President’s Commission on Implementation of United States Space Exploration Policy

http://www.moontomars.org

Delivered to “Beyond Einstein” Conference

Neil deGrasse Tyson
Commissioner

Astrophysicist & Director, Hayden Planetarium
American Museum of Natural History

SLAC, 18 May 2004
Where I Work
Where I Work

The Rose Center for Earth and Space - Hayden Planetarium

American Museum of Natural History, New York City
14 PhD Astrophysicists, 20+ Astro-Educators, 3 million visitors per year
Astrophysics Meets the Media
Astrophysics Meets the Media

TIME
WONDERS OF THE COSMOS
Amazing new pictures from the Hubble Space Telescope are revealing the universe's deepest secrets
Astrophysics Meets the Media
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Astrophysics Meets the Media
Astrophysics Meets the Media

THE NEW YORK TIMES, TUESDAY, APRIL 15, 2015

Under Prodding, Cosmologists Debate, Well, Everything

By BENNY HOYT

It is an irony of astrophysics that the universe is so vast, yet the information we can gather about it is so limited. The data we collect must be processed and analyzed, often with sophisticated computer models and simulations, to understand the complex interactions between different components of the universe. This process is akin to solving a puzzle, where each piece of data provides a small clue to the overall picture.

Astronomers, like detectives, use this information to piece together the history and formation of the universe. They study the expansion of the universe, the distribution of matter, and the nature of dark energy. These studies are not only scientifically important, but also serve as a reminder of our place in the cosmos.

In recent years, there has been growing interest in the relationship between astrophysics and the media. While scientists have always been communicators, the rise of social media and increased public access to advanced research has created new opportunities for engagement. This has led to a renewed interest in popularizing science, with an aim to increase public understanding and appreciation of the field.

However, this increased visibility also brings challenges. Scientists must be cautious when speaking to the public, as their words can influence perceptions and beliefs about scientific topics. It is important to communicate accurately and responsibly, avoiding oversimplification or sensationalism.

The story of Dr. James Peebles, who won the Nobel Prize in Physics in 2019, illustrates this point. Peebles was known for his work on the early universe and the expansion of the cosmos. Following his Nobel announcement, he received widespread media attention, which brought both praise and criticism. Some praised the recognition of Peebles’ work, while others questioned the appropriateness of the award.

As scientists navigate these challenges, they must continue to strive for a balance between openness and responsibility. The goal is to share knowledge with the public while maintaining the integrity and rigor of scientific research. This requires a deep understanding of the science, as well as the ability to convey it in a clear and accessible manner.

Ultimately, the relationship between astrophysics and the media is a two-way street. The science informs the public, while the public’s interest and engagement can influence the direction of scientific research. As we continue to explore the universe, it is important to remember that our knowledge is always evolving, and that the pursuit of science is inherently connected to our quest for understanding the cosmos.
Astrophysics Meets the Media
Astrophysics Meets the Media
Pluto’s Not a Planet? Only in New York

By KENNETH CHANG

As she walked past a display of photos of planets at the Rose Center for Earth and Space, Pamela Curtice of Atlanta scratched her brow, perplexed. There didn’t seem to be enough planets.

She started counting on her fingers, trying to remember the mnemonic her son had learned in school years ago.

My Very Educated Mother Just Served Us Nine Pizzas.

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

“I had to go through the whole thing to figure out which one was missing,” she said.

Pluto.

Pluto was not there.

“Now I know my mother just served us nine,” Mrs. Curtice said. “Nine nothings.”

Quietly, and apparently uniquely among major scientific institutions, the American Museum of Natural History cast Pluto out of the pantheon of planets when it opened the Rose Center last February. Nowhere does the center describe Pluto as a planet, but nowhere do its exhibits declare “Pluto is not a planet,” either.

“We’re not that confrontational about it,” said Dr. Neil de Grasse Tyson, director of the museum’s Hayden Planetarium. “You actually have to pay attention to make note of this.”

Still, the move is surprising, because the museum appears to have unilaterally demoted Pluto, reassigning it as one of more than 300 icy bodies orbiting beyond Neptune, in a region called the Kuiper Belt (pronounced KY-per).

