Chapter 1 : NASA's Next Mission to Mars Will Probe the Red Planet's Deep Interior in - Seeker

Mars is the "Red Planet" for a very good reason: its surface is made of a thick layer of oxidized iron dust and rocks of the same color. Maybe another name for Mars could be "Rusty." But the ruddy.

It resides with Earth our planet in the region of the solar system where liquid water can exist on the surface, and therefore the chance that life is or once was present on Mars remains a distinct possibility. Mars is the Roman god of war Ares is the Greek version , and the planet was probably given this name because of its red color. Mars is frequently referred to as the Red Planet. Atmosphere The atmosphere of Mars is quite different from that of Earth. It is composed primarily of carbon dioxide with very small amounts of other gases, such as nitrogen and oxygen. Local patches of early morning fog can form in valleys. At the Viking Lander 2 site, a thin layer of water frost covered the ground each winter. There is evidence that in the past a denser martian atmosphere may have warmed the planet enough to allow water to flow on the surface. Physical features closely resembling shorelines, gorges, riverbeds and islands suggest that great rivers once marked the planet. The first spacecraft to visit Mars was Mariner 4 in Several others followed including the two Viking landers in Ending a long 20 year hiatus, Mars Pathfinder landed successfully on Mars on July 4. One result of this is a temperature variation of about 30 C at the subsolar point between aphelion and perihelion. Though Mars is much smaller than Earth, its surface area is about the same as the land surface area of Earth. Notable Features Except for Earth, Mars has the most highly varied and interesting terrain of any of the terrestrial planets, some of it quite spectacular: Its base is more than km in diameter and is rimmed by a cliff 6 km 20, ft high. Much of the Martian surface is very old and cratered, but there are also much younger rift valleys, ridges, hills and plains. The southern hemisphere of Mars is predominantly ancient cratered highlands somewhat similar to the Moon. In contrast, most of the northern hemisphere consists of plains which are much younger, lower in elevation and have a much more complex history. An abrupt elevation change of several kilometers seems to occur at the boundary. Recently, some scientists have begun to question whether the abrupt elevation is real in the first place. Mars Global Surveyor should resolve the issue. The interior of Mars is known only by inference from data about the surface and the bulk statistics of the planet. Like Mercury and the Moon, Mars appears to lack active plate tectonics; there is no evidence of horizontal motion of the surface such as the folded mountains so common on Earth. With no lateral plate motion, hot-spots under the crust stay in a fixed position relative to the surface. This, along with the lower surface gravity, may account for the Tharis bulge and its enormous volcanoes. There is no evidence of current volcanic activity, however. And though Mars may have been more volcanicly active in the past, it appears to never have had any plate tectonics. There is very clear evidence of erosion in many places on Mars including large floods and small river systems. At some time in the past there was clearly water on the surface There may have been large lakes or even oceans. But it seems that this occurred only briefly and very long ago; the age of the erosion channels is estimated at about nearly 4 billion years. Valles Marineris was NOT created by running water. It was formed by the stretching and cracking of the crust associated with the creation of the Tharsis bulge. Early in its history, Mars was much more like Earth. As with Earth almost all of its carbon dioxide was used up to form carbonate rocks. The surface of Mars is therefore much colder than the Earth would be at that distance from the Sun. But it is thick enough to support very strong winds and vast dust storms that on occasion engulf the entire planet for months. The ice caps exhibit a layered structure with alternating layers of ice with varying concentrations of dark dust. In the northern summer the carbon dioxide completely sublimes, leaving a residual layer of water ice. There may also be water ice hidden below the surface at lower latitudes. Recent observations with the Hubble Space Telescope have revealed that the conditions during the Viking missions may not have been typical. The Viking landers performed experiments to determine the existence of life on Mars. The results were negative. Optimists point out that only two tiny samples were measured and not from the most favorable locations. More experiments will be done by future missions to Mars. A small number of meteorites the SNC meteorites are believed to have originated on Mars. On Aug 6, David McKay et al announced the first identification of organic compounds in a Martian meteorite. The authors further suggest that these compounds, in conjunction

with a number of other mineralogical features observed in the rock, may be evidence of ancient Martian microorganisms. Exciting as this is, it is important to note while this evidence is strong it by no means establishes the fact of extraterrestrial life. There have also bee several contradictory studies published since the McKay paper. Large, but not global, weak magnetic fields exist in various regions of Mars. This unexpected finding was made by Mars Global Surveyor just days after it entered Mars orbit. They are probably remnants of an earlier global field that has since disappeared. When it is in the nighttime sky, Mars is easily visible with the naked eye. Its apparent brightness varies greatly according to its relative position to the Earth. More detailed and customized charts can be created with a planetarium program such as Starry Night.

