The Two Faces of ESA

Since September of last year (2006), the BBC , Sky & Telescope Magazine, British National Space Centre News and other news organizations published articles presenting what was called a "3D perspective" of the Face on Mars. The source of this image was the European Space Agency (ESA). The ESA 3D model was constructed from images taken by the High Resolution Stereo Camera (HRSC) carried by ESA's Mars Express orbiter. The picture shows a high peak rising from the center of the "forehead" of the Face. This unexpected peak gives the landform a decidedly natural and un-facelike appearance (although some people have facetiously referred to this image as the "Unicorn," with the newly "discovered" peak serving as the animal's horn).

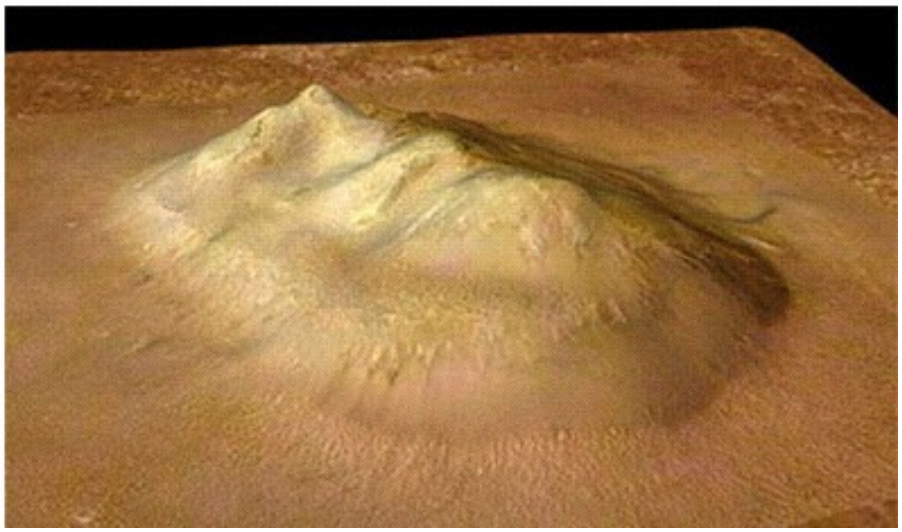

Figure 1 ESA Image said to be a 3D perspective widely published in the news media..

The implication was made in some of the news articles that the ESA model showed features not revealed in previous images because of the higher resolution and the stereo capability of the Mars Express camera. But some indication of the unexpected peak's existence should have been seen in the numerous high-resolution images of the Face acquired by NASA's Mars Global Surveyor and Odyssey spacecraft, which had image resolutions varying from 1.5 meters to 10 meters per pixel. The presence of even a moderately steep peak should have been clearly revealed by the brightness of its sunward slope and the darkness of the slope facing away from the sun. Images taken by the Viking spacecraft in 1976, with resolutions of only 50 meters, clearly showed the presence of a boulder (known as the "teardrop") that is much smaller than this peak would have to be.

Also, the first MGS image of the Face in 1998 was taken with a line-of-sight angle about 45 degrees from the vertical – essentially a half-profile view that should have clearly shown such a peak protruding from the landform, had it actually existed.

This “horn” feature was not detected by anyone who examined previous images closely, including Mark Carlotto. Carlotto wrote a paper published in the peer-reviewed Applied Optics journal describing his shape-from-shading analysis of the 3-dimensional shape of the landform based on the Viking images from the 1970’s.

In 2002, SPSR member Lan Fleming constructed an elevation map of the Face based on parallax measurements of three images acquired by NASA’s Mars Global Surveyor (MGS) spacecraft. The resolutions of these images ranged from 1.5 meters to 4 meters per pixel. The results were consistent with Carlotto’s shape-from-shading model. No indication of any high peak on the Face mesa was found. The existence of such a peak should have been readily apparent from the shift of the feature’s position relative to reference points on the surrounding terrain from one image to another.

After the release of the recent ESA image, the elevation of the landform at the position of the summit of the supposed peak was computed from parallax measurements on two of the same images that were used in 2002 stereographic analysis. That position could be identified by the small circular feature just below the summit of the peak in the 3D model because this feature also appears in the MGS images. As shown in Figure 2, the computed height of 270 meters at that position (labeled in red numerals) is about the same as it is for other points nearby, and about 100 meters lower than the elevation of the true highest point on the landform: the tip of the “nose.”

Also note in Figure 2, that there is no bright surface to the left of the supposed peak (in the direction of the sun) that would indicate a slope up to a higher elevation such as the bright surfaces on the right side of the “nose,” which indicate the slope leading up to the true peak of the landform.