“Pluto is noticeable by its difficulty to find,” Dr. Richard P. Binzel, a professor of planetary science at the Massachusetts Institute of Technology, said of the Rose exhibits. “They went too far in demoting Pluto, way beyond what the mainstream astronomers think.”

Dr. S. Alan Stern, director of Southwest Research Institute’s space studies department in Boulder, Colo., also dislikes the change. “They are a minority viewpoint,” he said. “It’s absurd. The astronomical

Continued on Page B4
Astrophysics
Meets
the Media
calmly while the Marijuana Reform candidate suggested that legalized pot would raise state revenues, voters the courtesy of allowing at least one meaningful face-off between the two major party candidates.

Pluto’s Plight

Things are looking bleaker than ever for Pluto, the most disrespected of the nine planets that we learned about in elementary school. Back then we thought we knew what a planet was, namely a spherical object that revolved around the sun and reflected its light. That fourth-grade version of Pluto even had an exotic cachet about it. It was so small and remote that it was not identified until 1930, after decades of fruitless searching for a mysterious (and much larger) Planet X that was believed to lie beyond the planet Neptune.

Although Pluto’s fans hate to admit it, the ninth planet owes its status more to the fact that astronomers expected to find a planet out beyond Neptune than to any intrinsic merit. Pluto has a moon and an atmosphere, but its icy, rocky body is more like a comet’s core than like any of the other planets. Pluto’s orbit is elliptical, not circular, and is not in the same plane as the other planetary orbits. Last year the Hayden Planetarium caused quite a stir by dropping Pluto from its list of planets.

Now, in the latest blow, astronomers reported last week that they have found another dirty iceball, about half the size of Pluto, that actually behaves more like a planet than Pluto does, with a circular orbit. The newly discovered Quaoar (pronounced KWAH-o-ar) lies among a multitude of small bodies in a region known as the Kuiper Belt that reflects the solar system as it was before tiny pieces of matter coalesced into bigger planets.

Astronomers predict that they will find up to 10 similar objects in the Kuiper Belt that are as large as or larger than Pluto. So unless we want to add 10 more planets to the elementary-school curriculum, we would be wise to downgrade Pluto to the distant iceball it is.
Astrophysics Meets the Media

NEW YORK POST

Leonardo’s stinker
Latest DiCaprio movie is a real turkey

KISS YOUR ASTEROID GOODBYE!
Don't worry, it’ll miss Earth by 600,000 miles
Astrophysics Meets the Media

NASA NEEDS A ‘CRASH’
If the asteroid were to hit Earth tomorrow, what would you do today?

Doomsday figures were way off mark.

Insurers have policy against end of the world

Phew, that was close!

COURSE IN MATH
Galactic rocks? Maybe they’re all in our heads

ANDREW PEYSER

NEW YORK TIMES, FRIDAY, MARCH 13, 1998
Astrophysics Meets the Media

Brad Clemmer, 19, college student, Reading, Pa.
“I’d probably go to church — and then I’d get drunk. I’d spend all the money I have on women and alcohol. I’d fly to the Bahamas, and sit on a beach with a tequila until the asteroid hit.”

Elizabeth Pena, 28, research assistant, Queens
“I’d get married immediately, since I’m going to later this year anyway. And we’d forget about the St. Lucia honeymoon. We’d just start getting loaded right after the wedding.”

Pete Kalabiska, 19, college student, Hamburg, Pa.
“I’d get together with all my friends and my family and have a big farewell party, where we’d all get drunk. And I’d go on a date with Cindy Crawford.”
Astrophysics Meets
the Media

Weekly World
NEWS

Alien Skulls Found on Mars!


Plus
Saddam’s Prison Lover Tells All!
Astrophysics Meets Merchandising
Astrophysics Meets Merchandising
Astrophysics Meets Merchandising
Astrophysics Meets Merchandising
Astrophysics Meets Merchandising
Astrophysics Meets Merchandising
Astrophysics Meets the Religious Right
Astrophysics Meets the Religious Right
Astrophysics Meets the Religious Right

Big Bang Theory,
You've Got To Be Kidding.

