

A black and white photograph of an astronaut on the moon. The astronaut is on the left, wearing a full space suit and helmet, standing on the lunar surface. In the center and right, there is a large, dark, angular rock formation. The background shows the vast, flat lunar landscape under a dark sky. The text 'Welcome!' is overlaid in large yellow letters at the top.

Welcome!

**To The Restructured,
Reconfigured,
NASA Advisory Council!**

A photograph of the lunar surface, showing a grey, cratered landscape. In the background, a crescent Earth is visible against the blackness of space. The text is overlaid on this image.

NASA Advisory Council and Other Thoughts About the Future

Harrison H. Schmitt, Chairman

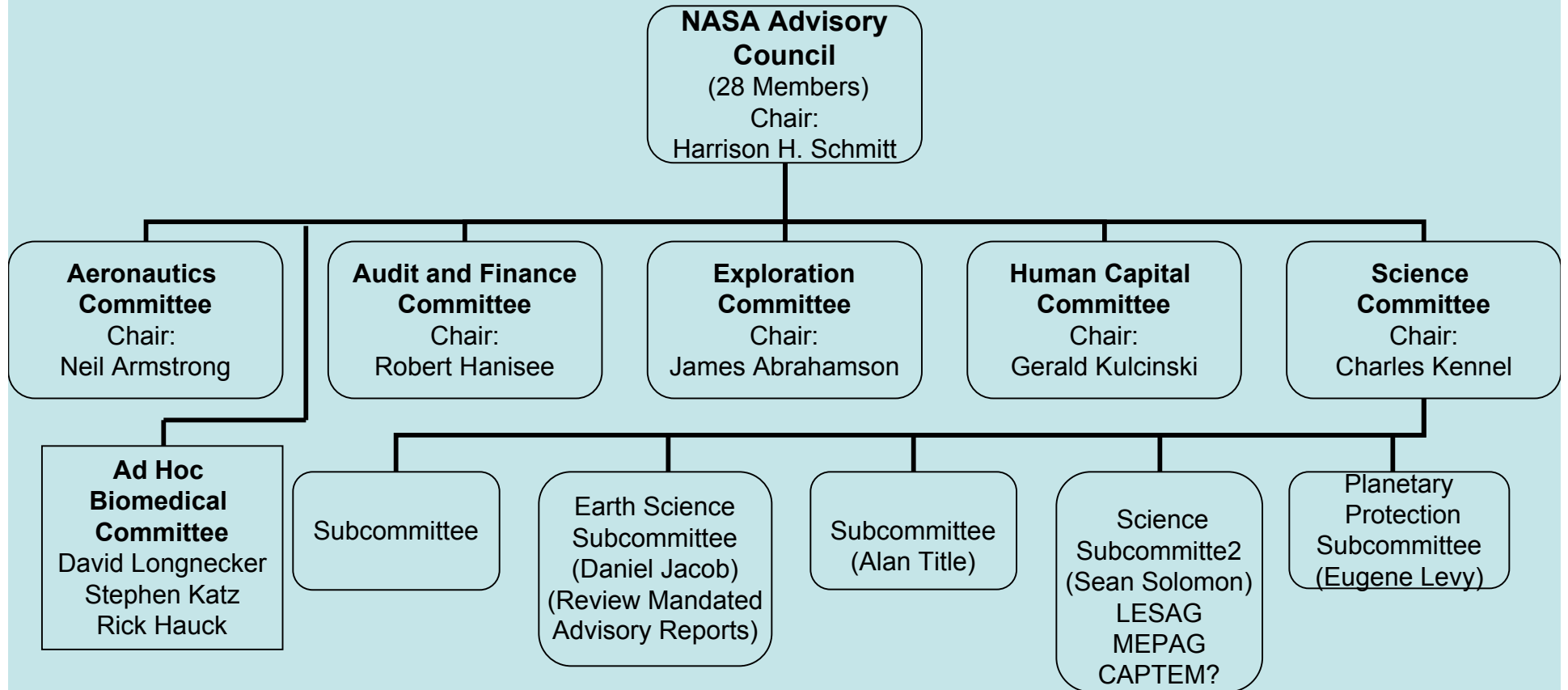
**The Council's Profound Thanks Go to the
Science Mission Directorate for
Organizing this Conference!**

