waver could meet, and the „fizzing" could start.*

*14.c.) Previous formations zoomed in a little. We can make out well the boiling caldron as the sides of the cracks came down. Borders of Valles Marineris are just like this, but on a much bigger scale.*

The outflow channels of Valles Marineris, starting with the largest one at the Eastern part of the valley, from Capri and Eos Chasma; to the North West of the center starting with Echus Chasma; to the North East starting with Juventae Chasma. On these channels we can see a sudden direction change. The Chryse-asteroid made the crust in its environment to dip in thus changed the directions of these rivers. On the fourth, smallest outflow, on Shalbatana Vallis we cannot detect this sign – although this was heading towards the basin from the beginning.



*14.d.)*

The question could raise if the Chryse Basin was there before the outflows started, and the rivers followed the reliefs. This is hard, almost impossible to tell just by investigating the elevations. But else things can help us out to find out that the basin was formed later (if a few hours later) than Valles Marineris and its rivers. One of the clues, what is the strongest in this question is the dark material at the Eastern end of the valley washed away by the flood started by the impact, as the water went uphill to the South. This can be seen on figure [9.h.]. So the outflow from the valley had already been started there.

## 15.) Light and dark areas

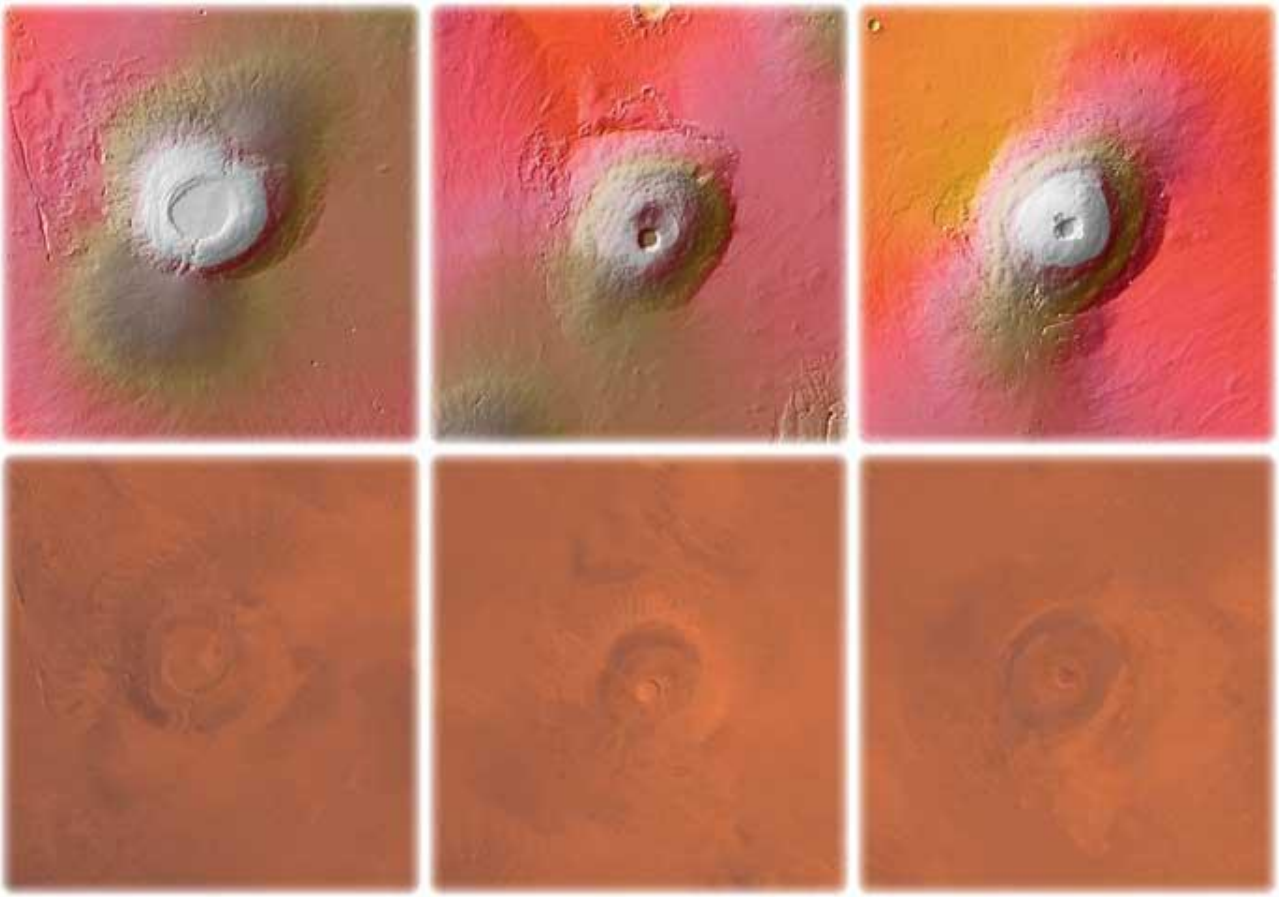
If we look over the surface on the map taken by the Viking probes we can observe that where we can assume volcanic activity, thus where the inner matter gets to the surface we find a different color on the ground. If we compare the color of Tharsis Bulge and the big volcanoes of Elysium with some distinct points and the Eastern end of Valles Marineris, and with the shifted colors on Syrtis Major, we find contradiction. This dark colored material can have volcanic origin – but then we should find it on and around the big volcanoes as well! We can see by now that the flows around the large mountains are not frozen lava but having a different source – so we cannot speak of volcanic up-fills, but quakes and shockwaves rippling and wrinkling the surface, and causing landslides. Two other things contradicts to volcanic origin in the case of the large mountains, not counting Syrtis Major:

Firstly: the water instantly started to cool the melted rock inside the opening vents under the ocean, making the flowing out harder. The inner pressure forming these holes on the crust existed for a short amount of time, and by disappearing the pressure dropped and it rather sucked the lava back, made it fell back, than it would feed the outflow.

On the other hand: the Southern volcano of Tharsis Bulge, Arsia Mons, what has the widest caldera has interesting marks. In the line of the secondary elevations on its slopes there are many small knobs. It might be that the secondary waves' affect fixed on the molten lava cooled by the ocean. This material with a hardened shell would have flown out harder than volcanoes in free air.

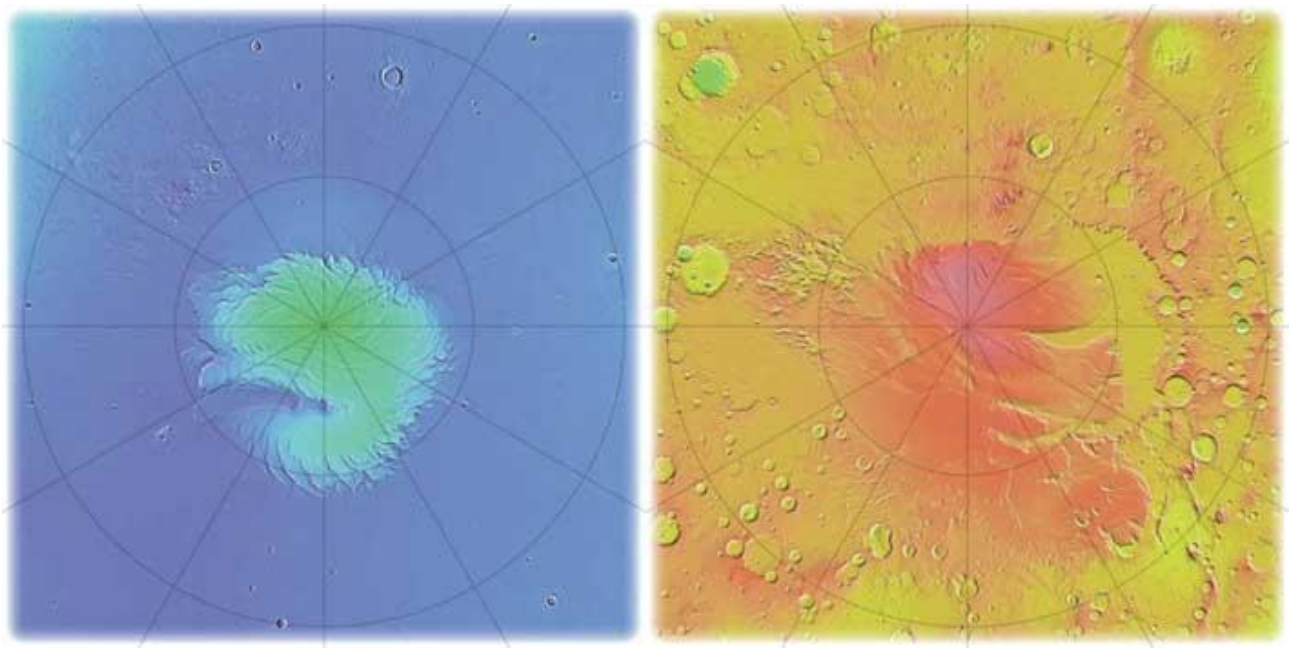
*15.a.) Arsia Mons*

The secondary elevations on Arsia, Pavonis, and Ascraeus Mons aren't lava flows either.