-God
Hubble Space Telescope - Public flap over cancelled servicing mission
(Editorials, OpEds, Barraged E-mail inboxes, Bill in Congress)

NASA Rovers: January-April, JPL websites received 10-billion hits

SETI at Home - Largest distributed computing project ever undertaken: 4 years at 25 Teraflops

Rose Center for Earth & Space - Weekend attendance of 1,000 people per hour
Commission Members

- Hon. Edward C. "Pete" Aldridge, Jr. - Chair; Fmr Sec’y Airforce
- Ms. Carleton S. Fiorina -- CEO, Hewlett Packard
- Hon. Michael P. Jackson -- Fmr. Dep Sec’y of Transportation
- Dr. Laurie A. Leshin -- Planetary Geochemist
- General Lester L. Lyles -- USAF Retired
- Dr. Paul D. Spudis -- Lunar Geologist
- Dr. Neil deGrasse Tyson -- Astrophysicist
- Hon. Robert S. Walker -- Former member of Congress
- Dr. Maria T. Zuber -- Planetary Geologist
Commission Focus

Major Elements

- Build Consensus on the Vision
- Strategies needed to Implement the Vision
Sec. 3. Mission

(i) A science agenda on the Moon and other destinations driving human and robotic science activities;

(ii) The exploration of technologies, demonstrations, and strategies, including the use of in situ natural resources

(iii) Criteria to select future destinations

(iv) Long-term management

(v) private sector and international participants

(vi) encourage Americas youth in math, science, engineering

(vii) within available resources.
<table>
<thead>
<tr>
<th>Appropriation</th>
<th>Enterprise</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exploration, Science, and</strong></td>
<td><strong>Space Science</strong></td>
<td>Solar System Exploration</td>
</tr>
<tr>
<td><strong>Aeronautics</strong></td>
<td></td>
<td>Mars Exploration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lunar Exploration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Astronomical Search for Origins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Structure &amp; Evolution of the Univ.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sun-Earth Connections</td>
</tr>
<tr>
<td><strong>Earth Science</strong></td>
<td></td>
<td>Earth System Science</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earth Science Applications</td>
</tr>
<tr>
<td><strong>Biological &amp; Physical</strong></td>
<td></td>
<td>Biological Sciences Research</td>
</tr>
<tr>
<td><strong>Research</strong></td>
<td></td>
<td>Physical Sciences Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research Partnership &amp; Flt Supt</td>
</tr>
<tr>
<td><strong>Aeronautics</strong></td>
<td></td>
<td>Aeronautics Technology</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td>Education</td>
</tr>
<tr>
<td><strong>Exploration Systems</strong></td>
<td><strong>Exploration Systems</strong></td>
<td>Human &amp; Robotic Technologies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transportation Systems</td>
</tr>
<tr>
<td><strong>Space Flight</strong></td>
<td><strong>Space Flight</strong></td>
<td>Space Station</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Space Shuttle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Space &amp; Flight Support</td>
</tr>
</tbody>
</table>
### $11.6 Billion Redirected

<table>
<thead>
<tr>
<th>Description</th>
<th>FY05-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discontinue Space Launch Initiative</td>
<td>-5.9</td>
</tr>
<tr>
<td>Retire Shuttle</td>
<td>-1.5</td>
</tr>
<tr>
<td>Eliminate Station research not tied to Vision</td>
<td>-1.2</td>
</tr>
<tr>
<td><strong>Human Space Flight related reductions</strong></td>
<td><strong>-8.6</strong></td>
</tr>
<tr>
<td>Defer start of new missions &amp; level spend rates</td>
<td>-2.7</td>
</tr>
<tr>
<td>Reduce space tech &amp; defer institutional activities</td>
<td>-0.3</td>
</tr>
<tr>
<td><strong>Other reductions</strong></td>
<td><strong>-3.0</strong></td>
</tr>
<tr>
<td><strong>TOTAL REDUCTIONS</strong></td>
<td><strong>-11.6</strong></td>
</tr>
</tbody>
</table>
$11.6 Billion Redirected

**Discontinue SLI** – Focus space transportation on exploration needs

**Shuttle Retirement** – Reflects planned end of decade completion of ISS assembly

**ISS Research** – Eliminate ISS physical sciences research not tied to needs of exploration vision and redirect towards those research areas required for exploration

**Defer new missions & freeze spending** – Defer start of new flight projects and sustain spending levels at current rate for other areas.

