MARS – NO LONGER THE RED PLANET BUT RATHER, THE GOLDEN BROWN PLANET

Barry E. DiGregorio

Mars – the golden brown planet as imaged by the Mars Science Laboratory Mastcam color camera.

Credit: MSSS/NASA/JPL

In August of 2006 the governing body of the International Astronomers Union (IAU) in Prague, in the Czech Republic voted to change the status of Pluto from the ninth planet in our solar system to an object now known as a dwarf planet. What this meant was that all the history books that had been previously written which claimed the solar system had nine planets; now all needed to be rewritten. Perhaps the IAU should now consider removing the title “Mars: The Red Planet” from history books as well.

For over 37 years the public have been shown images taken from the surface of Mars by NASA's twin Viking Landers, the Mars Pathfinder Lander and Rover, the twin Mars Exploration rovers, and the Phoenix Lander that depict Mars as an orange/red world.

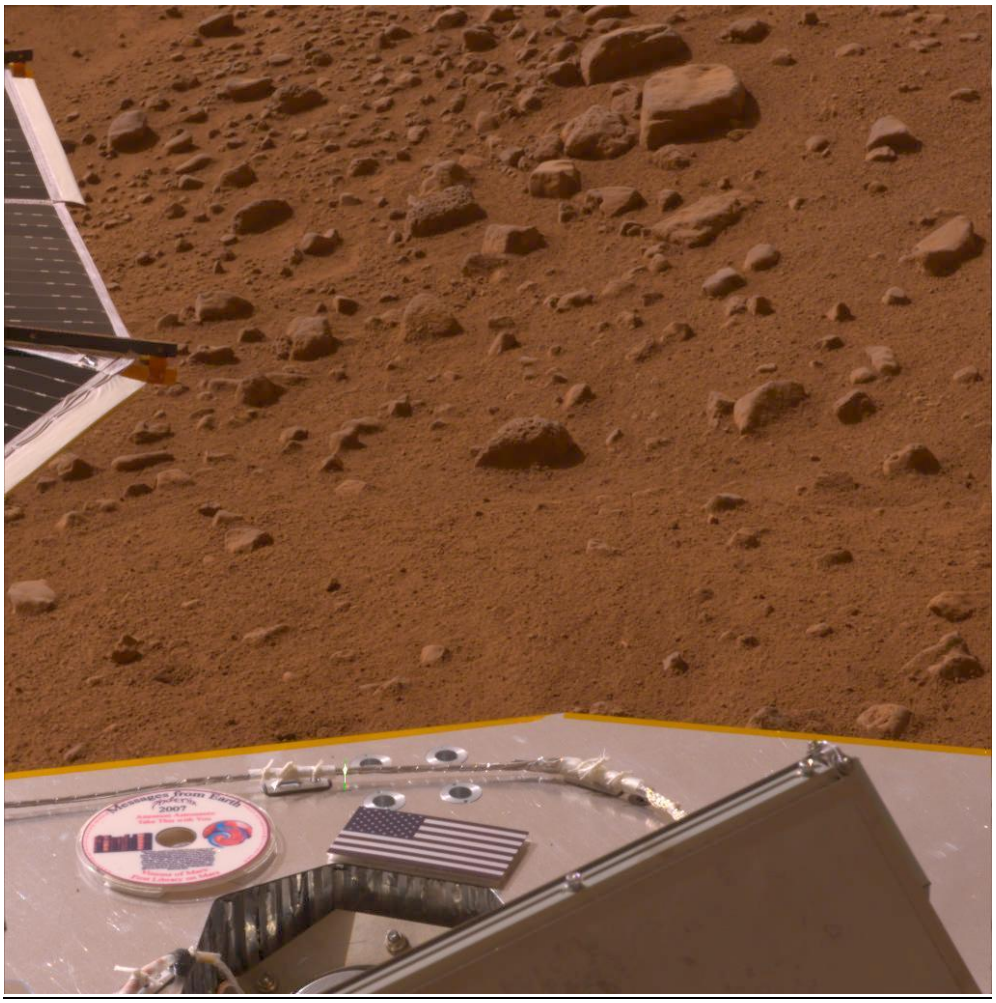
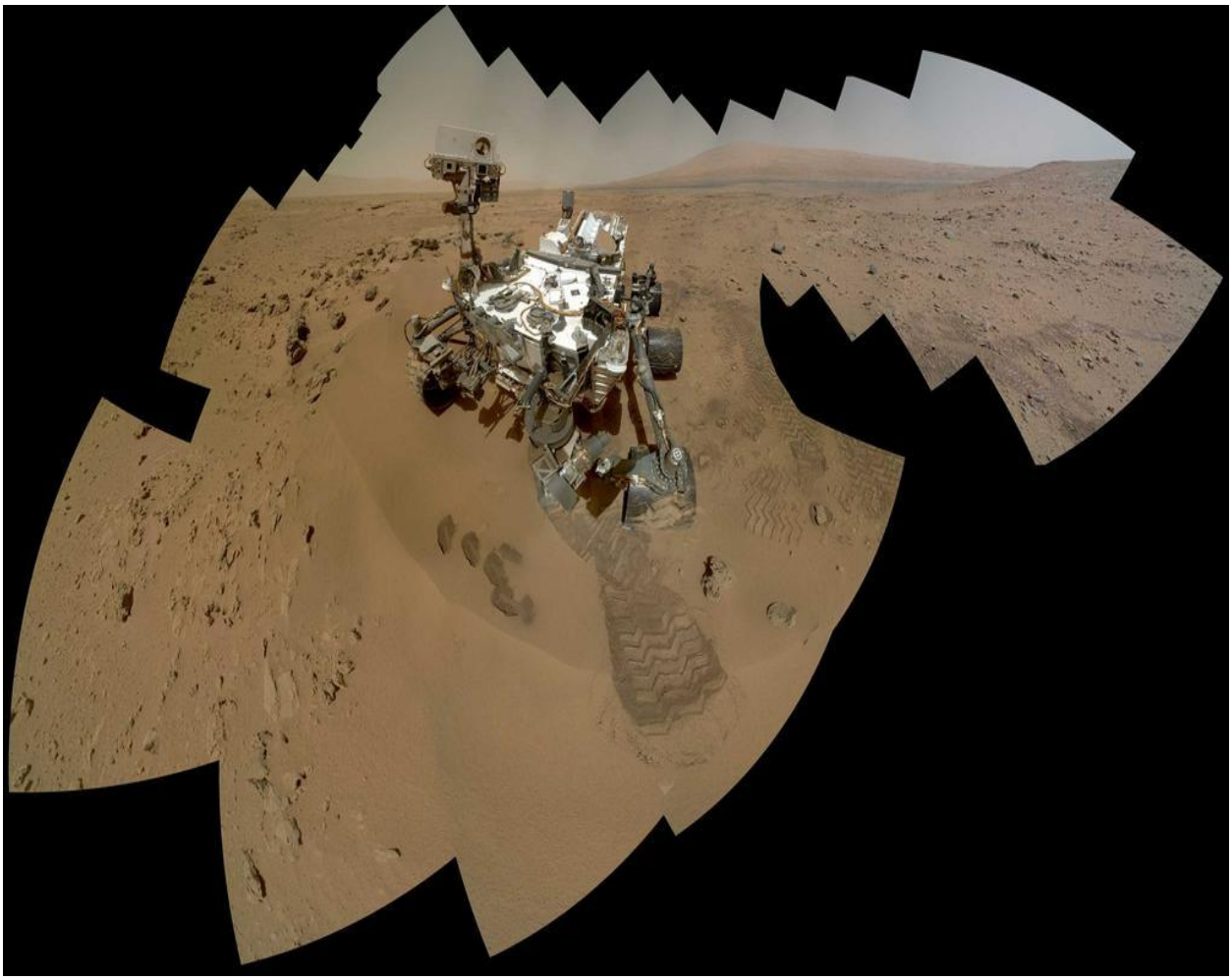