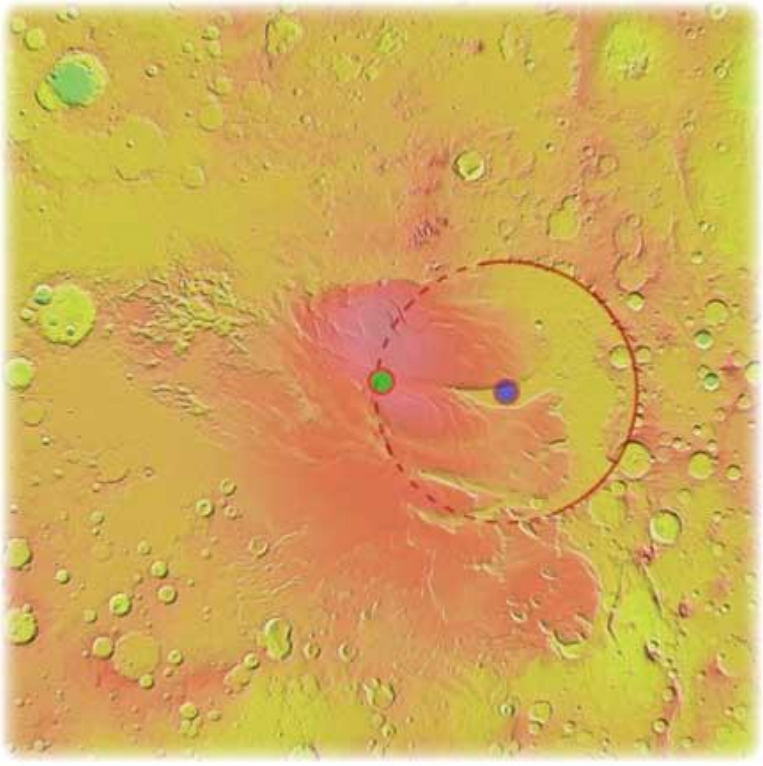


*15.b.) Left to right: Arsia Mons - Pavonis Mons - Ascraeus Mons*
*If we suppose that the dark material is from volcanic activity from the time of the catastrophy then it should be present in great amounts, still Tharsis Bulge and the volcanoes on it is the lightest area of the periphery. Heavy rains also couldn't wash down this material because once it touched a surface, it stuck there (like the Eastern outflow of Valles Marineris), plus the Bulge after lifting up couldn't be flooded because of its height.*

## 16.) Polar regions and icecaps – migration of the poles



*16.a.) North cap on the left, south cap on the right.*
*This can also be guessed by the amount of craters on the hemispheres.*



*16.b.) The south pole and its environment. The **big red circle** is the ancient icecap's border, with **blue dot** on the middle marking the possible ancient south pole.*
*The **green dot** points today's south pole.*

After the impacts due to the distortion of the planet the center of mass shifted and the rotation axle tilted. Then Mars began to regain its geoid shape by its own gravity and by the centrifugal forces coming from its rotation.

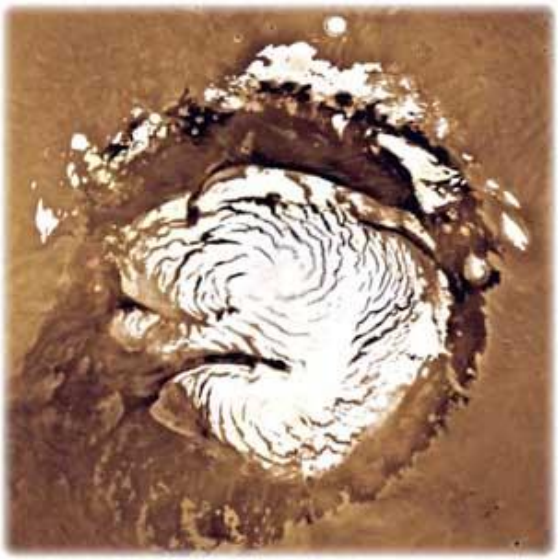
Mars has a wobbling of a 10-12 million years period. This might be the remains of the catastrophy, and it's not necessarily because Mars hasn't got a big moon like Earth to fix its rotation axle, as this wobbling is explained today.

On figure [16.a.] we can see a fine edged step on the relief to the right of the south pole. I couldn't explain this elevation with either of the impacts' shockwaves. But if we imagine a mass of ice on the ground around the pole, and surface waves running around the whole planet, this mass can cut into the surface holding down the crust under it, as the crust next to it can lift up freely, causing it to trim along the ice's margin. A totally regular section of a circle can be observed here, and it's very probable that it continues under today's ice cap. By drawing this full circle we can pinpoint the center of it, what would be the location of the used-to-be south pole (figure [16.b.]).

We can make out from the injuries of the surface that the ancient ocean covered nearly half of the planet. This must have been far sufficient water to form remarkable ice caps from. Despite this the size of the ancient ice cap is surprisingly small. Far smaller in proportions than our planet's. In the program Google Earth switching between Earth and Mars views we can easily compare the two planets' Southern ice caps. In the mean time Mars is further away from the Sun than Earth is, thus we could suppose lower mean temperature and bigger icecaps. It is possible that the disaster happened at summer time on the South hemisphere, so an imprint of a smaller ice cap appeared.

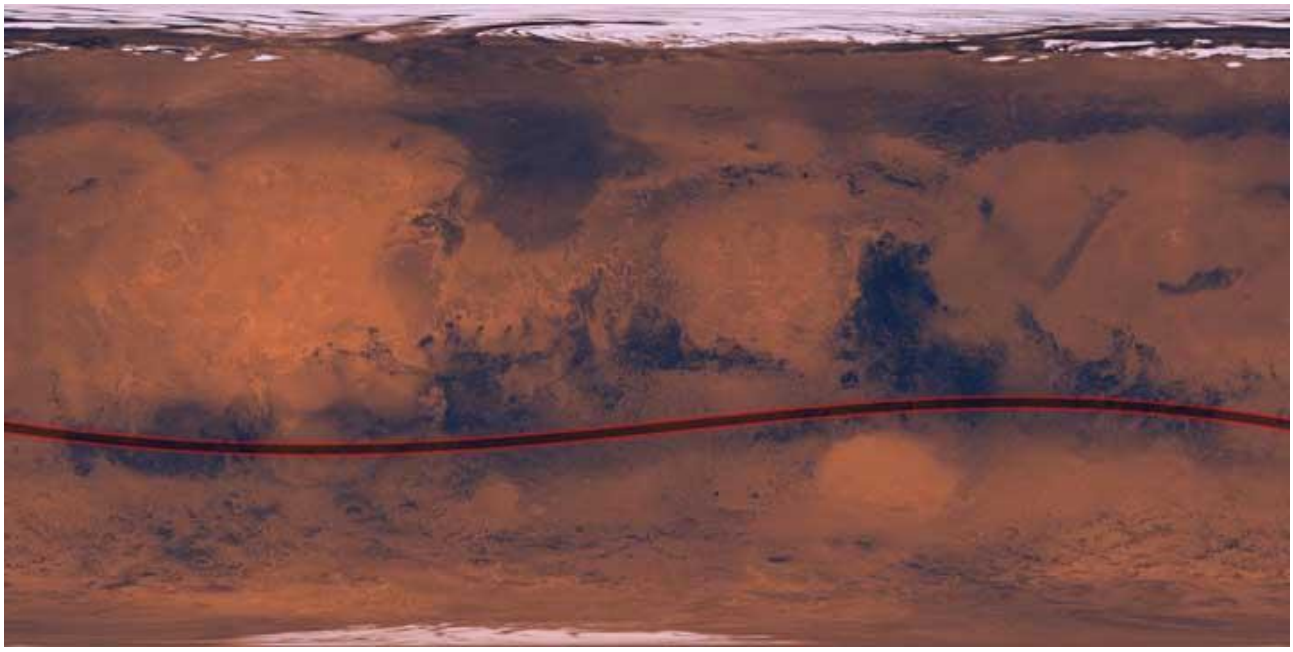
We assumed heavy distortions in shape. Its effects are also visible on the texture of the ice. There's an arc-like pattern on the ice of the south pole, which is oriented towards Hellas Basin. Let's imagine a soft plastic ball pushed in! Around the dip a slight rim forms. A portion of this rim fell on the area of the south pole's region. This rim later disappeared as the planet was regaining its shape. During the forming of the new ice cap its states remained with a series of arcs. Through the process of regaining the geoid shape the mass center also shifted, and the rotation axle's orientation slightly changed – its path mainly conserved in the new Northern ice cap.

The Northern polar region haven't preserved the signs of the ancient ice cap so significantly. We could draw it approximately around the dark colored region of condensed volcanic ash, as it forms a fine border. Centrally this is about at the same position as the new north pole. And from this we can make out that the ancient poles aren't opposing each other perfectly. The south pole is shifted in a direction opposing that where we can assume the planet have been stretched on the side of Tharsis Bulge.