NASA Advisory Council

Organizational Structure

The NASA Advisory Council provides independent advice to NASA through the Administrator concerning the implementation of Presidential and Congressional policy directives

NASA Advisory Council Structure



Available After Dinner Tonight for Questions
And Discussion About the Council

2006 Subcommittee Activities: Council Expectations

- **May Conference**

- Get acquainted
- Select a Vice-Chair
- Trade Contact Info
- Provide Guidance to SMD on R&A and Program Mix
- Organize Sub-groups
- Develop Draft Agenda for July Conference
- Review TORs

- **July Conference**

- Plan Fall Lunar Science Workshop
- Draft Workshop Agenda
- Desired Attendance
- Invited Attendance
- Invited Papers
- Solicitation of Community Inputs
- Determine Needed ESMD Inputs

Fall Lunar Science Workshop: Council Expectations

- Consider Exploration Science, Lunar Science, and Lunar-Based Science for a Return to the Moon
- Develop Science Objectives and Priorities as Initial Guidance for Return to the Moon Program Planning, Spacecraft Design, Training, and Operations
- Consider Decadal Survey and other Strategic Inputs
- Historically Comparable to 1965 Woodshole Conference for Apollo

Context of NASA's Return to the Moon

- Redevelop a Deep Space Operational Infrastructure and Discipline
- Define the Distribution of Potential Lunar Resources
- Establish an Infrastructure for Technical and Operational Testing of Architectural and Operational Options for Mars Exploration
- Answer Major Questions Related to Lunar Exploration Science, Lunar Science, and Lunar-Based Science
- Define / Answer New Science Questions

Lunar Science is Left to Do?

- **Testing of Giant Impact Hypothesis** (That We Know About)
- **Age(s) of Extremely Large Basin(s)**
- **Testing of Impact “Cataclysm” Hypothesis**
 - Calibration of Hadean (Earliest Pre-Cambrian)
 - Impact History of Earth and Inner Solar System
- **Global Delineation of Internal Structure of the Moon**
 - Extent of Magma Ocean
 - Distribution of Mg-Suite Parent Igneous Bodies in the Crust
 - Original Distribution of Magma Ocean Residual Liquid (urKREEP)
 - Structure / Compositional Details of Upper Mantle
 - Lower Mantle Characteristics / Mapping of Upper and Lower (Core) Boundaries

What Science is Left to Do?

- **Timing of Lunar Core Formation and Dynamo Circulation**
- **Global Sampling / Remote Sensing Correlations of Major Geological and Geochemical Units**
- **Depositional History of Polar Cometary Volatiles**
- **Determination of Resource Distribution & *In Situ* Concentrations, Particularly at the Poles**
- **Testing of Mars Sampling Systems and Strategies**
- **Lunar-Based Instrumentation Networks**
 - **Seismometers / Retro-reflectors / Magnetometers / Etc .**

Lunar-Based Science

Planetary Sciences

- Very Low Pressure Clathrate Experimentation (Europa And Mars)

- Martian Field Exploration Systems and Approaches

- Other?



Heliophysics

- **Lunar-Based Instrumentation**
 - Sun
 - Solar Wind
 - Solar Wind-Magnetosphere interaction
 - Solar Wind Lunar surface interaction
- **Regolith and Ejecta Blanket Stratigraphy**
 - Solar Wind Composition and Energy over Time
- **Other?**