Image returned from the Phoenix Lander: http://photojournal.jpl.nasa.gov/jpeg/PIA10699.jpg

However, with the landing of NASA Mars Science Laboratory and its new color cameras we see Mars as the human eye would see it if we were standing on the surface. The color of Mars is no longer red or orange but rather a golden brown with sky color that change daily depending on the amount of dust suspended in the atmosphere. Sometimes the Martian sky is a dusty golden brown and at other times appears to have hints of green and even blue in it as dust settles out of the atmosphere. Why is this not being treated as a major discovery?

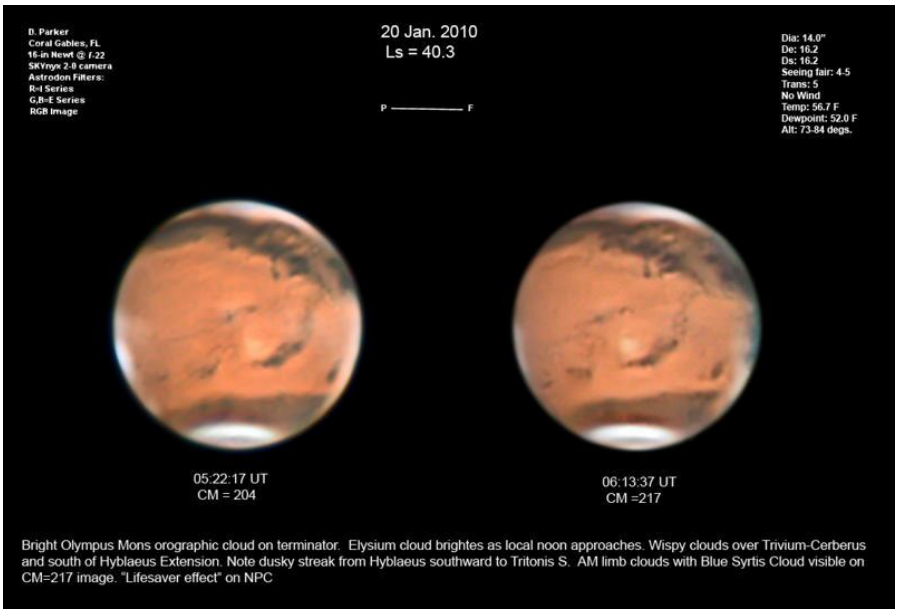
Below is a self-portrait from the Mars Science Laboratory MAHLI camera showing golden brown soil and a blue sky.



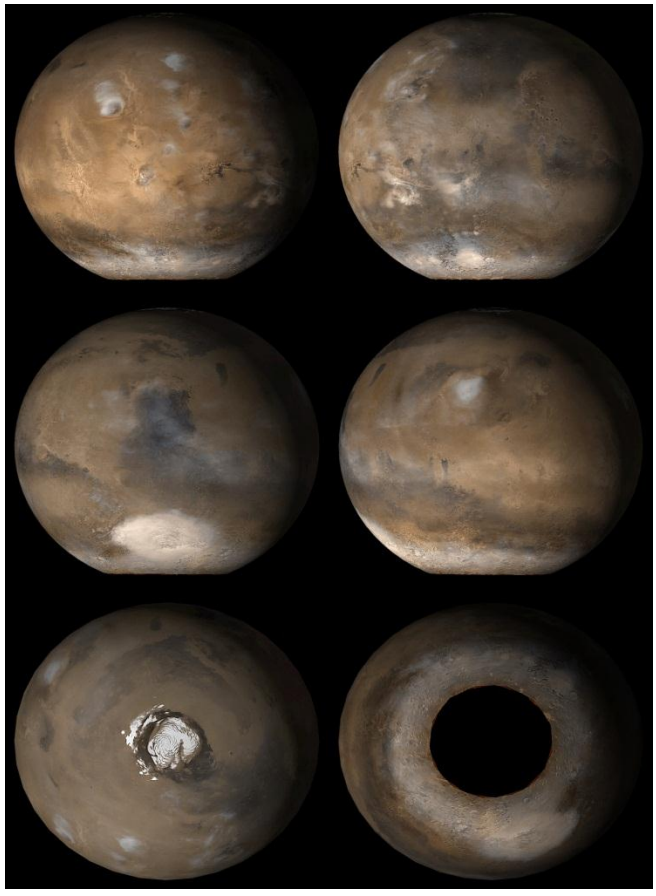
http://mars.jpl.nasa.gov/msl/multimedia/images/?ImageID=4934

Prior to the arrival of NASA spacecraft on Mars, the planet held the title “The Red Planet” mainly due to thousands of years of people looking up at the sky and seeing Mars as a red star like object. This effect was largely caused by the brown color of Mars shining down through Earth’s thick atmosphere which in turn caused the planet to take on a bright reddish or orange color. Yet professional and amateur astronomers who have observed Mars through medium to large telescopes know that Mars is never seen as orange or red.