Chapter 2 : Mars Surface - Universe Today

The modern era of Mars exploration began on July 14, , when the Mariner 4 spacecraft flew by the planet and transmitted to the Earth 22 close-up pictures of the surface with resolutions of several kilometers per pixel ().

Besides silicon and oxygen, the most abundant elements in the Martian crust are iron, magnesium , aluminum , calcium , and potassium. Surface geology Main article: Geology of Mars Mars is a terrestrial planet that consists of minerals containing silicon and oxygen , metals , and other elements that typically make up rock. The surface of Mars is primarily composed of tholeiitic basalt , [40] although parts are more silica -rich than typical basalt and may be similar to andesitic rocks on Earth or silica glass. Regions of low albedo suggest concentrations of plagioclase feldspar , with northern low albedo regions displaying higher than normal concentrations of sheet silicates and high-silicon glass. Parts of the southern highlands include detectable amounts of high-calcium pyroxenes. Localized concentrations of hematite and olivine have been found. Mars has many distinctive chemical features caused by its position in the Solar System. Formation of the oldest extant surfaces of Mars, 4. Noachian age surfaces are scarred by many large impact craters. The Tharsis bulge, a volcanic upland, is thought to have formed during this period, with extensive flooding by liquid water late in the period. Hesperian period named after Hesperia Planum: The Hesperian period is marked by the formation of extensive lava plains. Amazonian period named after Amazonis Planitia: Amazonian regions have few meteorite impact craters, but are otherwise quite varied. Olympus Mons formed during this period, with lava flows elsewhere on Mars. Geological activity is still taking place on Mars. The Athabasca Valles is home to sheet-like lava flows created about Mya. Water flows in the grabens called the Cerberus Fossae occurred less than 20 Mya, indicating equally recent volcanic intrusions. Martian soil Exposure of silica-rich dust uncovered by the Spirit rover The Phoenix lander returned data showing Martian soil to be slightly alkaline and containing elements such as magnesium , sodium , potassium and chlorine. These nutrients are found in soils on Earth, and they are necessary for growth of plants. The streaks are dark at first and get lighter with age. The streaks can start in a tiny area, then spread out for hundreds of metres. They have been seen to follow the edges of boulders and other obstacles in their path. The commonly accepted theories include that they are dark underlying layers of soil revealed after avalanches of bright dust or dust devils. Radar data from Mars Express and the Mars Reconnaissance Orbiter show large quantities of water ice at both poles July [66] [67] and at middle latitudes November Huge linear swathes of scoured ground, known as outflow channels , cut across the surface in about 25 places. These are thought to be a record of erosion caused by the catastrophic release of water from subsurface aquifers, though some of these structures have been hypothesized to result from the action of glaciers or lava. Features of these valleys and their distribution strongly imply that they were carved by runoff resulting from precipitation in early Mars history. Subsurface water flow and groundwater sapping may play important subsidiary roles in some networks, but precipitation was probably the root cause of the incision in almost all cases. A number of authors have suggested that their formation process involves liquid water, probably from melting ice, [75] [76] although others have argued for formation mechanisms involving carbon dioxide frost or the movement of dry dust. Further evidence that liquid water once existed on the surface of Mars comes from the detection of specific minerals such as hematite and goethite , both of which sometimes form in the presence of water. This forms only in the presence of acidic water, which demonstrates that water once existed on Mars. The Phoenix lander directly sampled water ice in shallow Martian soil on July 31, This finding was derived from the ratio of water to deuterium in the modern Martian atmosphere compared to that ratio on Earth. The amount of Martian deuterium is eight times the amount that exists on Earth, suggesting that ancient Mars had significantly higher levels of water. Results from the Curiosity rover had previously found a high ratio of deuterium in Gale Crater , though not significantly high enough to suggest the former presence of an ocean. Other scientists caution that these results have not been confirmed, and point out that Martian climate models have not yet shown that the planet was warm enough in the past to support bodies of liquid water. These seasonal actions transport large amounts of dust and water vapor, giving rise to Earth-like frost and large cirrus clouds. Clouds of water-ice were photographed by the Opportunity