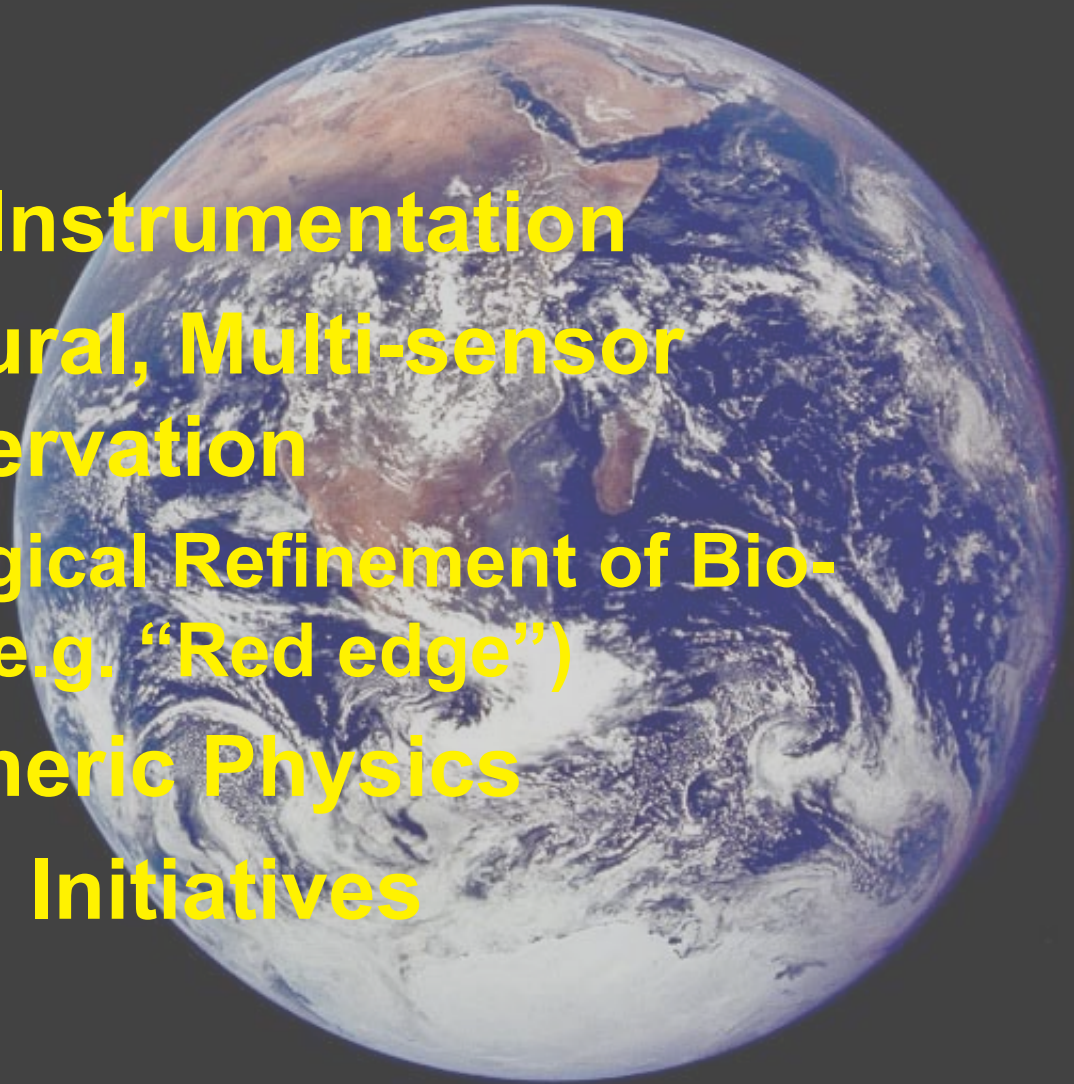


Astrophysics

- **Potential Role for the Moon as Observatory Platform**
 - Radio-astronomy
 - Constant view Polar observations
- **Information for Evaluation of Designs of Potential Lunar-based Observatories**
 - **Additional Characterization of Lunar Environment**
 - Dust Migration / Precipitation / Rejection
 - Geotechnical Parameters for Construction
 - Seismic Stability
 - **Protection of Critical Systems**
 - Dust (Note Apollo Retro-reflector Stability)
 - Thermal Cycling
 - Vacuum
 - Radiation
- **Galactic and Solar Radiation History**
 - Regolith and Ejecta Blanket Stratigraphy
- **Other ?**

Earth Sciences

- **Lunar-Based Instrumentation**
 - **Multi-spectrual, Multi-sensor Global Observation**
 - **Astrobiological Refinement of Biosignature (e.g. “Red edge”)**
 - **Magnetospheric Physics**
 - **Educational Initiatives**
 - **Other?**



Planetary Protection

- **Testing of Systems and Strategies in an Extreme Environment**
 - Sample Container Sealing
 - Container Dust Containment
 - Microbe & Molecular Viability
 - Other?