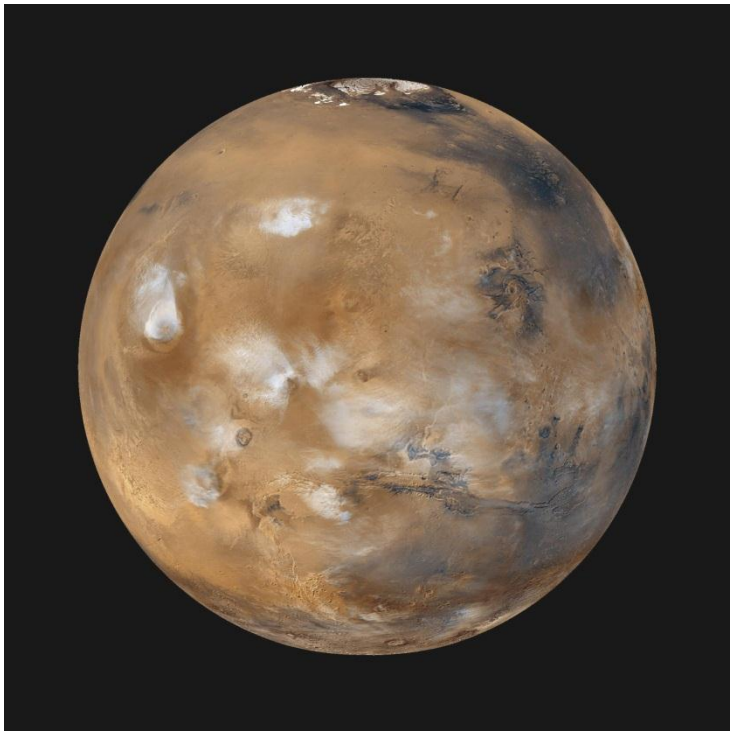
Donald Parker of Coral gables, Florida is one of the most respected amateur astrophotographers in the United States and says, “Mars rarely looks red to me... usually orange to the naked eye. The only time I have seen it as quite red was years ago when I was in Chicago and Mars was in the far southern sky. This reddening was most likely due to atmospheric absorption of the short wavelengths. Usually it resembles Arcturus. Through the telescope (12-24 inches aperture, it appears yellow-orange, maybe a peach color. Otherwise the only other color I have seen is the "Blue Syrtis Cloud," which at certain seasons makes Syrtis Major intensely blue when it is near the limb.



Color CCD image of Mars taken by Donald Parker



Compare Parkers images taken through Earth's atmosphere to those taken above from Martian orbit by the Mars Global Surveyor orbiter on November 13 2006. Where is the red or orange color?



Mars as imaged by the Mars Global Surveyor Spacecraft in 1996. White wispy clouds embrace the summit of Martian volcanoes. Where is the red surface?

Credit for both MGS images: MSSS/NASA/JPL

Why such a big fuss over the color of Mars? First of all, the new Mars Science Laboratory color images reveal a completely new Mars never seen before and it is not even being discussed. Why not? Second it has to do with NASA's 37-year history of showing surface images of Mars as an orange/red world when in fact it is not. The question is why would NASA want to publish color images of Mars that show a false red or orange color for sky, soil and rocks and call it true color? Over the years some researchers have been trying to call attention to the color issue because they say it could have a bearing on whether any type of photosynthetic life growing in the cracks and crevices of Martian rocks might be concealed by the color red. One of these researchers, Dr. Gilbert V. Levin was a biologist on NASA's first landed mission to Mars, Viking that was also the first mission to have dedicated biological instruments to look for microbial life.

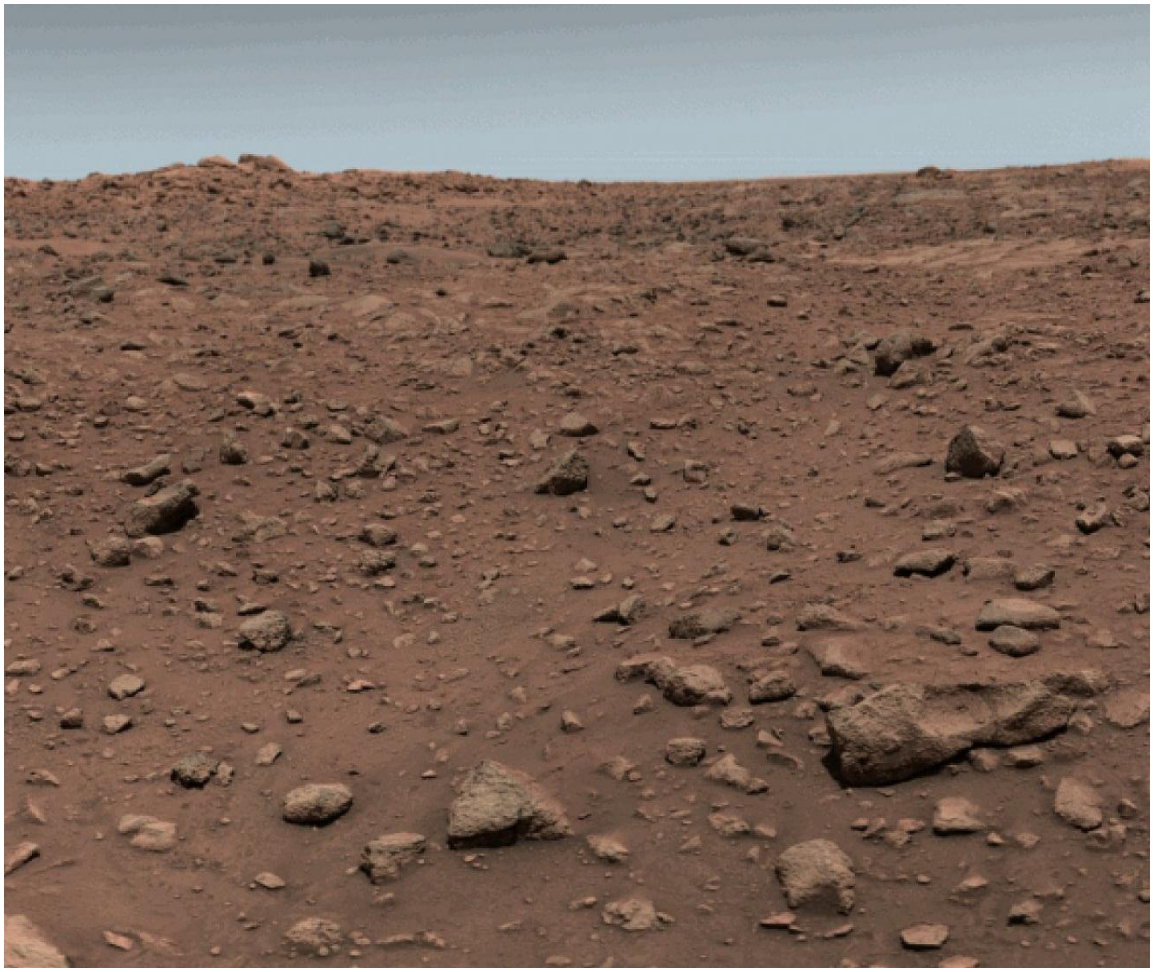
As an astrobiology researcher and science writer myself, I will add my own personal observations to try and analyze the full measure of this unusual story.