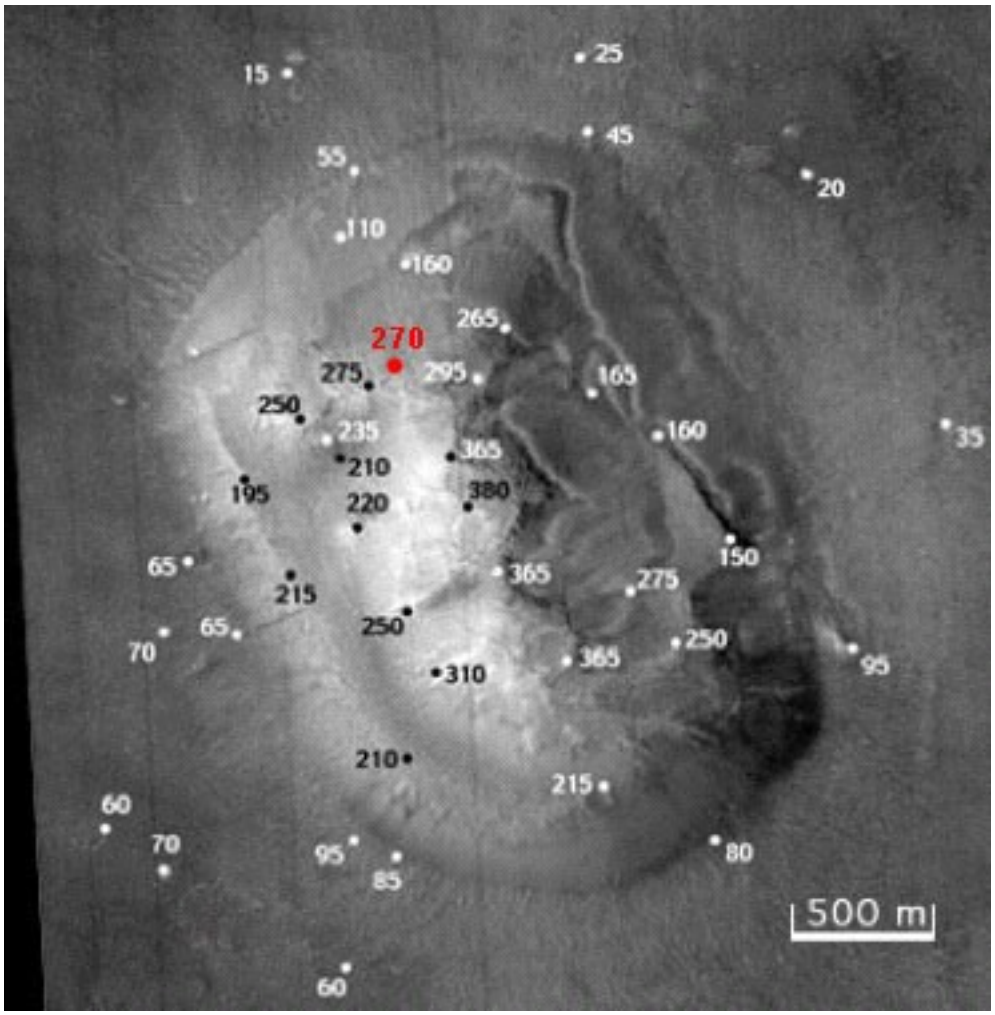

Figure 2 Elevation map of the Face landform. The position and height in meters at the position of the "horn" are shown in red.

Parallax shift is also the basis for acquiring information on 3-dimensional topology from the Mars Express HRSC images. For this elevation model, we had to settle for using the MGS images taken months apart under differing lighting and atmospheric conditions because they were the only images available at the time. But ESA's HRSC is designed to take a set of images spaced only a few minutes apart and taken from different angles of view that can be chosen for optimal accuracy in the 3D reconstruction. For that reason we would expect ESA's 3D reconstructions to be more accurate than the ones that Carlotto and Fleming constructed. (Repeated request were made to ESA for sharing 3D data from which the HRSC 3D perspectives were constructed. Even though the proprietary period was over they ignored our request.) But we would also expect ESA's reconstruction to be consistent with ours within the limits of the resolutions of the images used. And there is in fact an ESA HRSC 3D perspective rendering that is in agreement with our models. But it's not the one that was published in the various news articles. This second perspective model from ESA shows no evidence of the "horn," and its west side has the same suggestive likeness to a face as in the old Viking images. _

For comparison, the “Two Faces of ESA” are shown next to each other in Figure 3. While the ESA model that was not published in the press is reasonably consistent with those that Carlotto and Fleming constructed, it is not at all consistent with ESA’s “Unicorn” model.