Examples of Lunar Architecture Constraints

- Site Selection
- Payload “Envelope”
- Exploration Enhancement
- Mobility Enhancement
- (ESMD Working on the Return to the Moon Architecture)



Site Selection Considerations

Pinpoint Landing Capability

Future Location of Permanent Lunar Operations

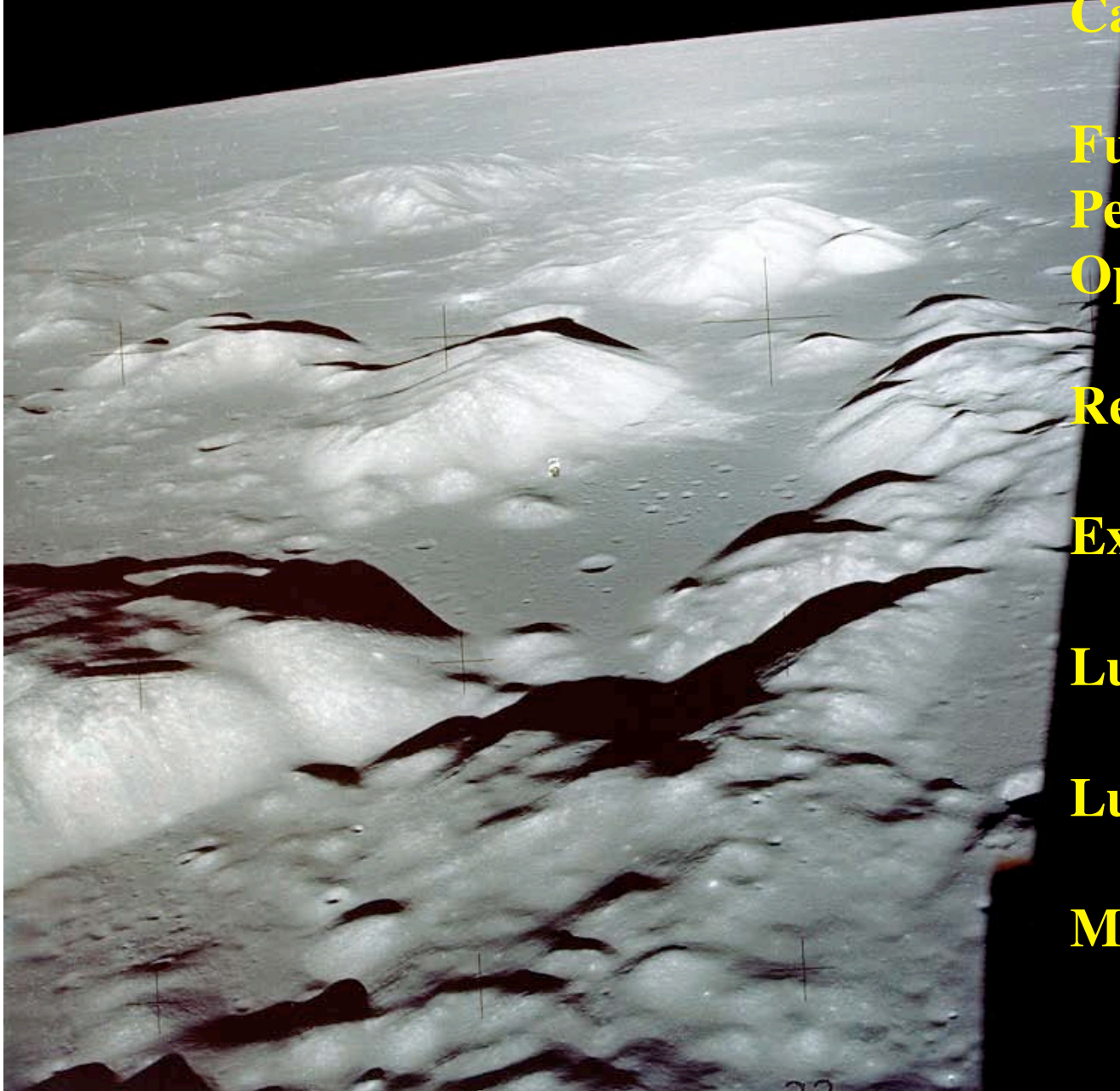
Resources Exploration

Exploration Science

Lunar Science

Lunar-Based Science

Mars Simulations



Payload “Envelope”