THE FIRST VIKING LANDER COLOR IMAGE

Contact
In Context

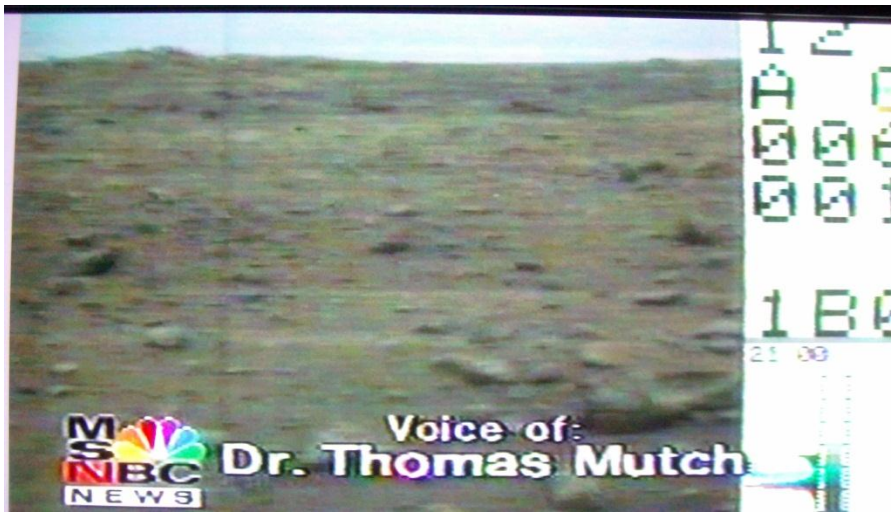
DiGregorio

I was lucky enough to see the first color picture from the surface of Mars beamed to my TV screen in 1976. I was 23 years old at the time. That image from the Viking Lander 1 on July 21st showed a pale blue sky, brownish colored soil and rocks. I thought it looked like a second Earth. It was published on the front page of many newspapers worldwide. Viking was to be the first search for life on another planet using real life detection instrumentation.



The first Viking Lander 1 color image showing a blue sky and brownish soil. The image is no longer in available in the NASA archives.

However, even before the biological testing of the mission had begun, someone in the JPL control room gave the order to have the color changed. Within one day NASA publicly announced that the blue-sky image was not the color of Mars in spite of the fact that Thomas A. Mutch, the Viking imaging team leader had described how the blue-sky image was made to a live NBC news crew the previous day.



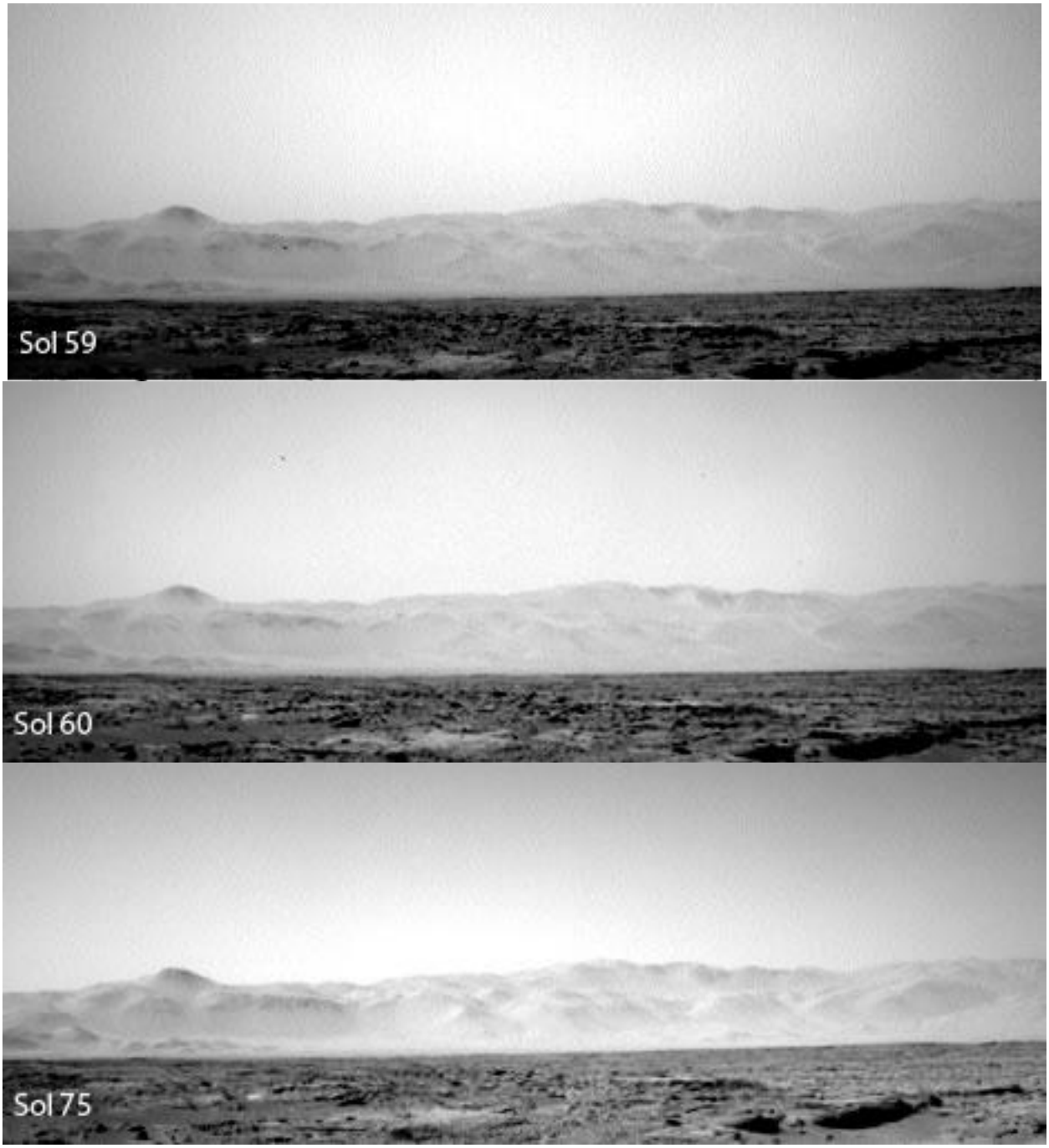
TV broadcast of the first color image coming in from Viking Lander 1