rover in Frozen carbon dioxide accumulates as a comparatively thin layer about one metre thick on the north cap in the northern winter only, whereas the south cap has a permanent dry ice cover about eight metres thick. This permanent dry ice cover at the south pole is peppered by flat floored, shallow, roughly circular pits , which repeat imaging shows are expanding by meters per year; this suggests that the permanent CO2 cover over the south pole water ice is degrading over time. With the arrival of spring, sunlight warms the subsurface and pressure from subliming CO2 builds up under a slab, elevating and ultimately rupturing it. This leads to geyser-like eruptions of CO2 gas mixed with dark basaltic sand or dust. This process is rapid, observed happening in the space of a few days, weeks or months, a rate of change rather unusual in geology â€" especially for Mars. The gas rushing underneath a slab to the site of a geyser carves a spiderweb-like pattern of radial channels under the ice, the process being the inverted equivalent of an erosion network formed by water draining through a single plughole. Volcanic plateaus delimit regions of the northern plains, whereas the highlands are punctuated by several large impact basins. These new impact craters on Mars occurred sometime between and , as detected from orbit.

Chapter 3 : Mars: Planet Structure - Windows to the Universe

Mars - Atmosphere, Surface, and Interior - The planet's atmosphere, or surrounding layers of gases, is not very dense. Its surface is a cold, dusty desert. It is possible that water might periodically seep up in places from ice beneath the surface.

For thousands of years, human beings have stared up at the sky and wondered about the Red Planet. Easily seen from Earth with the naked eye, ancient astronomers have charted its course across the heavens with regularity. Nowhere is this more apparent than in the composition of the planet itself. Like Earth, the interior of Mars has undergone a process known as differentiation. This is where a planet, due to its physical or chemical compositions, forms into layers, with denser materials concentrated at the center and less dense materials closer to the surface. This core is surrounded by a silicate mantle that clearly experienced tectonic and volcanic activity in the past, but which now appears to be dormant. Besides silicon and oxygen, the most abundant elements in the Martian crust are iron, magnesium, aluminum, calcium, and potassium. Oxidation of the iron dust is what gives the surface its reddish hue. Composite image showing the size difference between Earth and Mars. Here on Earth, the core is entirely fluid, made up of molten metal and is in constant motion. This in turn protects the surface of our planet from harmful solar radiation. The Martian core, by contrast, is largely solid and does not move. As a result, the planet lacks a magnetic field and is constantly bombarded by radiation. It is speculated that this is one of the reasons why the surface has become lifeless in recent eons, despite the evidence of liquid, flowing water at one time. Despite there being no magnetic field at present, there is evidence that Mars had a magnetic field at one time. It also found evidence that would suggest that this magnetic field underwent polar reversals. These findings led to a re-examination of a theory that was originally proposed in which postulated that Mars experienced plate tectonic activity four billion years ago. Map from the Mars Global Surveyor of the current magnetic fields on Mars. The crust is mainly basalt from the volcanic activity that occurred billions of years ago. Given the lightness of the dust and the high speed of the Martian winds, features on the surface can be obliterated in a relatively short time frame. Elements with comparatively low boiling points, such as chlorine, phosphorus, and sulphur, are much more common on Mars than Earth. The North Polar Basin is the large blue low-lying area at the northern end of this topographical map of Mars. Hellas Planitia , also called the Hellas impact basin, is the largest crater on Mars. Its circumference is approximately 2, kilometers, and it is nine kilometers deep. The largest impact event on Mars is believed to have occurred in the northern hemisphere. Though not yet confirmed to be an impact event, the current theory is that this basin was created when a Pluto-sized body collided with Mars about four billion years ago. Scientists are currently unclear on whether or not a huge impact may be responsible for the core and tectonic activity having become dormant. The InSight Lander , which is planned for , is expected to shed some light on this and other mysteries â€” using a seismometer to better constrain the models of the interior. Mars also has discernible gullies and channels on its surface, and many scientists believe that liquid water used to flow through them. By comparing them to similar features on Earth, it is believed these were were at least partially formed by water erosion. Some of these channels are quite large, reaching 2, kilometers in length and kilometers in width. Yes, Mars is much like Earth in many respects. As our exploration of the Red Planet continues, we are learning more and more about its history and evolution. We have many interesting articles on the subject of Mars here at Universe Today. How Long is a Year on Mars? Mars , and Episode The Search for Water on Mars.