Mass

Communications

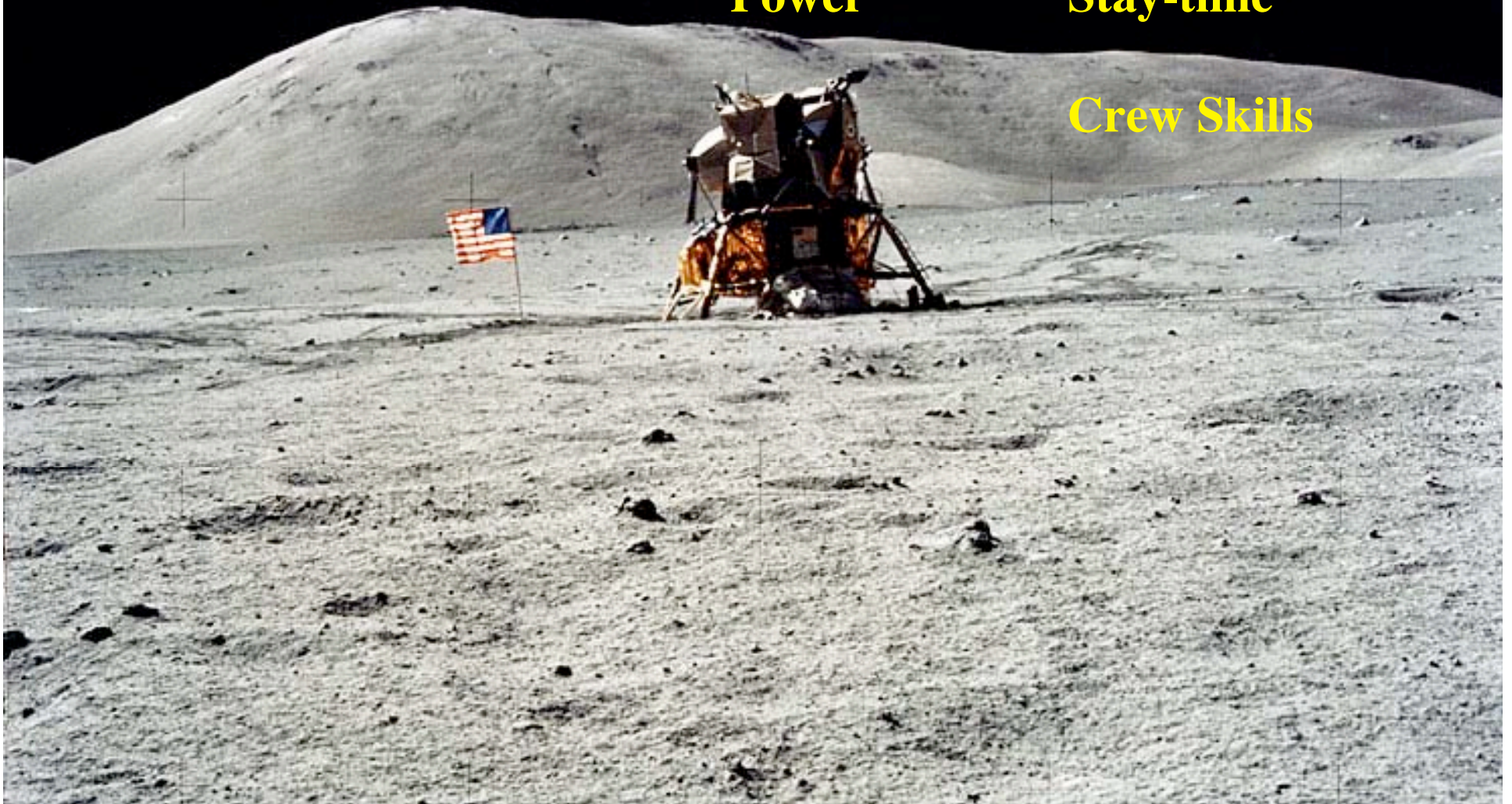
Stowage

Computation

Power

Stay-time

Crew Skills



Exploration

Stay-Time