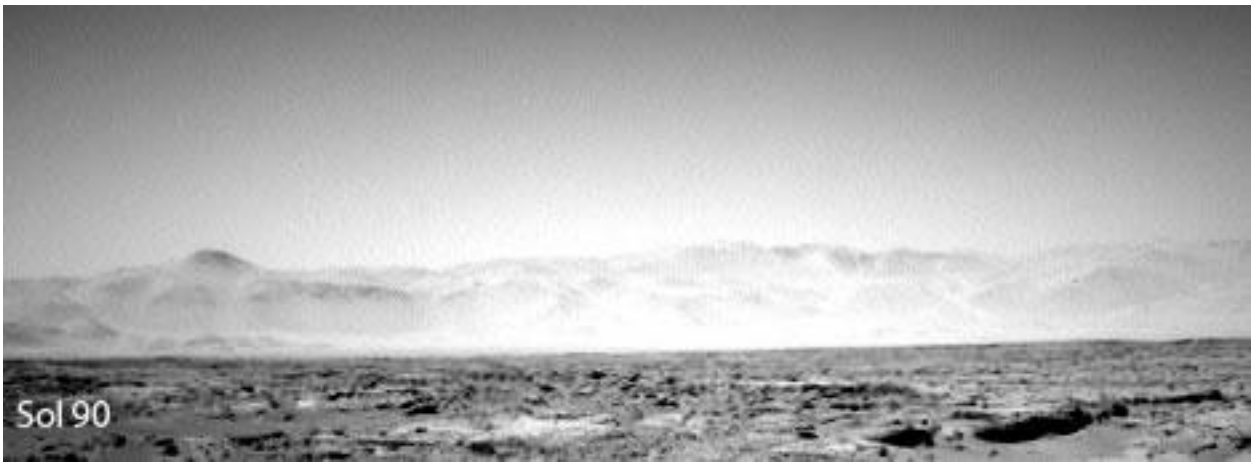
The revised Viking Lander 1 image (below) shows Mars as red as a tomato, for the sky, the soil and rocks. NASA would issue a later statement that said suspended dust in the atmosphere was the reason for the color change.

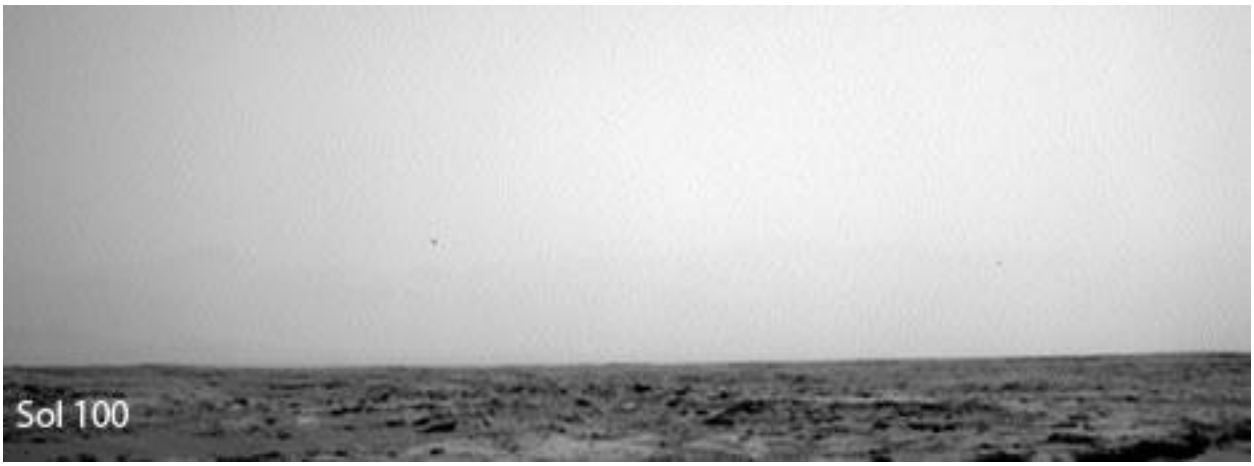
http://photojournal.jpl.nasa.gov/catalog/PIA00563

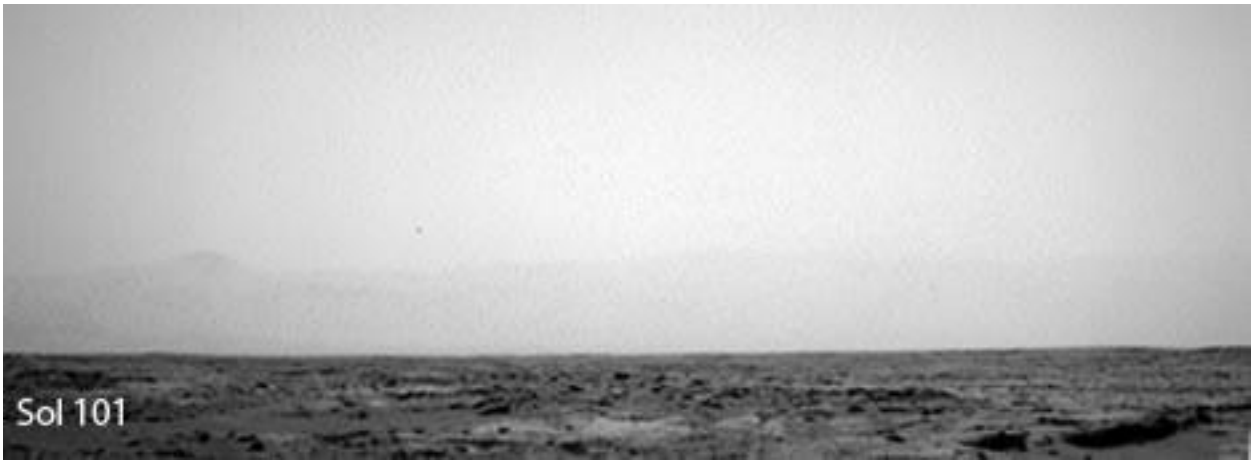
There is little doubt that dust in the Martian atmosphere varies from day (called SOLS) to day on Mars. Below are series of black & white images obtained from the Mars Science Laboratory cameras covering a

period of 42 days on Mars from SOL 59 to SOL 101 Notice how clear the sky is on SOLS 59, 60, 75 and 90 compared to those from SOLS 100 and 101.