*16.c.) The north pole on the images of Viking satellites.*

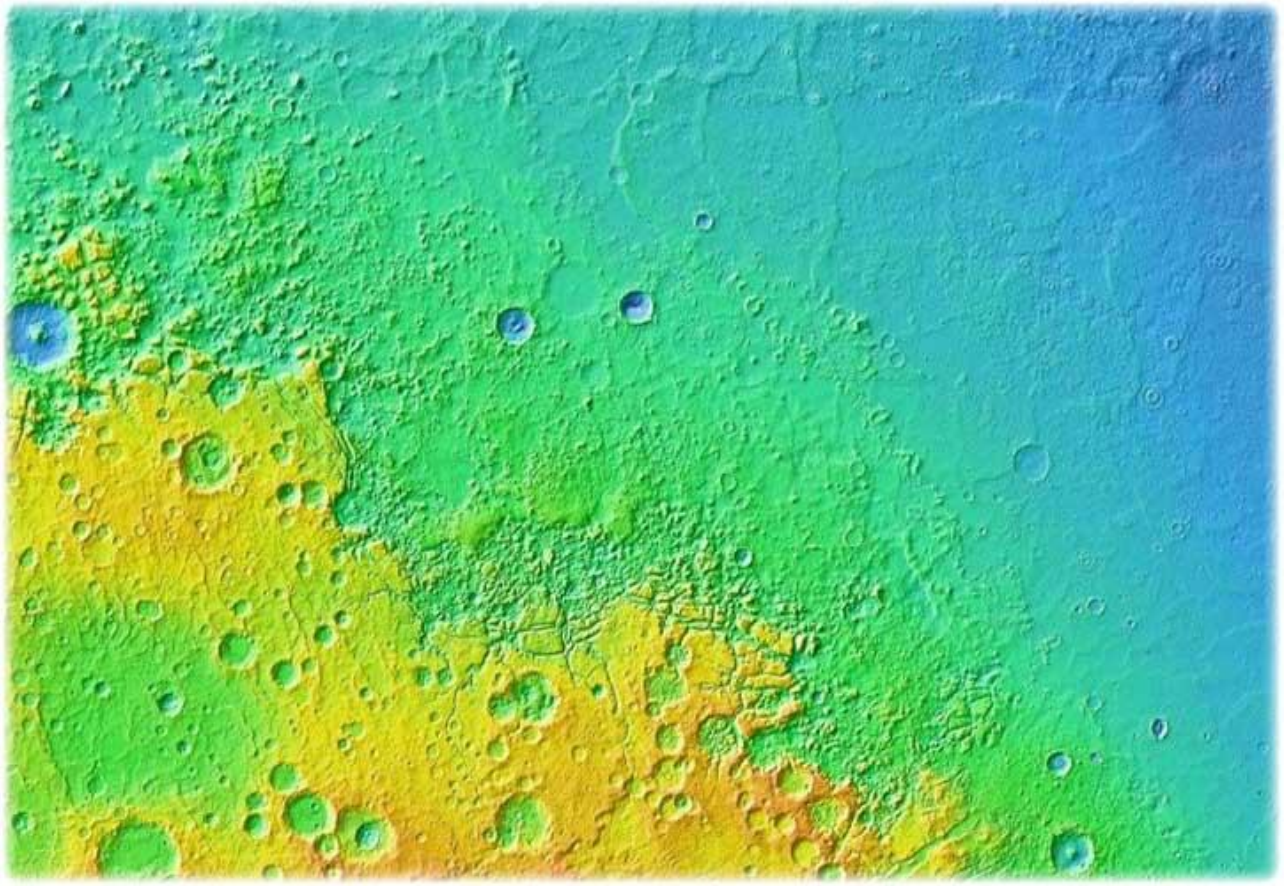
I note a thing here connected to the color differences of the surface: a continuous dark line can be made out on the Viking color map, parallel to the equator, a bit to the South from it. This doesn't follow the relief. It might reflect the atmospheric flows and temperature states at the time of the disaster, where a larger amount of volcanic ash could condense from the air via the heavy rains. It is also possible that this belt shows us the area where the Sun hit the surface in a right angle. As this line is on the southern hemisphere, there could be summer – with a smaller ice cap of course. The line is slightly sinusoidal because the axle was in a different angle at the time of the formation of this dark belt.



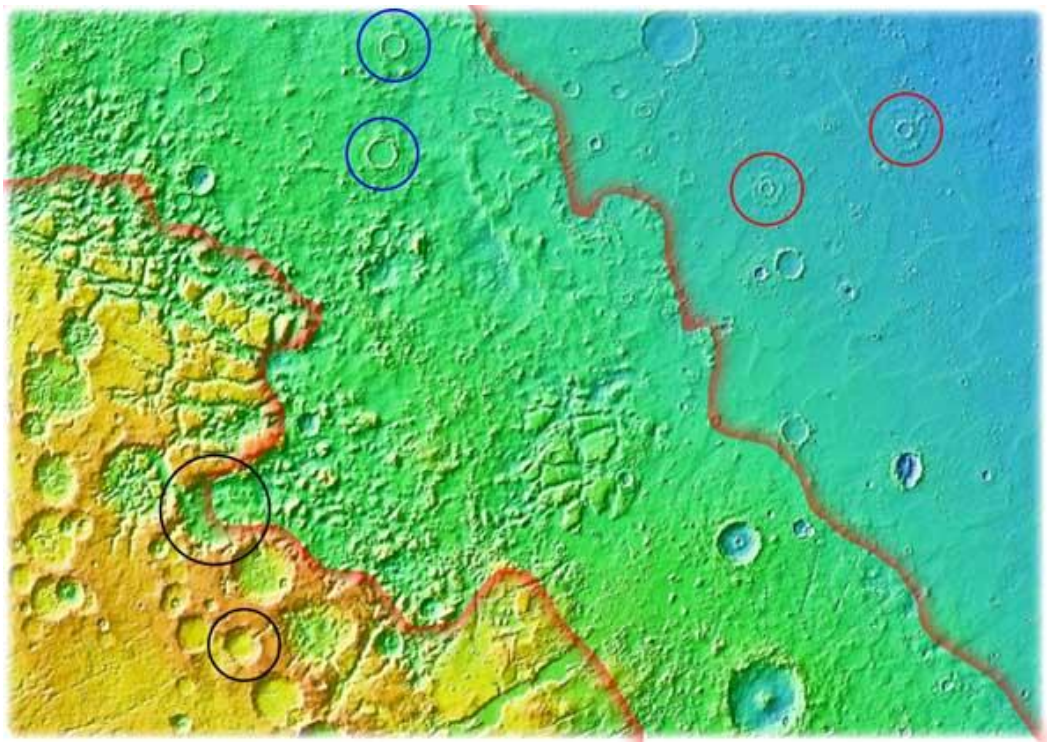
*16.d.)*

## 17.) Cracked coastlines, washed-away drylands

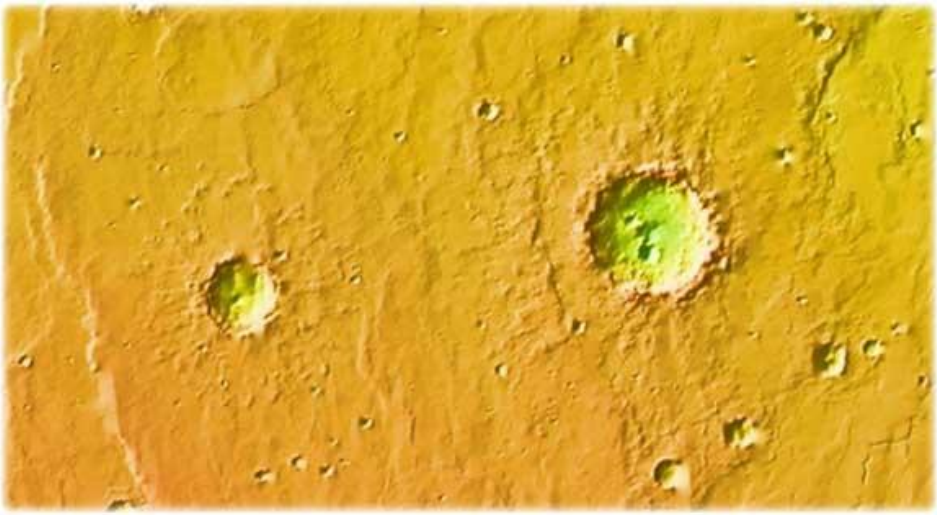
The shockwaves affected differently the wetlands than the more solid drylands. On drylands they broke up the surface. The regions lifting up (especially Alba Patera and Tharsis Bulge), and the impacts made the masses of water to move, which movement lasted for a while. Like in a tossed dish it wobbled. By the deformation of the planet the area covered by the ocean was rearranged. It breached to the drylands and started to wash away the coastlines and far beyond. It washed inside the cracks and melted these areas. The differences on the newly formed coastlines are because of the following: where there was already wet ocean floor like Alba Patera, Tharsis Bulge, and the environment of Elysium mountains this eroding effect didn't appear so much. But in the case of the regions what got nearer to the planet's center of mass because of the distortion, they were affected more by this phenomenon. An example for this is Deuteronilus Mensae, Protonilus Mensae, Coloe Fossae, Nilosyrtis Mensae to the North West of the Isidis Basin, and Nepenthes Mensae and Aeolis Mensae, to the South East which are less eroded, as the uplifted Elysium broke the waves in some degree. The elevations of Lucus Planum are dimmed, they are mainly ocean floor formations.



*17.a.) The most typical example of the broken coastlines is Nylosirtis Mensae and the surroundings found to the North West of Isidis Basin. On the picture the region from the top left to the bottom right colored green used to be dryland, but was washed off by the wobbling ocean. On this area we cannot find spattered type craters like we do on the ocean floor to the North East.*



*17.b.) Some typical craters from the area on figure [17.a.]. In the upper right part of the image we can see the ocean floor, crossing the middle between the two red lines is the washed off dryland, and the remained dryland is on the lower left part of the image.*
*Marked with **red**: the so-called splattered type craters are typical on ocean floors unlike anywhere else. Only one kind of terrain they can be found elsewhere, on areas with landslides, so on steep slopes with running, eased-up material. But they have different appearance there, much more a radial ray-like texture.*
*I show a closer example of these on the next figure.*
*Marked with **blue**: craters on drylands encountered with floods many times.*
*Only a few bigger crater remained from the time before the floods.*
*The smaller craters here are after the floods because the others had been erased.*
*Marked with **black**: craters on higher drylands where the wobbling ocean couldn't reach so much.*