**Suit / Glove Mobility
and Capability**

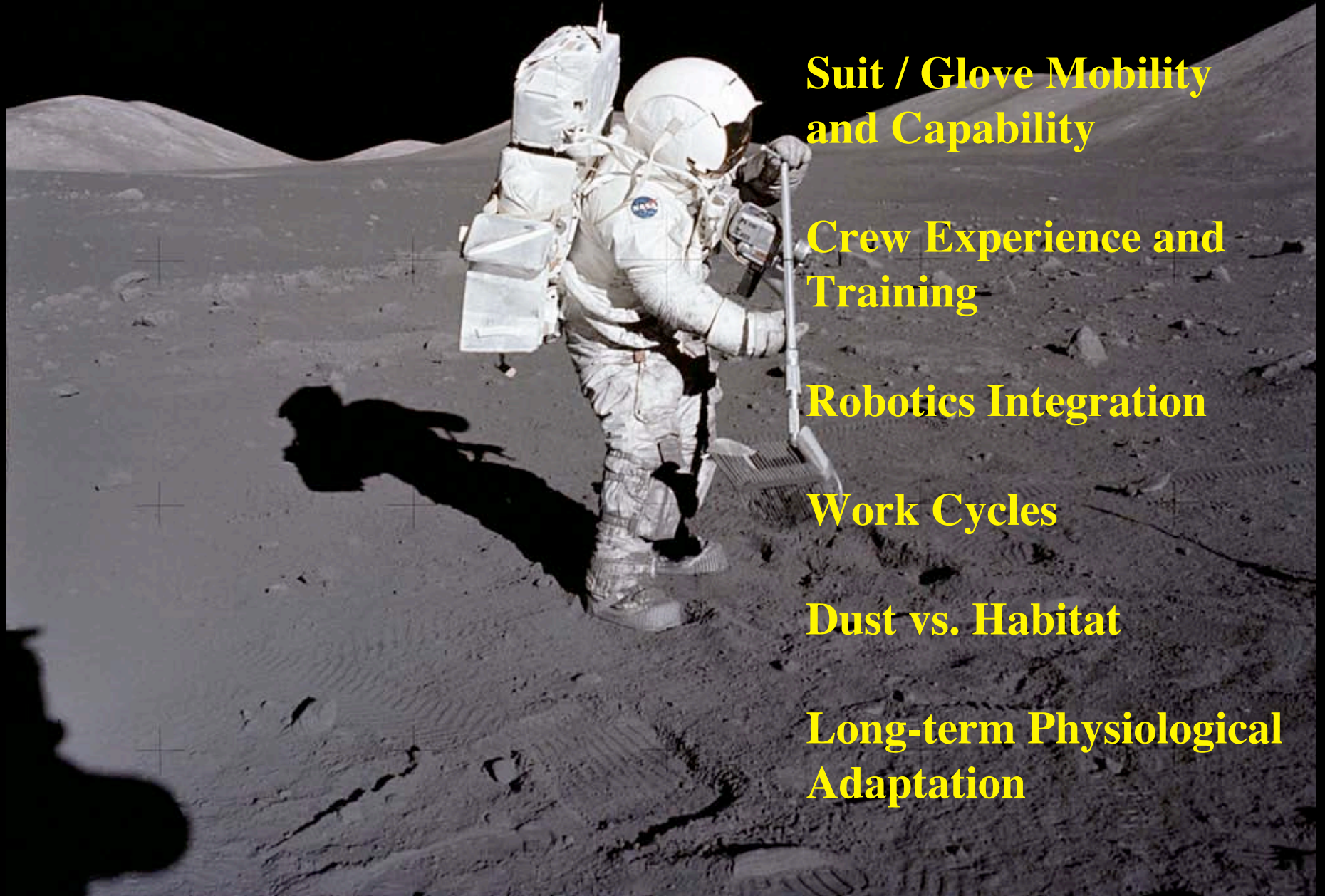
**Crew Experience and
Training**

Robotics Integration

Work Cycles

Dust vs. Habitat