The radical color change prompted some critical reactions from scientists working on the mission. Among those scientists was Gilbert V. Levin NASA's second funded astrobiologist who invented and built one of the three sensitive microbial detection instruments on both Viking Landers. It could detect as few

as 50 living cells in a gram of soil. I was intrigued with the Viking biology mission and I later sought out Levin to write a book on his life and times as one of the first biologists NASA funded to search for life on Mars. After over 30 years of trying to mimic the results of his nine biology tests on the soil of Mars using chemicals and oxidants NASA said were in the soil, Levin finally concluded in my July 1997 book *Mars The Living Planet* that only microbes could reproduce such results. Levin who earlier along with fellow researchers Patricia Ann Straat and William Benton published a research paper in a 1978 issue of the Journal of Theoretical Biology detailing what they thought was the first evidence of photosynthetic activity on some Martian rocks in front of Viking Lander 1.

http://mars.spherix.com/color/color.htm

Levin and his team were highly criticized for this move by most on the Viking mission team saying that Levin stepped out of his field of expertise.

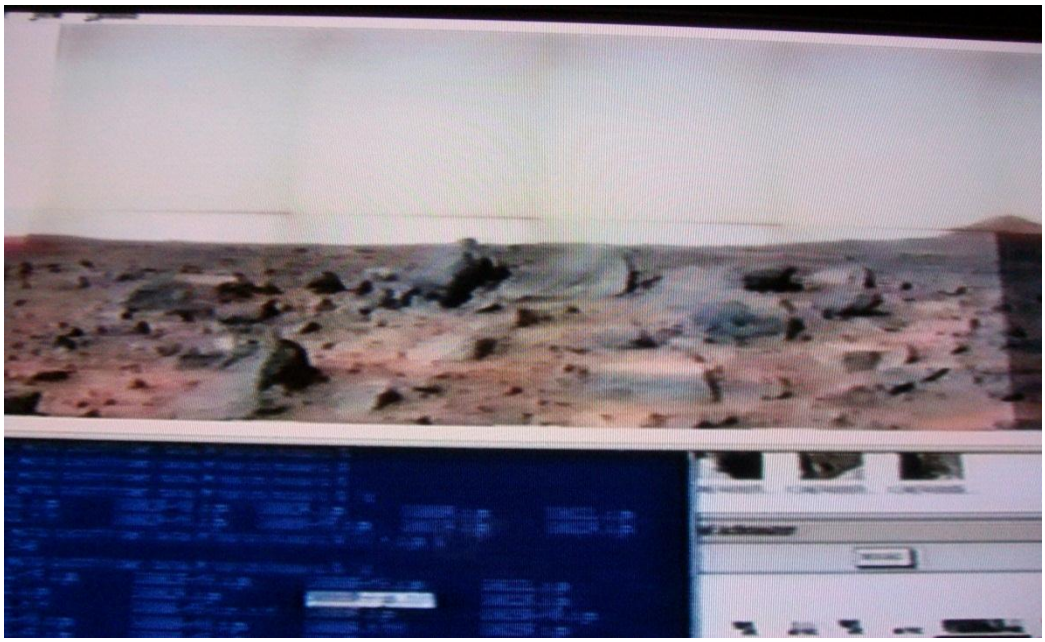
Levin said of this criticism, “The ridiculing by NASA of my color images and our published color analysis of the greenish patches on rocks made the falsification of color by NASA evident to me. I can only conclude it is part of a deliberate plan of NASA to deny there is life on Mars. This is also reflected in NASA's unscientific denial of our Viking biology results.”

Why would NASA do such a thing I asked him? “The most likely reason is NASA fears life on Mars will stall or end their plans to send Man to Mars.” What Levin meant was that if indigenous microbial life were still alive on Mars, it would take years of in-situ study to insure that any astronauts sent would not be stricken ill with new diseases or worse yet have the astronauts bring it back to Earth. Levin subsequently served on several early NASA Mars Sample Return committees and highly recommended that NASA put off such a mission until more evidence was obtained on Mars.

THE STRANGE STORY OF THE FIRST COLOR IMAGE FROM MARS PATHFINDER SHOWING A BLUE SKY

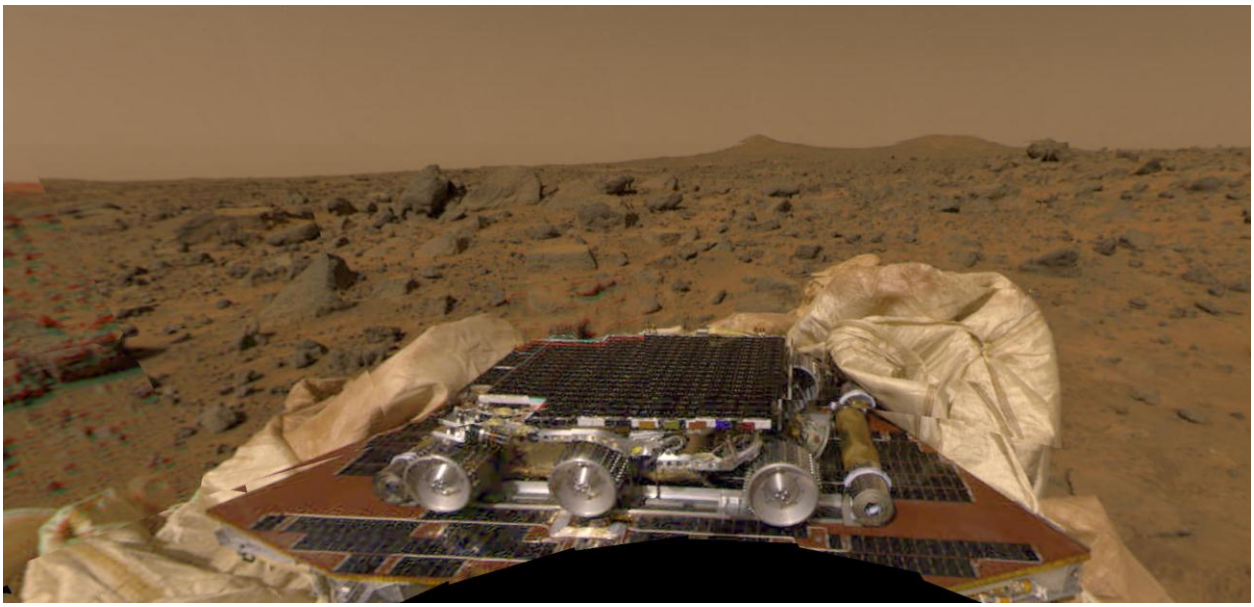
You would think that after retracting that first Viking blue-sky image that NASA would ever allow something like that to happen again, but it did, when Mars Pathfinder landed on July 4th 1997. I tuned in to watch an ABC Discovery News program in the USA called Mars Live that featured a live feed from the JPL control room monitor where the very first color Mars Pathfinder image was to come in. To my astonishment (thankfully I had my VCR recorder going) the image showed a blue sky and Earth-like brown tones for the soil just like the first Viking Lander 1 image did. The host of the program, ABC science editor Bill Blakemore along with journalist Steve Aveson are seen watching the color feed come in and suddenly are heard saying "Looks like blue skies over Mars" and Aveson responds immediately, "Yes, just look at that beautiful blue sky".