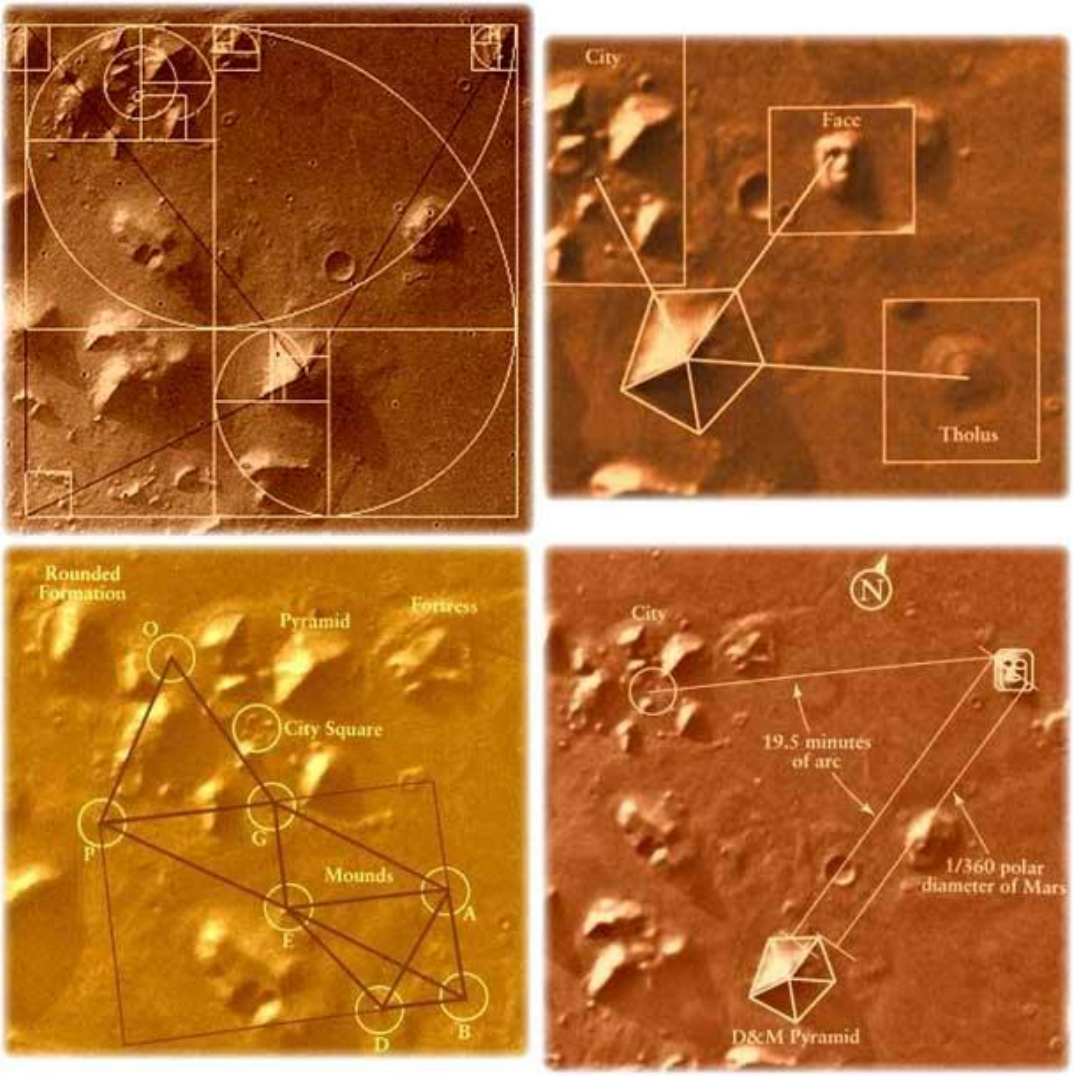
*17.c.) On the Northern part of Syrtis Major Planum, what was dryland before, typical ray-like splattered craters were created because of the landslides.*

Figure [9.a.] contains another good example for the work of the water.

## 18.) The Martian Face, the City, and the pyramids

The phenomenon discussed in the previous chapter is the cause for the objects mentioned in this title. They are located on the North East part of Cydonia Mensae. This area caught the imagination of many people because it holds regular patterns of elevations also with regular shape with an ordered arrangement. The regularities in positions are because the surface cracked up into pieces with similar sizes and in similar depth, regarding a smaller area. The water eroded these pieces and in some cases only a peak remained with radial ridges. These ridges are formed along the pieces' eroded corners. The best example for this is the Pentagonal Pyramid.

The proportions resulted by these processes give the opportunity to see buildings and intelligent design on the surface.



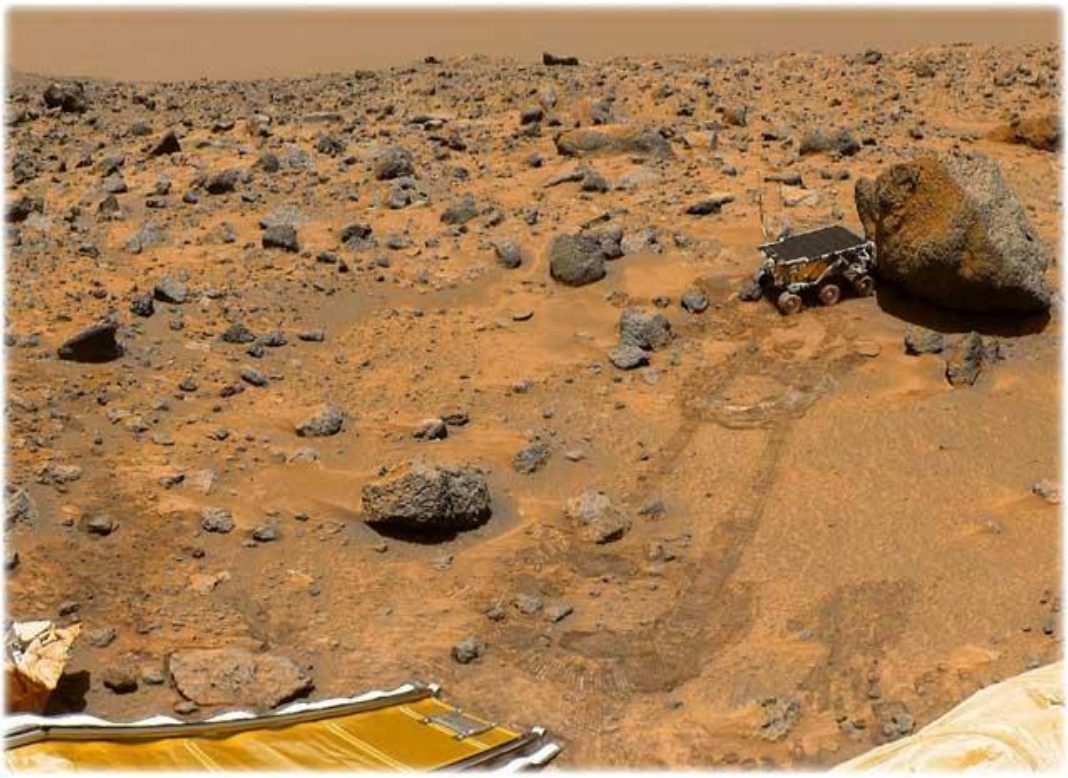

*18.a.)*

## 19.) Stony deserts

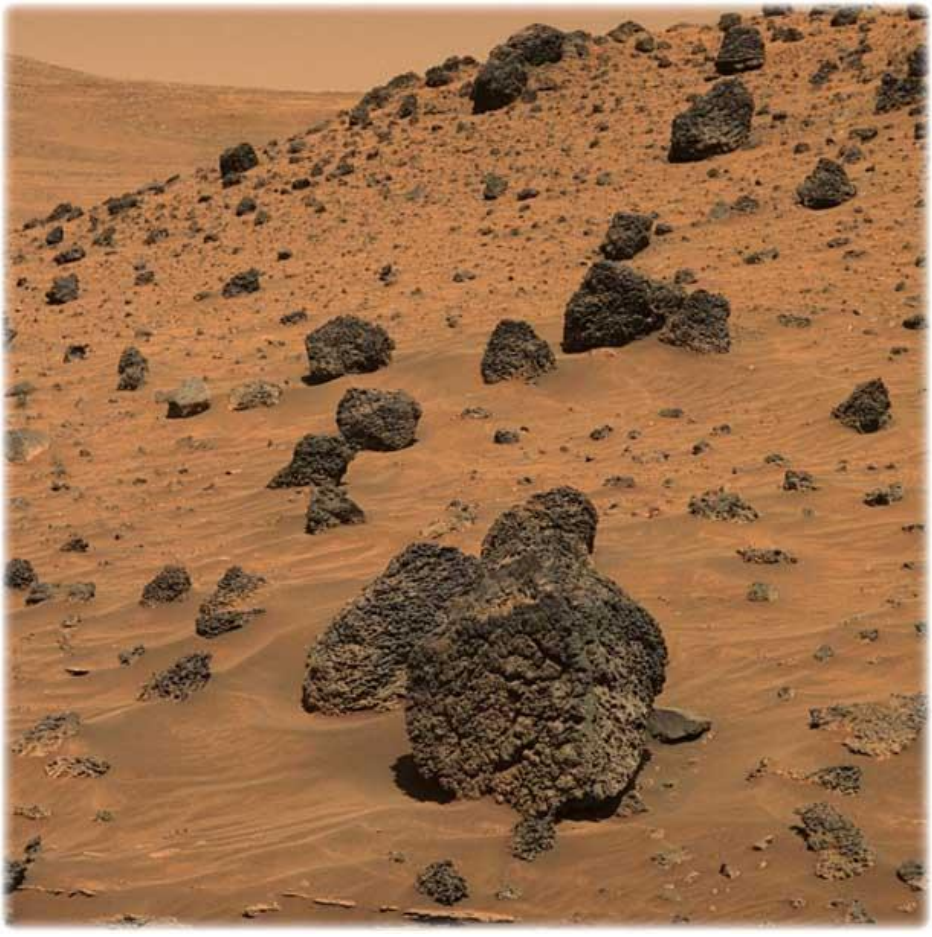
On most of the pictures taken by the Martian landers the surface is covered with debris of stones with different sizes everywhere.