Chapter 4 : InSight spacecraft will soon peer deep into the interior of Mars | racedaydvl.com

At some point, the atmosphere began to escape to space, and the Mars surface water began to disappear. Measurements of gases in the atmosphere may help tell the story of Mars's climate change. Interior.

Once there, it will spend approximately two Earth years gathering data on the interior of the Red Planet. EDT on May 5, To rewatch the launch, check out the video below! PDT on May 5th, those on the West Coast of the United States will have the chance to witness an interplanetary launch for the first time. There, it will gather data on the crust, mantle and core of Mars. It will also listen for tectonic activity and meteorite impacts. This second chance at the mission gives planetary scientists another opportunity to snatch victory from the jaws of defeat. These experiments could shed light on the history of the Earth and other rocky planets in the cosmos, as well as lay groundwork for future human exploration of the Red Planet. Scientists are looking to gather information on the basic structure of Marsâ€”for example, the thickness of its crust and the composition of its mantle and core. The Seismic Experiment for Interior Structure SEIS is a seismometer that will monitor quakes and internal activity, allowing scientists to draw conclusions about the history and structure of the Red Planet. The Heat Flow and Physical Properties Package HP3 will measure how much heat is coming from the interior of the planet, how heat flows underground, and paint a picture of how heat has been driving geologic and internal processes under the surface. Banerdt says this gives scientists an idea of how the interior of Mars has evolved over time. Exploring the Red Planet , to find out! Previous spacecraft have attached instruments to a robotic arm, which could then bring them to targets and retract them afterward. InSight, on the other hand, will need its instruments placed permanently. To do that, scientists will spend the initial sols after landing mapping out the terrain around the lander and using a robotic arm to grasp instruments off the deck of the lander and install them on the surface of the planet. Since then, Banerdt put in more than a half dozen mission proposals, hoping to get new data for the scientific investigations that had been languishing since Viking. Unfortunately, it was enough to ruin the precision of the measurements the team planned to take, and ultimately, to force the mission to be delayed. Banerdt and the team took advantage of the extra design time. Instead of merely fixing the leak, they redesigned the vacuum system entirely. They also took the opportunity to reevaluate other parts of the lander, particularly those that had raised questions in other missions. NASA provides information on both official viewing sites and informal viewing sites on a launch page. Video of the launch will be available on demand later at YouTube. The launch window for InSight begins at 4: PDT on May 5th and runs through June 8th. In either case, it will be a moment to watch. The 1-minute countdown begins at More information on InSight:

Chapter 5 : Geology of Mars - Wikipedia

Interior processes created a tear in the crust called Valles Marineris, and formed a massive plateau covered by soaring volcanoes in the Tharsis region. Water flowed for a time, carving river channels and perhaps filling lakes and shallow seas.

