

## NASA's future lies on moon, Mars

By Dan Vergano, USA TODAY

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Created during the Cold War to help the United States beat the Soviet Union to the moon, NASA once again finds its *raison d'etre* tied to a lunar landing.



Astronaut Steven Smith performs maintenance on the Hubble Space Telescope during a space walk Feb. 15, 1997.

AP/NASA Photo

But the world is much different from what it was in 1958. It's much different from what it was in 1961, when President Kennedy challenged Congress to land a man on the moon.

The United States' old adversary is in pieces. And President Bush's call for a return to the moon is not a rallying cry this time.

Quite the contrary: The president's "Vision for Space Exploration" sharply divides politicians and scientists, creating a gulf that awaits the man Bush has chosen to become NASA's next chief.

Confirmation hearings begin Tuesday for Johns Hopkins University engineer Michael Griffin, along with what is expected to be a long-delayed congressional examination of the space agency's future.

The president wants to shift NASA's focus to exploration and landing robot and astronaut conquistadors on nearby pieces of the solar system. The approach shifts the criteria for new science missions: Rather than basing a mission on raw scientific merit, it will be judged on how well it fits the goals of exploring the moon and then Mars.

"I think 2005 is the crucial year when Congress decides whether the vision set forth by the Bush administration, which requires tough choices with respect to the future direction of the NASA space effort, is the right direction to proceed," says space policy expert John Logsdon of George Washington University.

Says former NASA chief Sean O'Keefe, who began his new job as Louisiana State University's chancellor in March: "The nature of this debate is unique and more defining in the sense that the president has articulated very clearly what he expects NASA to do."

There's the rub.

"Many astronomers are concerned that future choices will be based less on the proven criteria of scientific timeliness, technical readiness and fiscal credibility and more on resonance with a narrow interpretation of the president's vision," physicist Roger Blandford writes in *Physics Today*.

Rep. Sherwood Boehlert, R-N.Y., said at a recent House Science Committee hearing, "It's critical that Congress have a full and open debate on the president's 'Vision for Space Exploration' and the future of NASA before NASA barrels ahead with the program."

## The president's vision

### A deeper look into space law

In calling for manned missions to the moon and beyond, President Bush suggested mining the moon's soil for "rocket fuel and breathable air" to supply those missions.

The suggestion led to a demand by some scientists for the creation of tons of fake lunar soil, called JSC-1, for experiments. Little of the phony stuff was left from the days of the Apollo moon landings.

Space enthusiasts have advocated such mining for decades, but participants at a January NASA conference concluded that a robotic mining mission to the moon is needed to prove it would work.

Another lunar issue to be addressed is that space law needs an update, says Frans von der Dunk of the International Institute of Air and Space Law in the Netherlands. The 1967 Outer Space Treaty allows "exploiting resources without properly owning the 'real estate' underlying it," says von der Dunk, but rules don't exist for licensing private firms or exercising legal control over their employees on the moon.

And the United Nations' 1979 Moon Agreement, which proclaims "the moon and its natural resources are the common heritage of mankind" while laying down rules for exploiting those resources, has never been signed by the United States.

"It is precisely this lack of legal certainty in many respects which calls for a distinct need for devising a proper legal regime for such exploitation soon," von der Dunk says by e-mail. "Without it, bona fide private efforts may shirk back from undertaking such activities, whilst the cowboys would not mind going there (to) just wait and see to what extent someone might legally and effectively challenge them."

In a speech in January 2004 at NASA headquarters in Washington, D.C., the president announced plans "to explore space and extend a human presence across our solar system" as "a great and unifying mission for NASA."

The speech was the culmination of closely guarded White House plans that began taking shape after the destruction of space shuttle Columbia in 2003 that killed seven astronauts. The Columbia Accident Investigation Board cited "the lack, over the past three decades, of any national mandate providing NASA a compelling mission requiring human presence in space."

Bush unveiled three goals:

- Completing the International Space Station and retiring the space shuttle fleet by 2010. The station work includes the installation of 22 solar panels and seven living and working areas for the crew.
- A manned mission with a new "Crew Exploration Vehicle" to the space station no later than 2014. NASA sees the CEV as a rocket system that's cheaper and easier to upgrade than the shuttle and will take astronauts first into orbit and then to the moon and Mars.
- Manned landings on the moon by 2020. The last moon mission was in 1972, three years after American astronauts were the first to land there. "With the experience and knowledge gained on the moon, we will be ready to take the next steps of space exploration: human missions to Mars and beyond," Bush said.