*19.a.) Viking 1 Lander*

*19.b.) Viking 2 Lander*



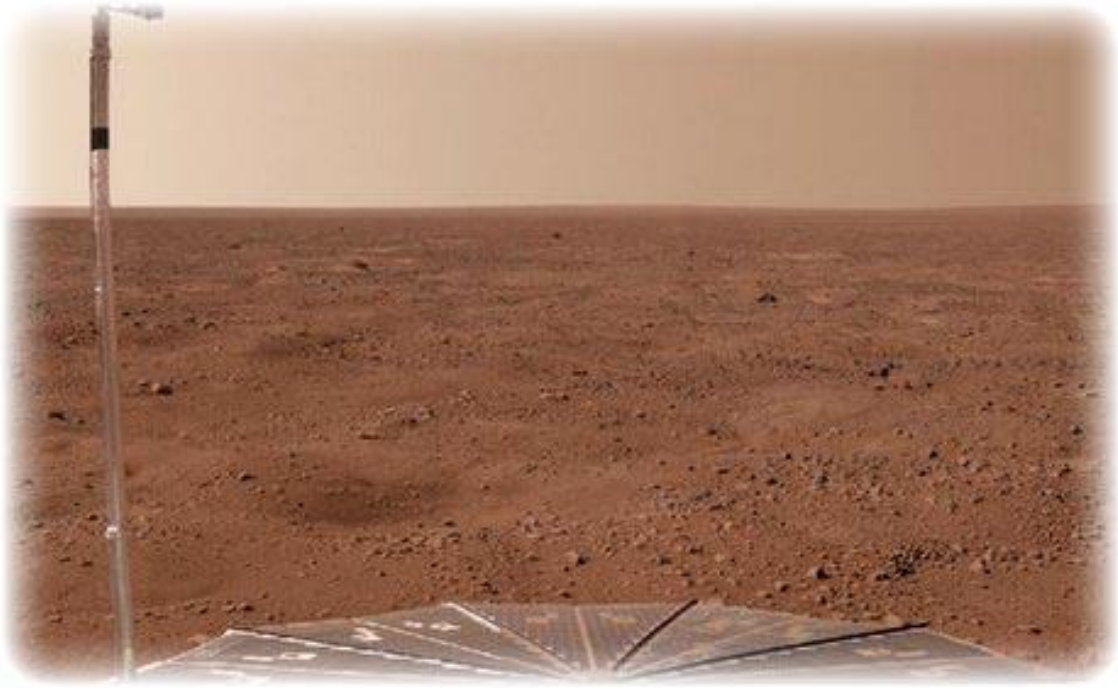
*19.c.) Pathfinder*



*19.d.) Spirit*

*19.e.) Opportunity*

Although Phoenix touched a near-clear ground near the north pole.



*19.f.) Phoenix*

And around Curiosity there were also less debris.

*19.g.) Curiosity*

Most of these stones could come from the big impacts, and their ejecta falling back. The floods spreaded this material around the planet, some times getting it far away from its place of origin.

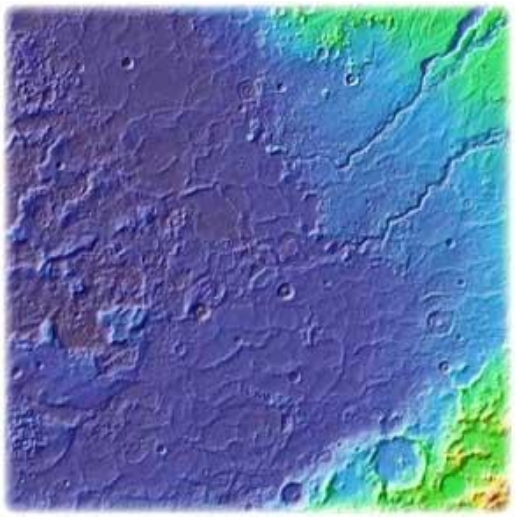
A part of the fine dust screening the surface could come from the ancient ocean floor, mainly from Tharsis Bulge, where the rushing water washed it down. With the help of shockwaves shaking the ground a part of it could mix with the water and spread in the environment. The other part of the dust is the ash got in the atmosphere condensed out with the heavy rains. Its red color comes from the oxidation of iron from the volcanic origin.

## 20.) Secondary shockwaves

Throughout the planet numerous formations (smaller groups of peaks, smaller volcanoes, wrinkles, deranged ground) tell us about the surface shaping effect of the shockwaves. The energy of the quakes wasn't depleted in creating gigantic formations. The finer ones are caused by the resonated inside layers of the planet. They started elastic movements thus creating secondary waves, quakes, and echoes. Waves of bigger frequency.

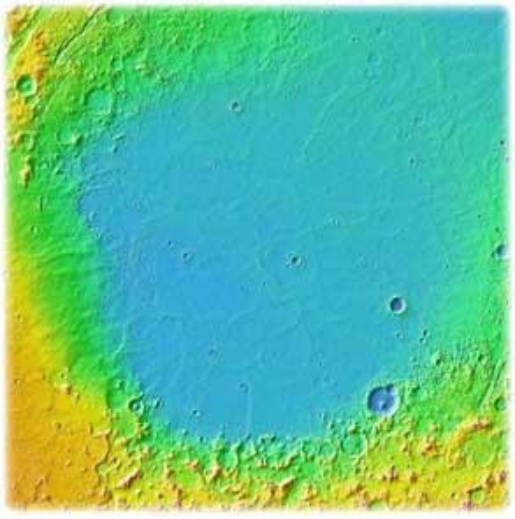
The following series of figures are made on different zooming factors.

The secondary waves like „upper harmonics" appeared in several ways depending on the quality of the crust, or if the waves derived from main shockwaves from the inside or from the surface. Induced by inner waves they created filamentous wrinkles like in Hellas Basin:



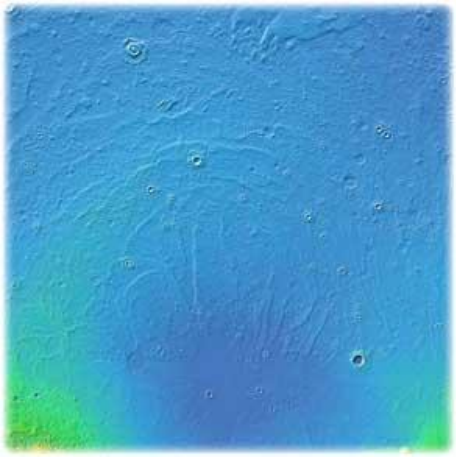
*20.a.)*

and with eased out examples in Isidis Basin on a bigger scale:



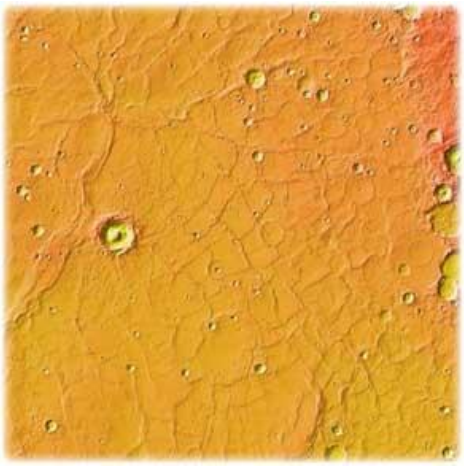
*20.b.)*

or with a different structure on Utopia Planitia's ring, generated by the Argyre's third type waves:



*20.c.)*

Interesting flake-like pattern on Hesperia Planum:

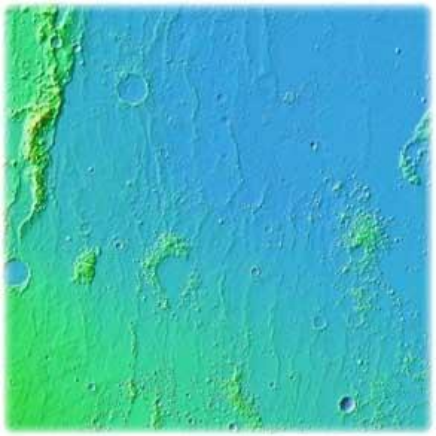


*20.d.)*

and on Syrtis Major Planum:

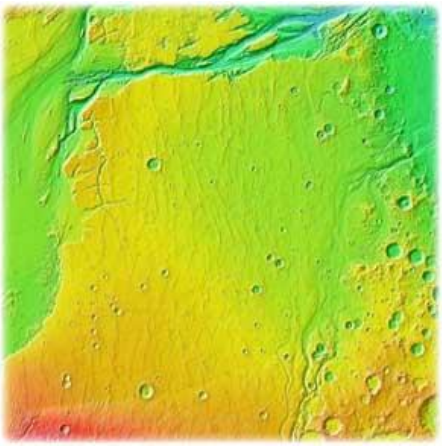
*20.e.)*

Wave-like wrinkles from secondary surface waves all around the planet on drylands as well as on ocean floor. It is the most spectacular on ocean floor, like to the East of Phlegra Montes on Arcadia Planitia:



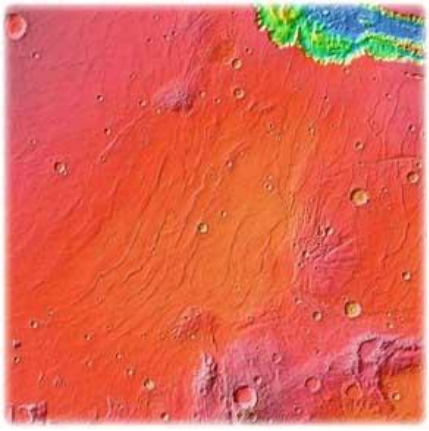
*20.f.)*

on Lunae Planum:



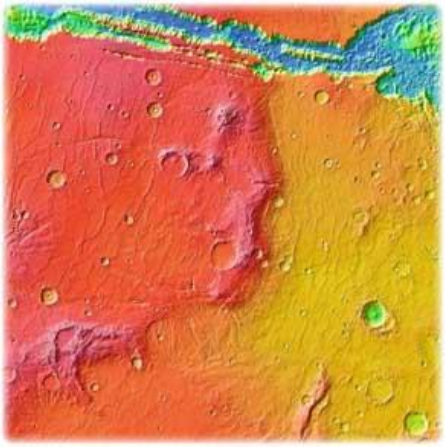
*20.g.)*

on Solis Dorsa:



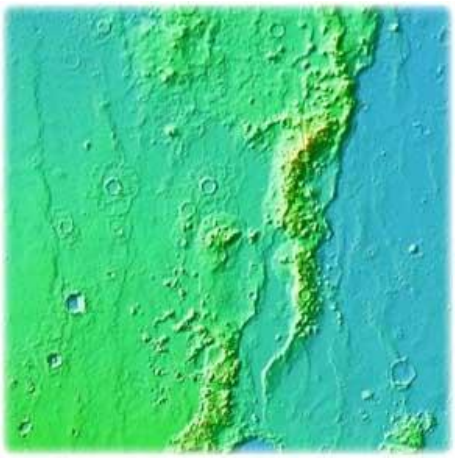
*20.h.)*

and on Thaumasia Planum as well:



*20.i.)*

From the loose ground of dry- and wetlands smaller hills rose up in the chaotic superposition points of the smaller wavelengths. The most spectacular example of this is Phlegra Montes:



*20.j.)*

and the Eastern part of Syria Planum is similar:

*20.k.)*

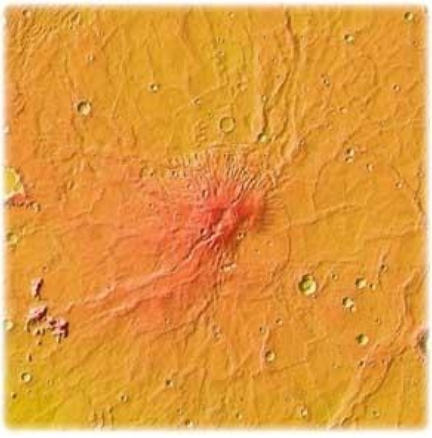
In sparse to the east of Ascraeus Mons:

*20.l.)*

and at several other locations on the Bulge. An interesting example of this appearance is on Arsia Mons with the biggest vent, crossing it:

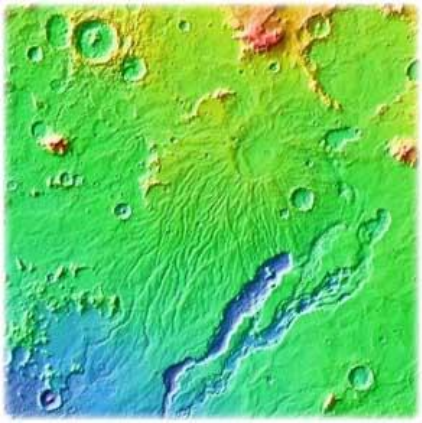
*20.m.)*

The wrinkles resembling the outflows around volcanoes, what I call „beard" also created because of the secondary waves. Like on Tyrrhena Patera:



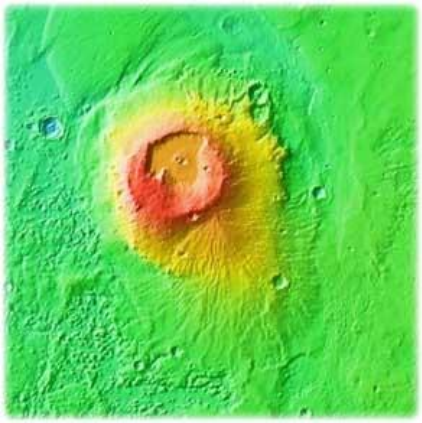
*20.n.)*

and its neighbour, on Hadriaca Patera:



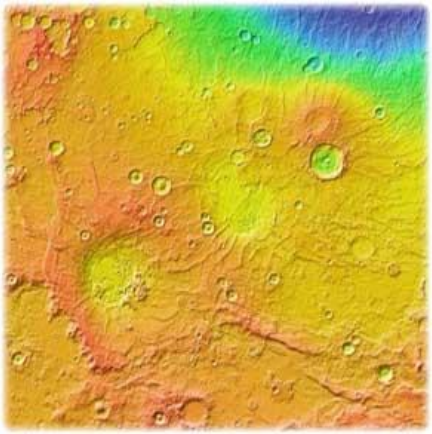
*20.o.)*

and on Apollinaris Patera:



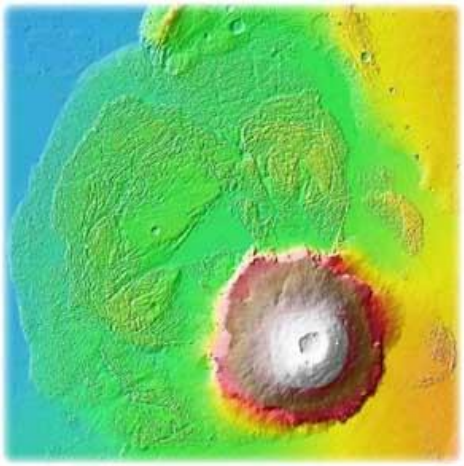
*20.p.)*

In the case of this last one the height of the starting point of the „outflow" related to the vent's rim doesn't let me suppose that it could be a lava flow. It's much more like the secondary elevations found on the three volcanoes on Tharsis Bulge (figure [5.m.]). Like last one, around the mountains of Malea Planum this characteristic also formed, but by more diffused forces:

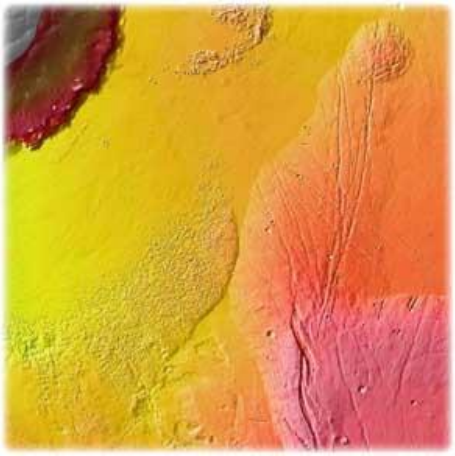


*20.r.)*

Secondary waves loosened the ground locally causing landslides and filling up craters. This couldn't be done by one-time shockwaves or by the low frequency main waves. These landslides apparent throughout the Tharsis Bulge, mostly in places like Olympus Mons:



20.s.)

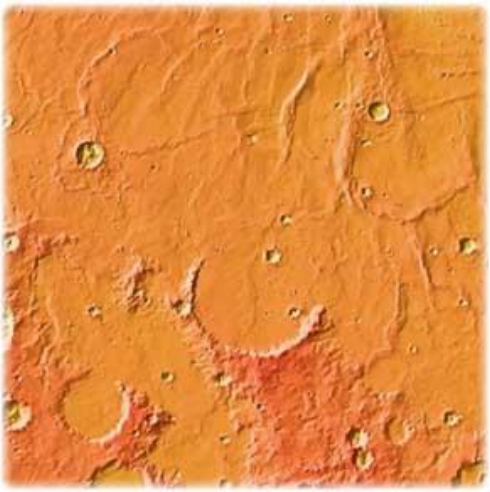


20.t.)

and to the South of Arsia Mons:

*20.u.)*

at the base of Syrtis Major:



*20.v.)*

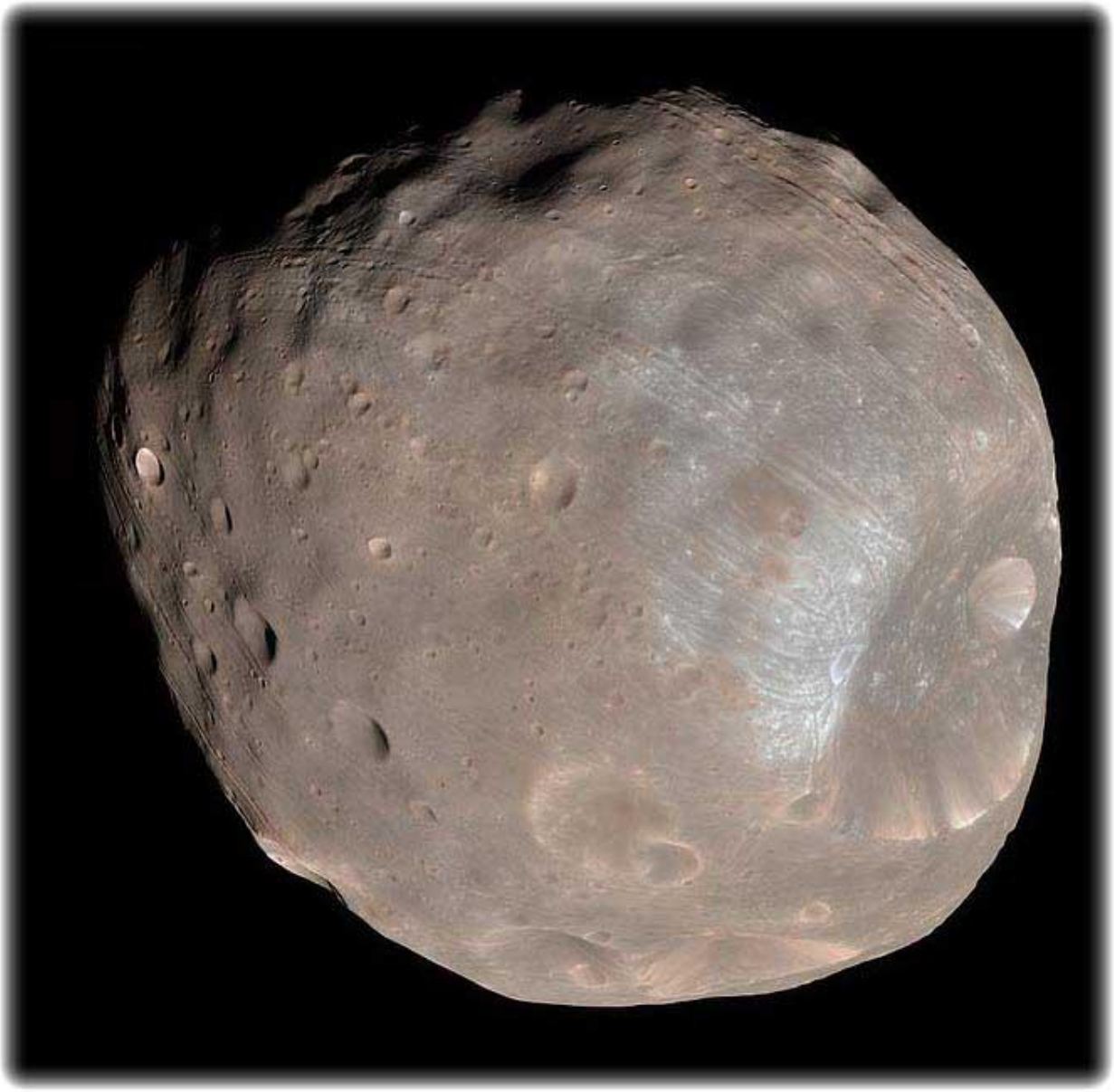
and to the South-West of Alba Patera:

*20.z.)*

And I could go on. So for these kind of characteristics on the whole surface of the planet on this scale the secondary waves, the upper harmonics - caused by the main shockwaves - can be made responsible.