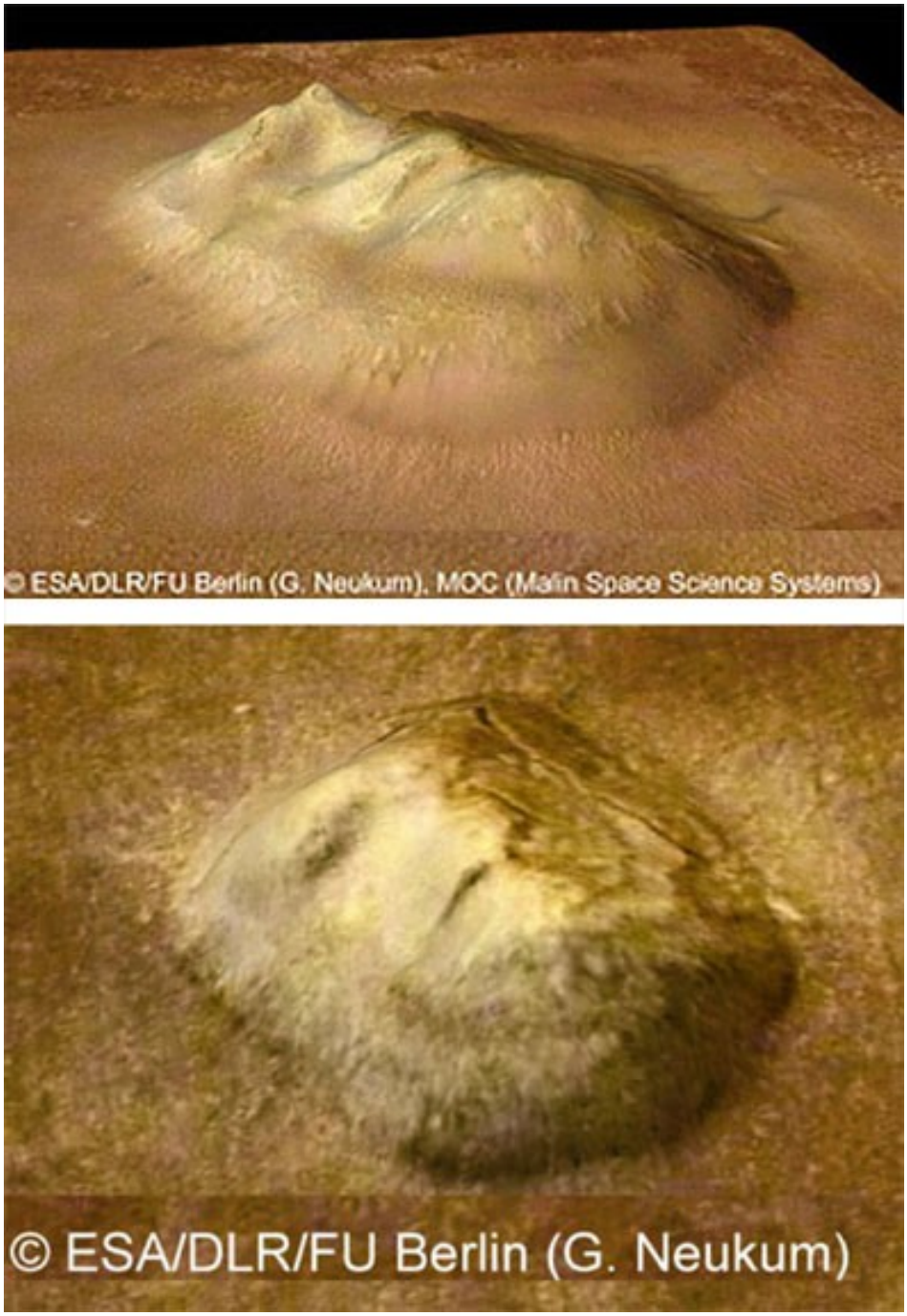

Figure 3 Top: 3D model published in the mass media. Bottom: 3D model not published in the mass media.

While the articles published in the press give no details whatsoever about how the Unicorn model was derived, there has been speculation that the main peak is simply an artifact of exaggerating the vertical height of features on the plateau of the Face mesa by a factor of 2 or more. This turns out to be true. SPSR member Horace Crater emailed the ESA Mars Express team and ask about how the image was produced. Dirk Benkert, a member of the HRSC team responded:

> "These perspective scenes are vertically exaggerated, mainly by a factor of 2 to 5 to highlight relevant surface structures. The final adjustment is done manually, so the exact exaggeration factor for each scene is unknown."

While the vertical heights were exaggerated, it appears that the exaggeration was not done uniformly. A uniform exaggeration would make all points on the surface higher by the same factor, but it cannot make a lower position such as the "horn" seem higher than the true high point of the landform (the "nose" ridge in the elevation map of Figure 2). The final adjustment "done manually" perhaps was the operation that created the nonexistent "horn" feature. Exaggerating the height scale to highlight surface structures is scientifically legitimate, but not when it's done without explicitly stating so and certainly not when it's done selectively rather than uniformly. ESA should have informed the news media to whom they released the image of these adjustments.