**Reduce space technology & defer institutional activities** – Adjust space technology funding and align remaining with exploration goals, and defer construction start of new facilities
Strategy Based on Long-Term Affordability

Pres. FY05 Five-Year Budget Plan

Exploration Missions
- About half funding robotic missions
- First human lunar mission 2020 (based on Apollo assumptions)

- Human/Robotic Technology
- Crew Exploration Vehicle
- International Space Station
- Space Shuttle
- ISS Transport
- Aeronautics and Other Science Activities
Historical Funding

$millions

CONSTANT 2004$

Total over each Decade

(Constant 04$ in billions)
1960-69 168
1970-79 110
1980-89 123
1990-99 164
2000-09 159

4% of Federal Budget
First Apollo Landing
Challenger Accident

0.7% of Federal Budget
Announced Exploration Vision
1a. As you may have heard, the United States is considering expanding the space program by building a permanent space station on the moon with a plan to eventually send astronauts to Mars. Considering all the potential costs and benefits, do you favor expanding the space program this way or do you oppose it? (asked of half of the respondents)

Favor 48 percent
Oppose 48 percent
Not sure 4 percent
January 10

1b. As you may have heard, the *Bush administration* is considering expanding the space program by building a permanent space station on the moon with a plan to eventually send astronauts to Mars. Considering all the potential costs and benefits, do you favor expanding the space program this way or do you oppose it? (asked of half the respondents)

Favor  43 percent
Oppose  52 percent
Not sure  5 percent
Public Hearings

Dates /Locations:

- **February 11, 2004 – Completed**
  - NTSB at Washington, DC

- **March 3-4, 2004 – Completed**
  - USAF Museum WPAFB at Dayton, OH

- **March 24-25, 2004 – Completed**
  - Georgia Tech at Atlanta, GA

- **April 15-16, 2004 – Completed**
  - Galileo High School, San Francisco, CA

- **May 3-4, 2004 - Completed**
  - Asia Society, New York City
The hearings focus on four themes

1) Competitiveness and Prosperity
2) Science and Technology
3) Management and Sustainability*
4) Education and Youth

* Sustainability

Will the vision survive...
Economic Cycles?
Political Cycles?
Topics Nearing Consensus

Criteria for Selecting Destinations
- Moon, Mars, asteroids, comets, Lagrangian points
- Ongoing surveys of planetary & astrophysics communities

Infrastructure to Support the Vision
- NASA centers (FFRDC model) allowing them to compete for personnel and projects. Becoming econ. drivers for communities

Systems Engineering --> systems of systems
- Spiral Development plan for enabling technology

Management Process
- *Not* Apollo; *Not* a race; Manage a process

Risk Management
- DARPA-like arm of NASA; encourages risk-taking

International Participation
- Create redundancies in key operations and to distribute technology development where and when sensible. E.g. Canada-arm on ISS

Education
- Space Academy in model of Military Academies; physical or virtual

Commercial Engagement
- Turn a space program into a space industry
Sec. 102. (c) The Congress declares that the general welfare of the United States requires that NASA seek and encourage, to the maximum extent possible, the fullest commercial use of space.
President’s Commission on Implementation of United States Space Exploration Policy

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Delivered to “Beyond Einstein” Conference

Neil deGrasse Tyson
Commissioner

Astrophysicist & Director, Hayden Planetarium
American Museum of Natural History

SLAC, 18 May 2004
International Cooperation

The President’s Exploration Vision directs NASA

To meet international commitments on ISS
To “pursue opportunities for international participation to support U.S. space exploration goals”
“A journey, not a race”

The National Aeronautics and Space Act of 1958 directs NASA to conduct its activities so as to contribute materially to:

“Cooperation by the United States with other nations and groups of nations in work done pursuant to the Act and in the peaceful application of the results thereof.”
The International Space Station Model

Europe:
France, United Kingdom, Belgium, Netherlands, Denmark, Norway, Spain, Germany, Italy, Sweden, Switzerland

15 nations working through 5 space agencies
All partners share management, research, costs, crew