The entire surface can be scoured by a single sand storm that hides it from observation for days at a time. Mars is a small world. While that does not sound like a large world at all, it is nearly equivalent to all of the dry land on Earth. The surface is thought to be mostly basalt, covered by a fine layer of iron oxide dust that has the consistency of talcum powder. Iron oxide rust as it is commonly called gives the planet its characteristic red hue. In the ancient past of the planet volcanoes were able to erupt for millions of years unabated. A single hotspot could dump molten rock on the surface for millenia because Mars lacks plate tectonics. The lack of tectonics means that the same rupture in the surface stayed open until there was no more pressure to force magma to the surface. Olympus Mons formed in this manner and is the largest mountain in the Solar System. It is three time taller than Mt. These runaway volcanic actions could also partially explain the deepest valley in the Solar System. Valles Marineris is thought to be the result of a collapse of the material between two hotspots and is also on Mars. The Martian surface is dotted with impact craters. Most of these craters are still intact because there are no environmental forces to erode them. The planet lacks the wind, rain, and plate tectonics that cause erosion here on Earth. Data returned by rovers and orbiters has shown that there are many minerals and erosion patterns on the planet that indicate liquid water in the past. It is possible that small oceans and long rivers once dominated the landscape. The last vestiges of that water are trapped as water ice below the surface. Scientists hope to analyze some of that ice and discover hidden Martian treasures. How seasonal jets darken the surface of Mars, and how ice depth varies across Mars. Want to explore the surface of Mars, check it out with Google Mars. Here is some more information about surface features on Mars. Mars , and Episode The Search for Water on Mars.

Chapter 6 : Mars Facts: Interesting Facts about Planet Mars â€¢ The Planets

surface and atmosphere Our knowledge of Mars has changed dramatically in the past 40 years due to the wealth of information provided by Earth-based and orbiting telescopes, and spacecraft investiga-.

The western hemisphere is dominated by the Tharsis region red and brown. Tall volcanoes appear white. Valles Marineris blue is the long gash-like feature to the right. The Elysium province is at the upper right edge. Areas north of the dichotomy boundary appear as shades of blue on both maps. The northern and southern hemispheres of Mars are strikingly different from each other in topography and physiography. This dichotomy is a fundamental global geologic feature of the planet. Simply stated, the northern part of the planet is an enormous topographic depression. In contrast, the lowlands north of the dichotomy boundary have few large craters, are very smooth and flat, and have other features indicating that extensive resurfacing has occurred since the southern highlands formed. The third distinction between the two hemispheres is in crustal thickness. The origin and age of the hemispheric dichotomy are still debated. Hypotheses of origin generally fall into two categories: A new theory based on the Southern Polar Giant Impact [17] and validated by the discovery of twelve hemispherical alignments [18] shows that exogenic theories appear to be stronger than endogenic theories and that Mars never had plate tectonics [19] [20] that could modify the dichotomy. Laser altimeter and radar sounding data from orbiting spacecraft have identified a large number of basin-sized structures previously hidden in visual images. Called quasi-circular depressions QCDs , these features likely represent derelict impact craters from the period of heavy bombardment that are now covered by a veneer of younger deposits. Crater counting studies of QCDs suggest that the underlying surface in the northern hemisphere is at least as old as the oldest exposed crust in the southern highlands. The vast Alba Mons formerly Alba Patera occupies the northern part of the region. The huge shield volcano Olympus Mons lies off the main bulge, at the western edge of the province. As a result, immense extensional fractures grabens and rift valleys radiate outward from Tharsis, extending halfway around the planet. The Elysium volcanic complex is about 2, kilometers in diameter and consists of three main volcanoes, Elysium Mons , Hecates Tholus , and Albor Tholus. The Elysium group of volcanoes is thought to be somewhat different from the Tharsis Montes, in that development of the former involved both lavas and pyroclastics. The largest one that is readily visible is the Hellas basin located in the southern hemisphere. Ancient, low-relief volcanic constructs highland paterae are located on the northeastern and southwestern portions of the rim. The basin floor contains thick, structurally complex sedimentary deposits that have a long geologic history of deposition, erosion, and internal deformation. The northeastern portion of the basin rim has been eroded and is now buried by northern plains deposits, giving the basin a semicircular outline. The northwestern rim of the basin is characterized by arcuate grabens Nili Fossae that are circumferential to the basin. One additional large basin, Utopia , is completely buried by northern plains deposits. Its outline is clearly discernable only from altimetry data. All of the large basins on Mars are extremely old, dating back to the late heavy bombardment. They are thought to be comparable in age to the Imbrium and Orientale basins on the Moon. Equatorial canyon system[edit] Viking Orbiter 1 view image of Valles Marineris. Near the equator in the western hemisphere lies an immense system of deep, interconnected canyons and troughs collectively known as the Valles Marineris. The Grand Canyon is largely a product of water erosion. The Martian equatorial canyons were of tectonic origin, i. They could be similar to the East African Rift valleys. The presence of streamlined islands and other geomorphic features indicate that the channels were most likely formed by catastrophic releases of water from aquifers or the melting of subsurface ice. However, these features could also be formed by abundant volcanic lava flows coming from Tharsis. For example, the peak discharge required to carve the km-wide Ares Vallis is estimated to have been 14 million cubic metres million cu ft per second, over ten thousand times the average discharge of the Mississippi River. Vertical exaggeration is extreme. Note that residual ice cap is only the thin veneer shown in white on top of the plateau. Martian polar ice caps The polar ice caps are well-known telescopic features of Mars, first identified by Christiaan Huygens in At the south pole, a small residual cap of CO2 ice remains in summer. Both residual ice caps overlie thick layered deposits of interbedded ice and dust. A similar