Another interesting difference between the two ESA models is in the credit labels printed on the two images. The Unicorn image lists Malin Space Science Systems (MSSS) as somehow partly responsible for the model, while the more accurate model lists only ESA and an ESA scientist. What contribution was made by Malin Space Science Systems is not stated.

MSSS's founder and principal investigator for the camera carried by NASA's Mars Global Surveyor, Michael Malin and other researchers associated with NASA have been involved in the public release of other badly distorted images of the Face, starting with the first enhanced MGS image in 1998. That image was subjected to excessive filtering that made the 300+ meter high landform appear to be a depression in the ground (causing the image to be referred to by some as the "Footprint" enhancement). For comparison, NASA's "Footprint" image is shown next to the same image properly processed by Carlotto.

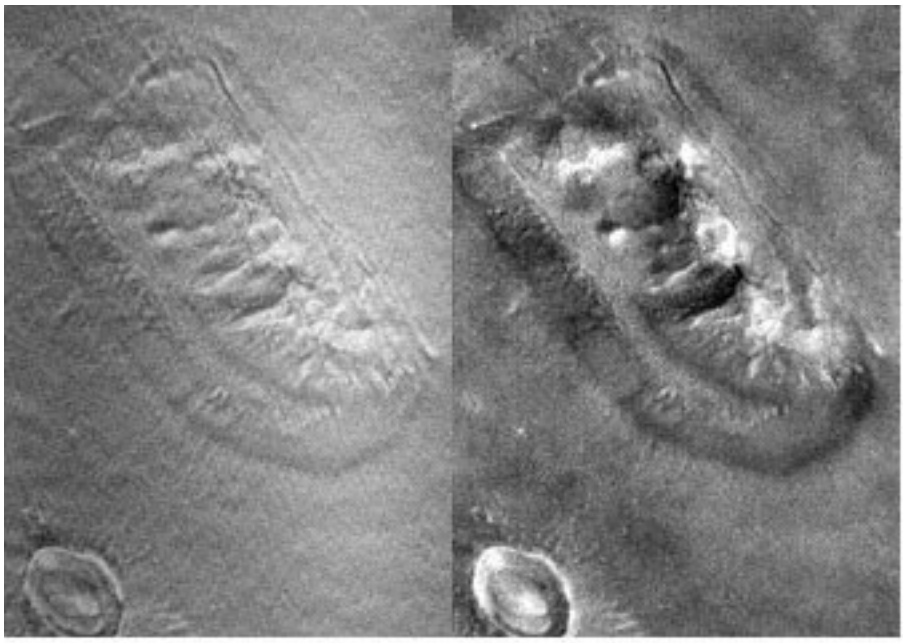

Figure 4. The 1998 Face image. To the left is the excessively processed NASA image. To the right is the same image as properly processed by Carlotto.

Dr. Mark Carlotto gives a detailed description of the problems with this and another of the enhancements in an online article.

Self-styled "skeptics" are convinced that each and every one of the distorted images appearing in the popular press is by itself sufficient proof that the Face is natural. But they seem curiously untroubled by the fact that each such image depicts the landform with a markedly different shape than what the other distorted images show.

The Face has many intriguing features, foremost among them the symmetry of the platform. For that reason we are always interested in any new information on the landform that Mars exploration provides. But there is a wide range of opinions within SPSR about the likelihood that it could be of artificial origin. As can be seen in the overhead views of the Face such as the one shown in Figure 2, its eastern (right) side has only a vague resemblance, if any, to a face and a depression somewhat suggestive of an eye is not the same shape and is not symmetrically placed relative to the eye-like feature of the western side. This leaves the artificiality hypothesis dependent on the unverified (and perhaps for the foreseeable future, unverifiable) assumption that the landform was either "damaged" or that the asymmetry was intentional. Primarily for that reason, SPSR as a group has *not* arrived at the conclusion that the evidence to date compels acceptance of the artificiality hypothesis.

While there has undoubtedly been some pseudoscience associated with the Face on Mars image, science writers owe it to their readers to take a more questioning stance when faced with so-called debunking evidence. Short articles like those quoted at the beginning

of this article appear from time to time, almost in a predictable fashion, attempting to debunk the Face Mesa's role in Planetary SETI, as if it were a Martian “Great White Whale” that some feel compelled to harpoon whenever it surfaces in their conscious thoughts. Too infrequently, papers appear in peer reviewed journals in which the issue of Planetary SETI is discussed more seriously (see for example two articles by SPSR members in the January 2007 issue of the Journal of the British Interplanetary Society). It would be refreshing to have those attempting a serious critique of Planetary SETI to reply in kind to such articles instead of tiresome repetitions of short debunking articles.