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Panel Session I - Exploration has Already Begun: Space Science within the new "Vision" for NASA

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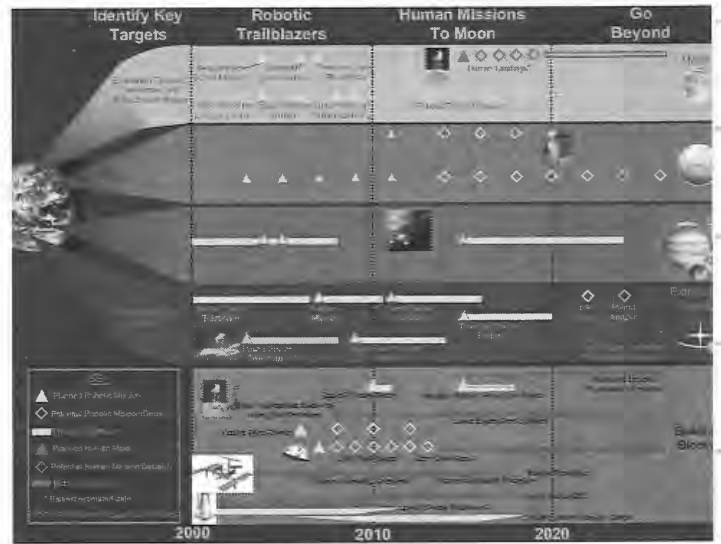
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Exploration has Already Begun: Space Science within the new "Vision" for NASA

[See also Panel III]

Dr. Harley Thronson
Director of Technology
NASA Office of Space Science



The Space Science Vision

The Space Science Enterprise seeks to discover:

- How the universe began and evolved
- How we got here
- Where we are going
- Whether we are alone

A Robust Space Science Program Consistent with the President's "Vision"

Emphasis in four broad areas:

- A new lunar robotic program and an augmented Mars robotic program to achieve science goals and support human exploration.*
- Robotic exploration in the outer Solar System specifically to search for life's other potential abodes.*
- Seek Earth-like worlds outside the Solar System via astronomical observations.*
- Understand and predict the effects of "Space Weather and Climate" on robotic and human systems.*

... and the technologies to achieve this.

The Sun Planet Connection: Space Weather and Climate

How does the planet respond to solar variation?

- Disruption of technology based systems
- Harm humans in space
- Climate change

Why Should We Care About Space Weather?

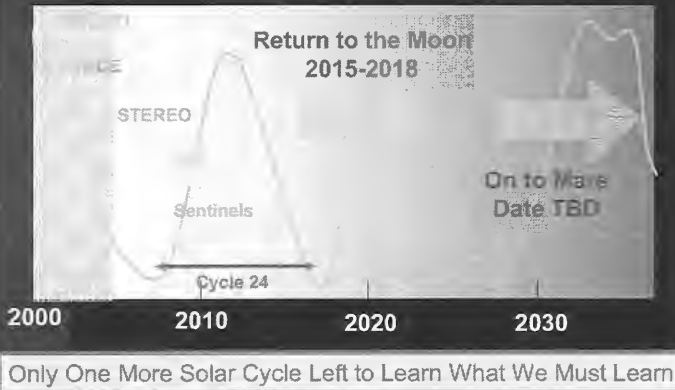
Return to the Moon

On to Mars

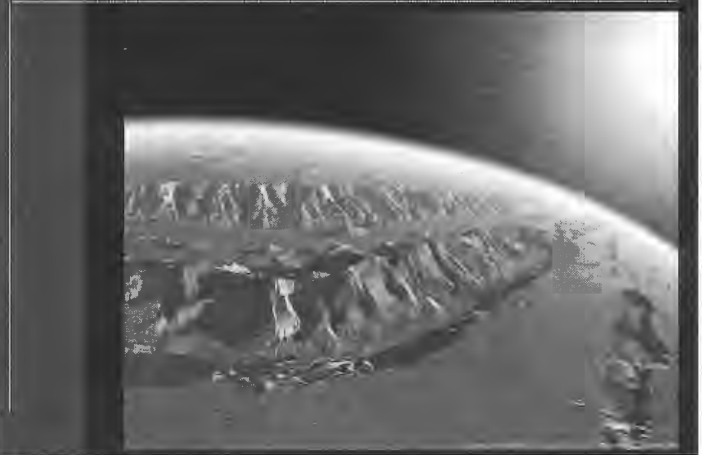
Beyond...

Radiation exposure will be a significant and serious hazard during any human expedition transiting deep space

Significant Events in the Moon, Mars, and Beyond Vision



Finding the Habitable Zones ...in space and time: Exploring the Solar System's Other Possible Abode for Life



Why Mars?

Mars is the nearest planet for which the search for evidence of life is justified:

- Earliest Mars preserves record of conditions and materials from which LIFE could have started (on Mars or on Earth)
- Even today there are places on Mars that are "habitable"

Mars is so much like Earth, yet surprisingly different

- Silicate planet with an atmosphere, hydrosphere, and climate
- Potentially allows for comparative climatology with Earth
- Natural "control experiment" for key state variables

Mars inspires, both scientifically, and as a tangible frontier

- Today's MEP will provide the knowledge needed to decide when to send human explorers to the Red Planet

The Outer Solar System: Life in *Truly* Extreme Environments?



If we do not find life elsewhere in the Solar System, there is a Universe of worlds to investigate.



The Astronomical Search for Life-bearing Planets

And Who Else is Looking for Their Origins?

A Search for Extra-Solar Planets and Life Beyond the Solar System



The First Steps to Studying in Detail the Universe of Planets Beyond the Solar System

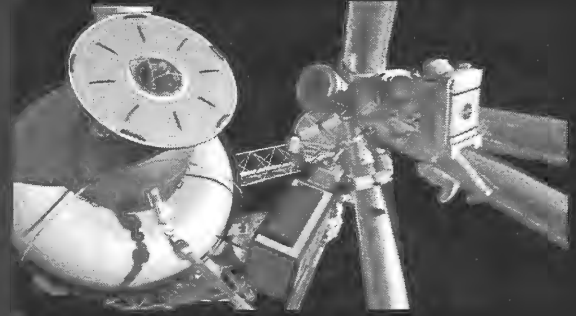
The James Webb Space Telescope: planned for launch in 2011 to study the birth of galaxies, stars, and planets.



The Terrestrial Planet Finder: one design, planned for launch in the middle of the next decade, to search for Earth-like worlds.



Human and Robotic Collaboration to Achieve the President's "Vision"



A Libration Point "gateway" facility supporting humans and robots to assemble a telescope to search for Earth-like worlds.

NASA
Humans and Robots Collaborating to Answer One of Humanity's Defining Questions

Are we alone?



Experience with the Hubble Space Telescope demonstrates the enormous public appeal of using astronauts to achieve astronomical goals.

Planet Imager - 2020+



The Moon, Mars, and Beyond
 ...the search for life:
 Humanity's most enduring quest