kilometers-thick plateau, Planum Australe , lies in the south. Both plana the Latin plural of planum are sometimes treated as synonymous with the polar ice caps, but the permanent ice seen as the high albedo, white surfaces in images forms only a relatively thin mantle on top of the layered deposits. The polar layered deposits are some of the youngest geologic units on Mars.

Chapter 7 : Internal Structure of Mars â€“ The Center for Planetary Science

Covering our understanding of Mars' formation, geology, atmosphere, interior, surface properties, and potential for life, this textbook is essential reading for graduate courses, and an important reference for researchers.

Like the rest of the planets in the solar system except Earth , Mars is named after a mythological figure - the Roman god of war. In addition to its official name, Mars is sometimes called the Red Planet because of the brownish-red color of its surface. Mars is the second smallest planet in the solar system behind Mercury. Size of Mars compared to the Earth Side by side comparison of the size of Mars vs Earth Facts about Mars Mars is the fourth planet from the Sun and last of the terrestrial planets and is around ,, km from the Sun. The planet is named after Mars, the Roman god of war. It was known to the ancient Greeks as Ares, their god of war. This is thought to be because of the blood-red color of the planet which was also used by other ancient cultures. The landmass of Mars and Earth is very similar. This means that on Mars you could in theory jump 3x higher than you could on Earth. Only 16 of the 39 Mars missions have been successful. Pieces of Mars have been found on Earth. It is believed that trace amounts of the Martian atmosphere were within meteorites that the planet ejected. The study of this material has allowed scientists to discover more about Mars before launching space missions. Mars was once believed to be home to intelligent life. This came from the discovery of lines or grooves in the surface called canali by Italian astronomer Giovanni Schiaparelli. He believed that these were not naturally occurring and were proof of intelligent life. However, these were later shown to be an optical illusion. The tallest mountain known in the solar system is on Mars. Olympus Mons is a 21 km high and km diameter shield volcano that was formed billions of years ago. Scientists have found a lot of recent evidence of volcanic lava which suggests Olympus Mons may still be active. It is the second highest mountain in the entire solar system, topped only by the Rheasilvia central peak on the asteroid Vesta, which is 22 km high. Mars experiences huge dust storms â€" the largest in our solar system. The orbit path is more elongated than many of the other planets and this oval shaped orbit results in fierce dust storms that cover the entire planet and can last for many months. The Sun looks about half its size half it does from Earth when seen from Mars. When Mars is closest to the Sun in its orbit the southern hemisphere points toward the Sun and this causes a very short but fiercely hot summer. In the north it experiences a brief but cold winter. When the planet is farthest from the Sun, Mars experiences a long and mild summer because the northern hemisphere points toward the Sun. This is compared with a cold and lengthy winter in the south. With the exception of Earth, Mars is the most hospitable to life â€" a number of space missions are planning for the next decade the further increase our understanding of Mars and when it has the potential for extraterrestrial life, as well as whether it may be a viable planet for a colony. Martians, also known as extraterrestrials from Mars, are a common character in science fiction books and movies. This makes Mars one of the most popular and talked about planets in the solar system. It takes Mars Earth days to orbit the Sun with its orbit radius of ,, km. Mars is the only other planet besides Earth that has polar ice caps. The northern cap is called the Planum Boreum, with Planum Australe in the south. Water ice has also been found under the Martian ice caps. Mars has seasons like Earth, but they last twice as long. This is because Mars is tilted on its axis by about The orbit of Mars is the most eccentric of the eight planets. This means it is the least circular orbit path of the planets. Mars does not have a magnetic field â€" although there are some scientists that believe it did have a magnetic field somewhere around 4 billion years ago. More information and facts about Mars It was believed life existed on Mars for much of the nineteenth century. The reason behind this belief was part mistake and part imagination. As others noticed these lines, some suggested that they were too straight and could only be the work of intelligent life. The popular conclusion as to the nature of these lines was that they were canals constructed for irrigation purposes. However, with the development of more powerful telescopes in the early twentieth century, astronomers were able to view the Martian surface more clearly and determine that these straight lines were merely an optical illusion. As a result, the earlier claims of life on Mars were without evidence and, therefore, discarded. The large amount of science fiction written during the twentieth century was a direct outgrowth of the belief that Mars possessed life. From little green men to death rays, Martians were the focus