ABC News correspondent's Steve Aveson (left) and Bill Blakemore (right) on Mars Live special the day Mars Pathfinder sent back its first color image



ABC News feed direct from JPL monitor showing the first color image from Mars Pathfinder as it came in

The ABC news program then cuts to a commercial and when the show returns the color image from Mars Pathfinder is replaced with the now famous orange-red version below.



http://nssdc.gsfc.nasa.gov/planetary/image/marspath_80839.jpg

Hosts Aveson and Blakemore quickly thanked the audience for tuning in and signed off but did not mention anything at all about the color change.

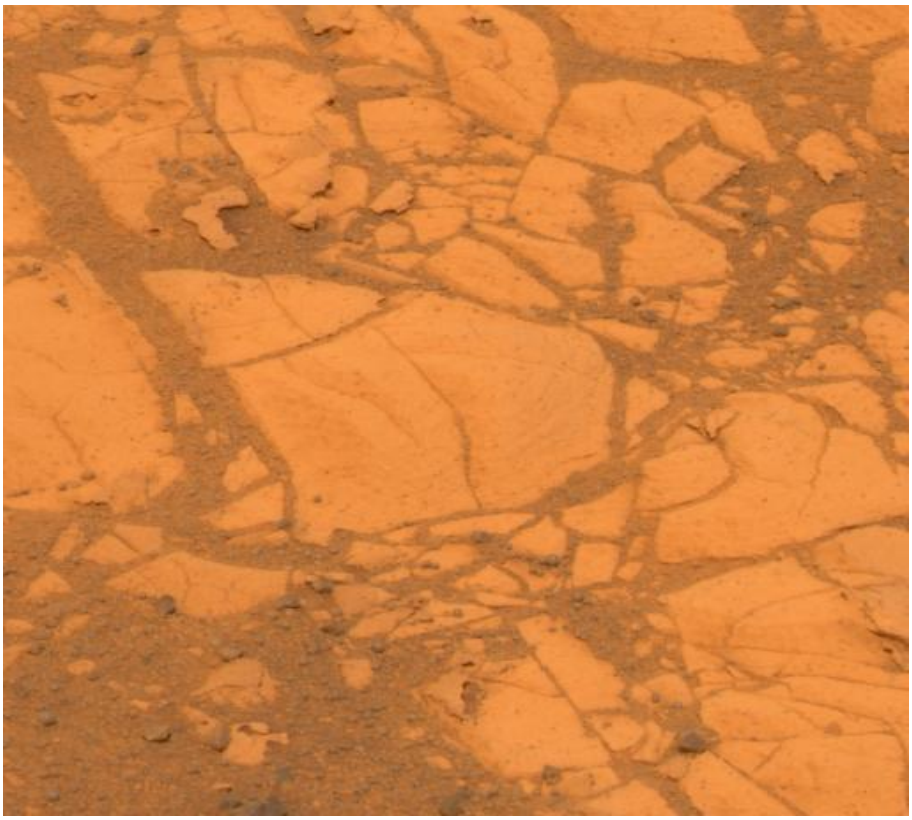
To back this story up, a well-established news photographer named Kevork Djansezian was in the JPL control room when that first Mars Pathfinder image came in. Djansezian's photograph was published the next day in many newspapers including the San Francisco Chronicle and USA Today. His photograph clearly showed a blue sky over the brownish twin peaks at the landing site.

I sent Peter Smith the principal investigator for the Mars Pathfinder imaging camera a link to the Djansezian photograph, which is now gone from the internet, and he replied:

“So someone at JPL was playing with the contrast and his screen was photographed by a journalist. Nobody's lying, the journalist reported what he saw and whoever was adjusting the image was trying to portray a Martian scene to show off the rocks and soil. Mars is not an easy subject for a photographer and TV screens only showing 8 bits of information. If you are implying that the glimpse of blue sky and brown soil on a JPL computer is somehow the true color of Mars, then you are simply wrong.”

Yet NASA has maintained an “orange-red” color for Mars right up until the Mars Science Laboratory “Curiosity” landed in Gale crater on August 6th, 2012. The previous mission was the Mars Exploration Rovers (MER) and in the link below this Cornell University website claims the orange-red of Mars as “true color” images.

