Do NASA Images Create Fantastic Voyages?

Scientists distort images of planetary bodies by accident or design; now they are being scolded for misleading the public

YOU KNEW THE NATIONAL AERONAUTICS and Space Administration (NASA) had an image problem, but the latest is one that's been staring you in the face for years. Remember those incredible images taken by NASA spacecraft of the planets and their moons? Turns out some *were* incredible. Over the past few months, several planetary scientists have raised the embarrassing question: Have agency scientists been inadvertently misleading the public with images that portray celestial bodies as places of towering mountains and day-glo colors when reality is a great deal duller?

For researchers, consciously exaggerating images can be a valuable technique—one that can bring out faint shadings and topographic details. And it has obvious publicity value for NASA. But the recent release of dramatic radar images from the Magellan mission to Venus sparked a debate over planetary sex appeal versus reality.

It turns out that some of the shots exaggerated the height of a low-lying, almost invisible Venusian volcano by a factor of 22.5. That's like stretching a two-story home until it has the proportions of the Washington Monument. Now not only CNN addicts but readers of *Scientific American* think Venusian molehills are actually towering pinnacles. Some planetary scientists, though, think the community should strive harder for accuracy.

David Morrison of NASA's Ames Research Center at Moffett Field, California, for example, put out a playful call for the formation of a Flat-Venus Society "to promote the fact that our sister planet is mostly flat, rolling plains." He doesn't mind the vertical exaggeration itself; geologists do that sort of thing all the time to bring out subtleties of the lay of the land. "The problem is not the distortion," says Morrison, "the problem is that no one knows" about the distortion.

How could anyone? Magellan scientists issued nary a word about the vertical exaggeration in the caption material accompanying images released to the press or in slides shown at scientific meetings. The images weren't meant to be misleading, says Ellen Stofan, Magellan deputy project scientist at the Jet Propulsion Laboratory. The oversight arose, she speculates, because "it becomes so standard, you don't think about it." Now the affected Magellan captions have been amended , and vertical exaggeration was scrupulously noted in recent Magellan talks, something that elicited chuckles from the audience of experts.

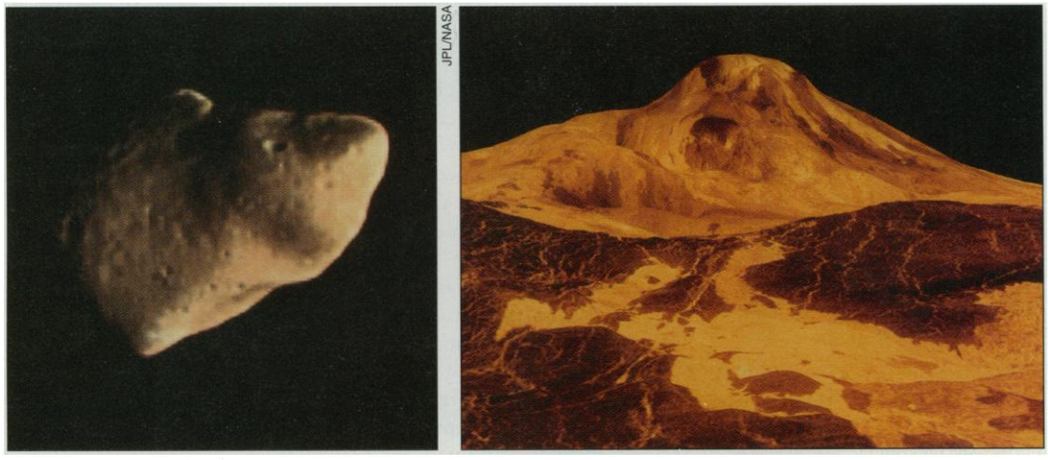
After the Magellan images had opened the debate, another distortion showed up last December, when Galileo mission scientists released the first color image of an asteroid. It portrayed Gaspra in butterscotch-yellow tones when every planetary scientist knows it would be gray to the human eye.

Even critics of the image admit that it's far harder to control the color of a planetary image than its geometric proportions. When the Viking landers set down on Mars in 1976, for example, they began sending back images of orange rocks and dust. Months later, after the orange landscape was firmly fixed in the public mind, a proper calibration of the camera showed the Martian surface was actually a dark yellowish brown.

Likewise, the first images from the Voyager spacecraft of Jupiter's moon Io dressed it in a garish red-orange reminiscent of a badly decayed pizza. "I had looked at Io in a telescope," says astronomer Andrew Young of San Diego State University, "and I knew it wasn't that color. I found that the true color for Io was really this dirty-looking pale olive color that's pretty uninspiring." The problem was the known insensitivity of the Voyager camera in just the color range where a small error can produce huge differences in perceived color. "It's like playing with the color knobs on a TV," says Young. "When you don't have something familiar like human flesh tones for comparison, you can get all kinds of things."

Voyager scientists later paid more attention to twiddling the color knobs at Saturn, Uranus, and Neptune (nobody is quibbling about the rich blue of Neptune). But the issue arose again as the Galileo spacecraft flew past the asteroid Gaspra. Clark Chapman of the Planetary Science Institute in Tucson says that he alone, among the members of the Galileo imaging team, called for a "true color" image of the asteroid, which would have been a shade of gray. But the team chose butterscotch and, worse, labeled the hue "approximately true color" in the captions. That version may tell experts something about Gaspra's composition, Chapman admits, and it looks better on the evening news. But, he grouses, that's "not what you would see at Gaspra." Imaging team leader Michael Belton of Kitt Peak National Observatory responds that his group did its best given the limited data.

Having done his dissertation on the subtle grays of asteroid color, Chapman concedes the difficulty of rendering colors as humans would see them, but he thinks NASA could do better—or alert the public to the inevitable distortions. "One could easily be more up front about it," he argues. "I'm not saying there's a conspiracy, but it sets people up to be disappointed with the true nature of the universe." ■ RICHARD A. KERR



Truth in labeling. *In reality, the asteroid Gaspra* (above) *would be gray, and the Venusian volcano, Maat Mons (seen in a computer-generated perspective view), would look flat.*