## 21.) Mars' moons

On Mars the teared surface by the ejecta is common. At this degree of energies we can assume a few things. Not all the ejecta could fall back after the big impacts, in fact it is possible that some of it is still up there in the form of a cloud or ring. For some of todays newly forming craters this floating mass also could be made responsible, as for the failure of some Martian probes. This last assumption has to make us consider the Mars missions with humans, because the environment of the planet could be polluted by this debris. We don't know how far all this happened in the past and it is possible that Mars' gravity couldn't clear its neighbourhood yet well enough. These micrometeorites could easily cause disastrous failure to the probe carrying humans aboard, because yet noone was looking for this fine debris circling around the planet. It is also possible that it forms rings and there could be otherwise ideal orbits that are crossing these areas. These should be mapped and avoided!



*21.a.) Phobos: the bigger moon of Mars, what is closer to the planet.*

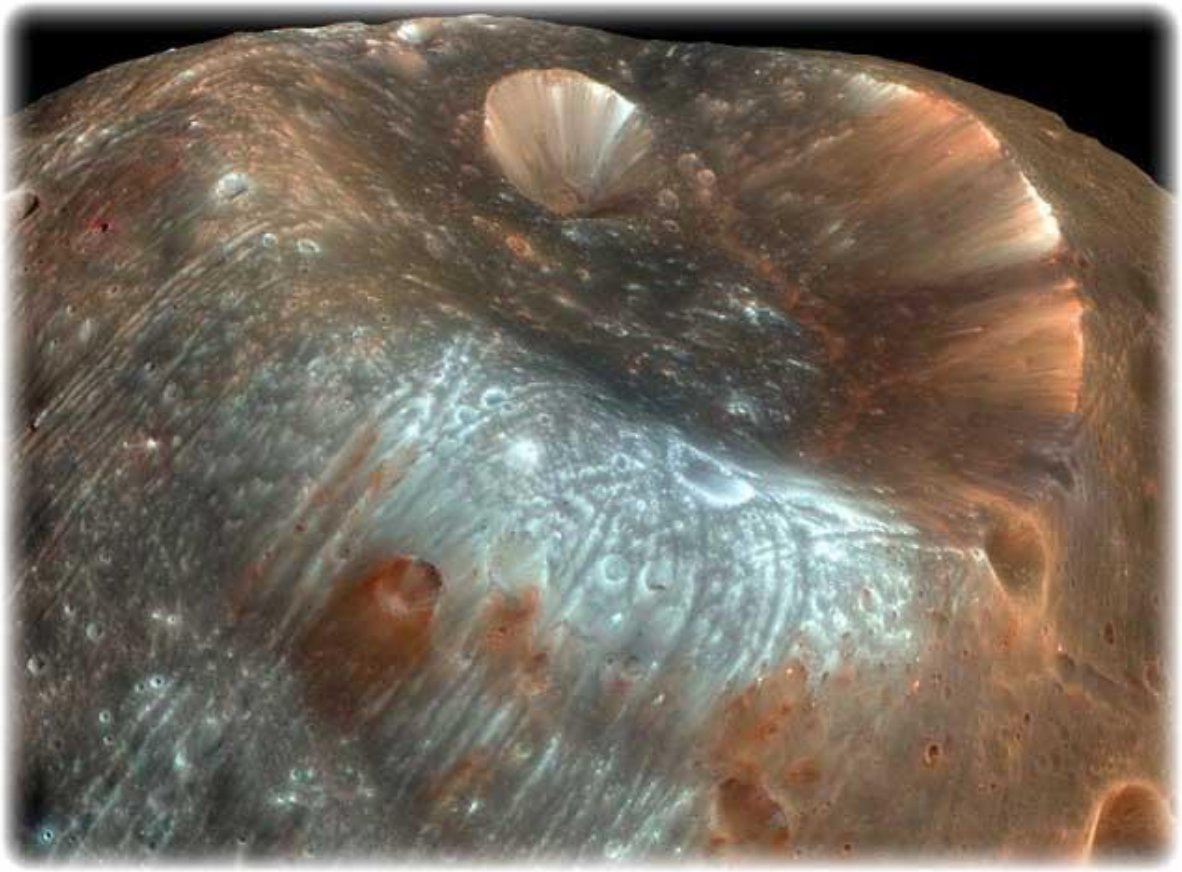
We can easily suppose that the Martian moons are also from the material thrown out by the big impacts. In my opinion their most possible source is the first impact, where the crust broke in deeply and the mantle could squirt out to space, thus we might see these droplets frozen in space and bombarded by the smaller debris of ejecta. More asteroids like these may wander around the Solar System which are very familiar to these in size, look, composition, and inner structure, originating from this impact.

The two Martian moons, Phobos and Deimos have a very instable orbit. Phobos, the bigger and closer to the planet is on a narrowing, Deimos, the smaller and farther away is on a widening orbit. After the Hellas impact much more droplets could get in space like these. Some could fall back, some could fly away like Deimos will in the future. Today's moons can be the two droplets with the most stable orbits.


*21.b.) Phobos over Grenoble in France*
*It's just on a vacation here for size comparison*
*(Picture: Ludovic Celle, 2012)*

According to computations in a few million years they will also disappear from the Martian sky. The face of Phobos is much more cratered than Deimos', possibly because it was closer to the events and it got more hit from the debris flyin into space.

An interesting result of one research is that the inner structure of Phobos is not compact, a bit like a sponge, filled with gaps. If material from inside the planet gets into space the environmental pressure drops significantly, in practice to near zero. The soluted gases in the molten material got loose. A body with 10 kilometers in diameter has negligible gravity, thus materials with different density doesn't start to arrange into layers quickly, namely the magma and gases. So the gas bubbles could stay nearly where they were born. Freeing of the gases could be detained also because in the cold space a hard crust could form by the rapidly cooling magma. Gases could exert pressure to this crust. Phobos took a hit by a big piece of debris, creating its most spectacular formation, Stickney Crater.



*21.c.) Stickney Crater is the most spectacular formation on Phobos.*
*The cracks spreading radially from the crater are apparent. They are reaching to the other end of the moon.*

The cracks radiating from this crater along the surface could be caused by the inner pressure of the gases. The outer force broke the shell and it cracked up. If the Martian moons were created like this and in the future we want to investigate them deeper, then these circumstances have to be taken into consideration. Damage can be caused via explosions by freeing up the possible high pressure gases when the probes drill deep.

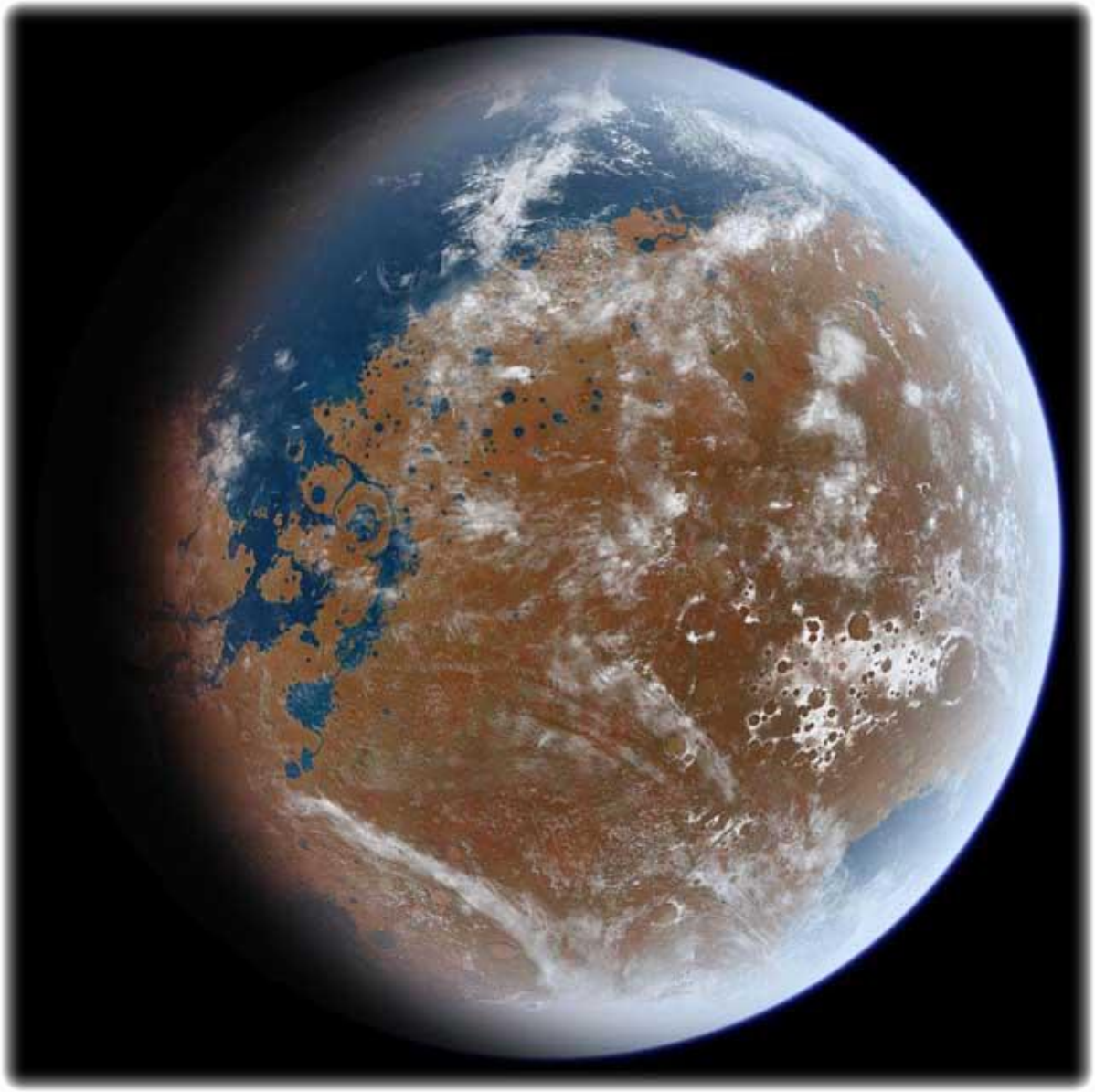
Crater rims are dim on Phobos which could mean that they are created by the debris of the impacts and not by meteors coming from outer space with great speed differences.