of many television and radio programs, comic books, movies, and novels. Although the discovery of Martian life in the eighteenth century eventually proved to be false, Mars is nonetheless the planet most hospitable for life other than the Earth. The Viking mission in the s conducted experiments on the Martian soil in hopes of detecting microorganisms. While it was initially believed that the formation of compounds during the experiments were a result of biological agents, it has since been determined that these compounds can be created without biological mechanisms. Future planetary missions scheduled to test the possibility of past and present life include the Mars Science Laboratory and ExoMars missions. Thus, something other than the composition is at work. The huge difference lies in the density of the two atmospheres. Simply put, Mars would resemble Venus if it possessed a thicker atmosphere. One of the long standing areas of research regarding the Martian atmosphere is its impact on the presence of liquid water. Surprisingly, despite the thin atmosphere, Mars experiences weather patterns. The primary form of this weather consists of winds, with other manifestations that include dust storms, frost, and fog. As a final note on the Martian atmosphere, leading theories claim that it may have once been dense enough to support large oceans of water. One popular explanation for this change is that Mars was struck by a large body and in the process a large portion of its atmosphere was ejected into space. The northern hemisphere is seen to be relatively smooth with few craters, whereas the southern hemisphere is an area of highlands that are more heavily cratered than the northern plains. Other than topographical differences, the distinguishing feature of the two regions appears to be geological activity, with the northen plains being much more active. The Martian surface is home to both the largest known volcano, Olympus Mons, and largest known canyon, Valles Marineris, in the Solar System. With a height of 25 km and a base diameter of km, Olympus Mons is three times the height of Mt. Everest, the tallest mountain on the Earth. Valles Marineris is 4, km long, km wide, and almost 7 km deep. To put the shear magnitude of its size into perspective, Valles Marineris would stretch from the East to West coast of the United States. Perhaps the most significant discovery regarding the Martian surface was the presence of channels. What is so meaningful about these channels is that they appear to have been created by running water, and thus providing evidence to support the theory that Mars could have been much more similar to the Earth at one time. However, subsequent images showed that lighting and a little imagination are what brought life to the formation. Estimates put its thickness in the northern hemisphere at 35 km, and 80 km in the southern hemisphere. Some scientists point to the lack of a significant magnetic field as an indication that the core is solid. However, within the past decade much data has been gathered to indicate that the core is at least partially liquid. The cause for this change is attributed to the gravitational forces exerted upon Mars by neighboring planets. This, of course, is due to its orbital distance. One Martian year is equal to almost Earth days. It takes Mars about 24 hours 40 minutes to complete one full rotation, easily making the Martian day the closest in length to an Earth day. What this means is Mars actually experiences seasons like those on Earth, though each is substantially longer because of the orbital distance of Mars.

Chapter 8 : Mars Surface, Landscape, and Interior | Exploring the Planets | National Air and Space Museu

The surface of Mars is the end of volcanic activity has apparently stopped the recycling of chemicals and minerals between the surface and interior of the planet.

Chapter 9 : NPR Choice page

Mars Surface Mar's surface is a dry, barren wasteland marked by old volcanoes and impact craters. The entire surface can be scoured by a single sand storm that hides it from observation for days.