He established a commission to study the feasibility of his plan. Known as the Aldridge Commission, the panel solidly backed Bush in June and reported, "This journey of exploration will sustain vital national objectives here on Earth."

Although space-exploration advocates had problems with some aspects of the goals, they praised them for jolting NASA out of the inertia of its commitments to the space station and shuttles.

NASA spends about \$6.7 billion a year on the shuttle and space station. The rest of its \$16 billion budget mostly goes to space science, Earth science, aeronautics and, now, developing technologies to meet Bush's goals.

"Exploration done properly is a form of science," a recent National Academy of Sciences panel concluded. But financial realities are becoming increasingly apparent. A National Research Council report last year warned that the plans threaten the funding of probes aimed at unraveling the mysteries of solar flares, which endanger satellites, power lines and astronauts.

Scientists reacted with dismay when NASA gained congressional approval last year to raid science budgets to pay for exploration, says physicist Robert Park of the American Physical Society. They fear that NASA's signature cost overruns will lead to more cuts in science-mission spending.

The cancellation of the Jupiter Icy Moons mission because it was considered too difficult, as well as threats reported in *Nature* magazine to the Voyager interstellar probes and six other long-running missions, also have created anxiety.

Scientists have cause to be nervous. The Congressional Budget Office reported last year that projected cost overruns will either push the next moon landing as far back as 2027 or force a cut in science spending by 24% to 46% to pay for the reprise in 2020 of astronaut Neil Armstrong's "giant leap for mankind" in 1969.

And budget deficits tighten congressional purse strings. "I don't think NASA should be our top budget priority," said Boehlert, a supporter of the lunar landing goal, at February's NASA budget hearing. "So something has to give."

### **Much is on the table**

The White House sees NASA's goals as set, says Keith Cowing, co-author of *New Moon Rising: The Making of America's New Space Vision and the Remaking of NASA*. "But Congress just sees this as the start of the conversation."

The conversation, which picks up steam at Griffin's confirmation hearing, has interesting topics:

- The 14-year-old Hubble Space Telescope, which is popular with space watchers, is expected to fail after 2007 if expensive repairs are not made. NASA announced in February that it wants funding only to safely crash Hubble into the ocean. Sen. Barbara Mikulski, D-Md., says NASA's failure to spend \$291 million set aside last year for Hubble repairs would be "a violation of the law."
- Proposed cuts in aeronautics research threaten thousands of research center jobs in Ohio, Virginia, Alabama and California, alarming lawmakers from those states.
- House Science Committee chief of staff David Goldston says the panel expects to learn this month about NASA's plans to retire the shuttle corps. Key questions concern the research agenda and final design of the space station, as well as the number of remaining shuttle flights, now set at 28, needed to complete the station. Some proposals would cut shuttle flights to 10 or 15 to finish the station, says NASA's Michael Kostelnik, deputy associate administrator for International Space Station and Space Shuttle Programs.

## Griffin enters the picture

### □ The Michael Griffin file



**Age:** 55

**Family:** Wife, Rebecca, three daughters and one son.

**Education:** Bachelor's degree in physics (1971) at Johns Hopkins University. Master's degrees from various universities in aerospace science (1974), electrical engineering (1979), applied physics (1983), business administration (1990) and civil engineering (1998). Doctorate in aerospace engineering (1977) at University of Maryland.

**Present job:** Head of the space department at Johns Hopkins University Applied Physics Laboratory, 2004 to present

**Previous NASA experience:** Associate administrator for exploration, 1991-93; chief engineer, 1993-94; supervisor at NASA's Jet Propulsion Laboratory, 1977-79.

Into this arena steps Griffin, 55, space department chief at Johns Hopkins University Applied Physics Laboratory. A space industry veteran, his selection has been praised widely. "His character and skills make him a brilliant choice," O'Keefe says.

Griffin declined to comment on his plans, standard practice for nominees. However, he has endorsed the administration's exploration goals in past congressional testimony, calling for astronaut landings on the moon, Mars and then asteroids. But he also called for speeding up the exploration goals and criticized their "somewhat high" cost.

In a previous job at NASA about a decade ago, Griffin championed a mission called "First Lunar Outpost" that the Congressional Budget Office says would cost \$35 billion now. The 45-day manned mission would propel an astronaut habitat and four-person lander to the moon. Astronauts would test to see whether lunar soil can generate oxygen for breathing and rocket fuel.

"We're about to get a new leader and that could change our direction," Kostelnik acknowledges.

"The question isn't whether NASA is trying to fit 10 pounds into a 5-pound bag anymore," O'Keefe says. "The debate will be whether we have the right combination of things to go into that bag. Those are the questions we'll see resolved."