*21.d.) Deimos: smaller, smoother and farther away as Phobos.*

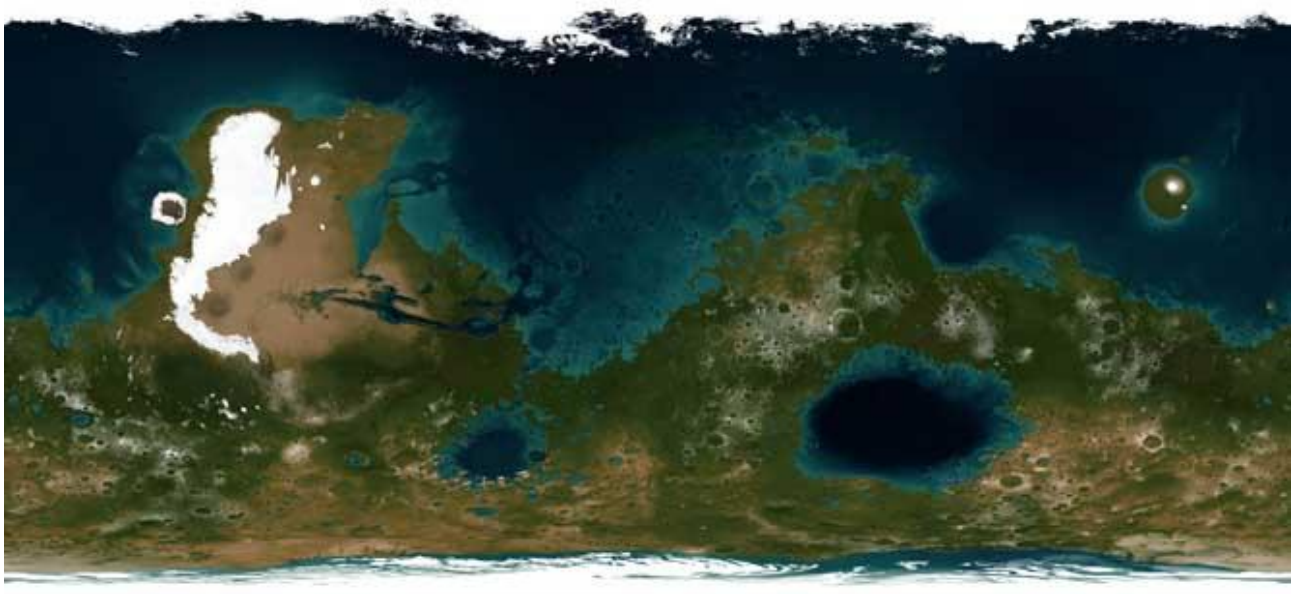
Deimos observed the other three impacts from farther away so it received less hits from the debris, and also avoided a Stickney-like collision what could broke its shell.

## 22.) The ancient Mars

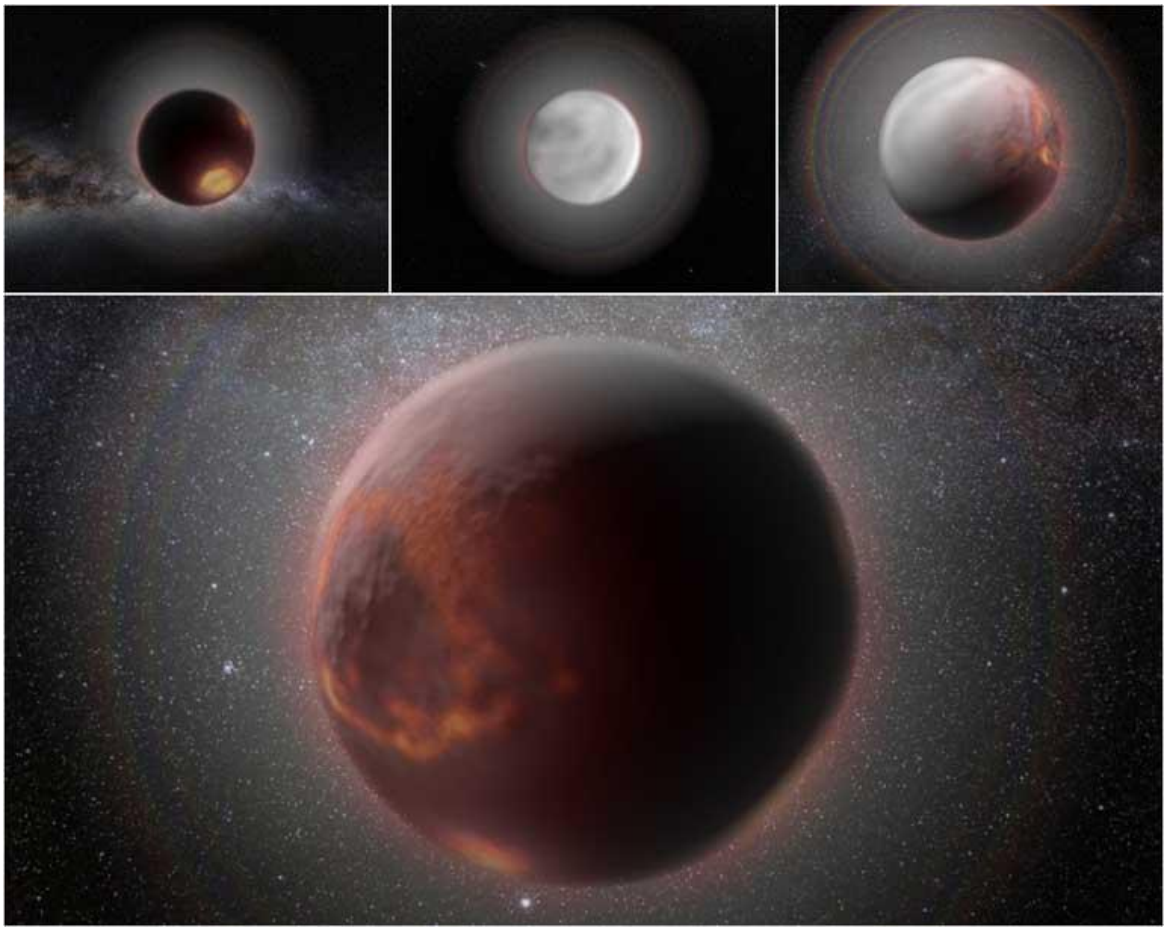
How could our brother planet look before the disaster? While the connections of formations mentioned in this paper aren't taken into consideration, we are stumbling in darkness. Whilst let there be some artistic reflections in this topic.



*22.a.) Computed and artistic representation of Mars from the height data of MOLA (Mars Orbiter Laser Altimeter). The creator erased the formations what are younger than two billion years – as todays Martian geology suggests.*
*Original image: http://en.wikipedia.org/wiki/File:AncientMars.jpg*
*I strongly suspect that this isn't the correct picture, as the Reader could get it from this paper. The next picture is a little bit closer to my imagination. Certainly we should erase all of the large formations mentioned so far, like the big impact craters, the smaller craters of the debris, mountains, volcanoes, canyons, cracks, and riverbeds, Tharsis Bulge, Alba Patera and surroundings. So everything what is typical about today's surface of Mars. As a result we get almost a virgin, immaculate surface, without any repelling wounds, a true pearl of our sky -with a continuous blue ocean on the Northern, and a green Southern hemisphere between two sparkling white caps at the poles.*



*22.b.) Another science-artistic interpretation - when life was flourishing. We can see the surface without the troubling cloud layer. I suspect the planet never looked like this exactly. But it could have these colors before the disaster – without the typical formations of the big impacts of course.*



*22.c.) Just after the impacts. From different angles – made by me, as I imagine.*

## 23.) To be continued?

The picture of the happenings described here are far from complete. I think huge discoveries are waiting for us even in this topic, about our brother planet. The connections waiting to be uncovered, this system can be applied to all of the similar celestial bodies: Earth, Moon, Venus, and Mercury, to the bigger moons of our gas giants, if we could find out more of their inner structure and the working and history of our Solar System.

This paper is more like a collection of proposals which I think are worth to deal with, comparing these to the gathered data of Mars (and not with the conclusions already taken from those), checking them with modeling and simulations.

Continuing this research is beyond my capacity. The rest (the most) depends on the open-minded scientists and enthusiastic amateur geologists and astronomers.

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2014.07.17.