http://pancam.astro.cornell.edu/pancam_instrument/true_color.html

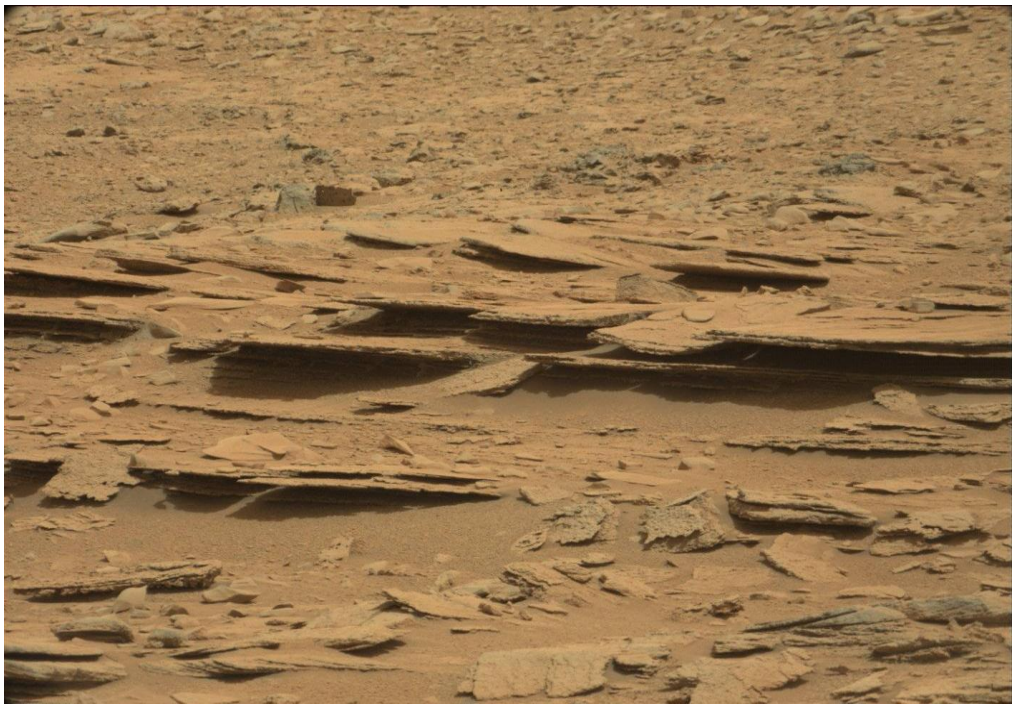


A true color image? An orange Mars captured by the MER rover Opportunity

Photo credit: D. Savransky and J. Bell (Cornell) / JPL / NASA

Photo credit: D. Savransky and J. Bell (Cornell) / JPL / NASA

Compare the above two Mars Exploration Rover Pancam images (supposedly) “true color” to the Mars Science Laboratory Mastcam color image below:



Both the MAHLI and Mastcam cameras aboard Curiosity are very different cameras than were previously sent to Mars. They take color images exactly the same way that a consumer digital camera does. Thus the Curiosity imaging team can reproduce colors the same way as you would see them through your camera if you were on Mars.

See all raw Mars Science Laboratory images here:

http://mars.jpl.nasa.gov/msl/multimedia/raw/

Up until October 31st and November 1st of 2012 Curiosity was sending back interesting Earthy brown colors for soil and a variety of colors for the rocks. The sky however looked like a smoggy day in Los Angeles. By the time the images from the MAHLI camera came in on October 31st and November 1st things got very interesting with the sky color. There it was again: a pale blue sky with a slight greenish tint to it. The color of the soil and rocks was the same, but the sky had blue in it.

http://mars.jpl.nasa.gov/msl/multimedia/raw/?s=84&camera=MAHLI

http://mars.jpl.nasa.gov/msl/multimedia/raw/?s=85&camera=MAHLI

Michael C. Malin, the principal investigator for the MAHLI and Mastcam cameras on Curiosity says, “To my eye, the MAHLI images show a rather grayish sky. I do not know what the opacity of the dust in the atmosphere was that day, but it is possible that clear skies and the time of day might have led to a bluish tint to the sky.”

Below is a Mars Science Laboratory Mastcam image showing green colorations on some rocks - from SOL 76. Levin asks could it be evidence of algae or lichens?

http://mars.jpl.nasa.gov/msl-raw-images/msss/00076/mcam/0076MR0571002000E1_DXXX.jpg

Michael Malin says, “The green color is not "real," and stems in part from the fact that the color filter array [on the Mastcam] has twice as many green pixels as it has red or blue pixels.”

Richard Hoover a former Astrobiology Group Leader at NASA's Marshall Space Flight Center in Huntsville, Alabama is skeptical of NASA's interest to find life on Mars. "I am aware that NASA has previously altered the color of some of images from Mars to make the sky appear orange rather than blue. There is ample evidence that NASA has a serious problem with considerations of the possibility of the existence of life elsewhere in the Cosmos. If this were not the case, how can one explain the fact that in the decades since Viking searched for evidence of life on Mars, there has not been a single NASA mission to Mars that has carried any kind of instrumentation to conduct a real search?”

Joseph Miller, a neurobiologist at the University of Southern California largely agrees with Hoover’s assertion. He has analyzed Levin’s Viking biology data for circadian rhythms and using a mathematical test designed to separate biological signals from nonbiological signals is 95% positive that Levin found life on Mars in 1976. Yet NASA has shrugged his analysis off with little regard. Miller says, “One factor is that it would be very embarrassing for NASA to reverse themselves on the interpretation of Viking. So that is a matter of pure institutional ego. But other factors enter in. Serious investigation of the possibility of life on other planets would doubtless rile up the fundamentalists. NASA hates controversy. They got burned rather badly on the Mars meteorite some years ago and probably don't want to repeat that unless they have incontrovertible evidence of life. Of course they could have achieved that or

negated the possibility sometime in the last 37 years by flying another life detection experiment! But for quite a few years they actually refused to even consider such proposals. Also I think certain NASA-associated individuals are also amazingly venal. Their idea seems to be if there is life on Mars, I am going to discover it, get the Nobel Prize and the hell with everyone else! Some of these types are very powerful, sit on funding agencies and editorial boards and basically enforce the "no life on Mars" dogma by rejecting any analysis to the contrary."

So what to make of this? Has the issue of color on Mars been used in a conspiracy to cover up signs that Mars harbors some form of simple photosynthetic life forms as Gilbert Levin thinks? Or has the evolution of planetary imaging on Mars surface moved at such a slow pace we cannot tell what the color of its surface is? If the latter were true, then why have all the color images returned from spacecraft visiting the moon, Venus as well as all of the other planets in our solar system been rendered as problem-free true color views? The Fact that Mars is no longer the red planet should now be emphasized and embraced by the scientific community, media as well as educators. Just as in the case of Pluto being demoted as the ninth planet in the solar system, we now need to face the truth about the color of Mars. I think a golden brown planet that has occasional blue skies is an important finding in of itself. It gives all the more reason to study Mars and look for signs of life. Mars deserts now seem more Earth like than we ever imagined. Now all we need is to find the organic molecules that provide the indisputable proof that Martian life exists on the golden brown planet – but that is another long story. See:

Mars rover Curiosity finds organic compounds, not life

http://articles.washingtonpost.com/2012-12-03/national/35623329_1_mars-rover-mars-science-laboratory-john-grotzinger

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