**Long-term Physiological
Adaptation**



Mobility

Dust

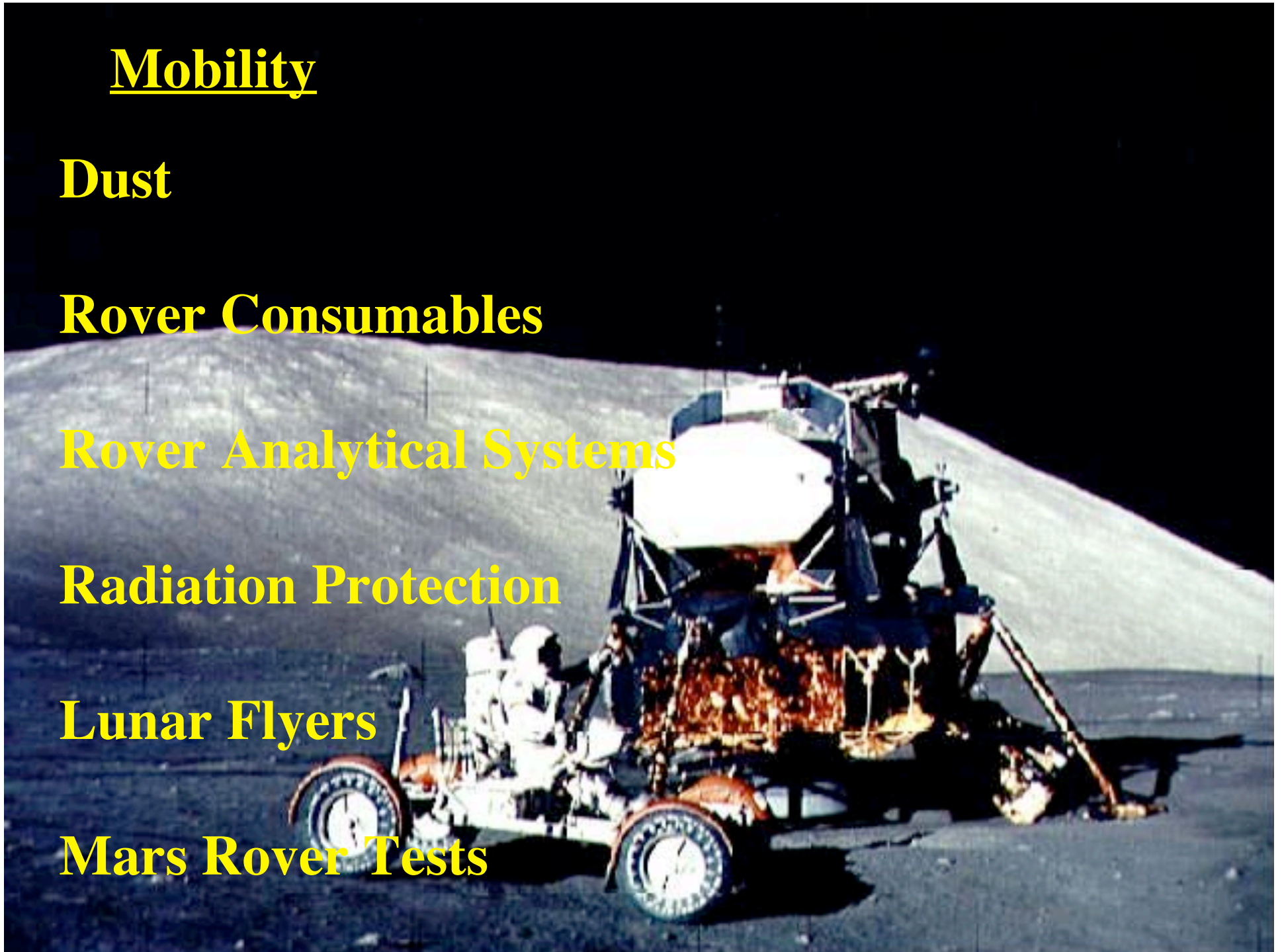
Rover Consumables

Rover Analytical Systems

Radiation Protection

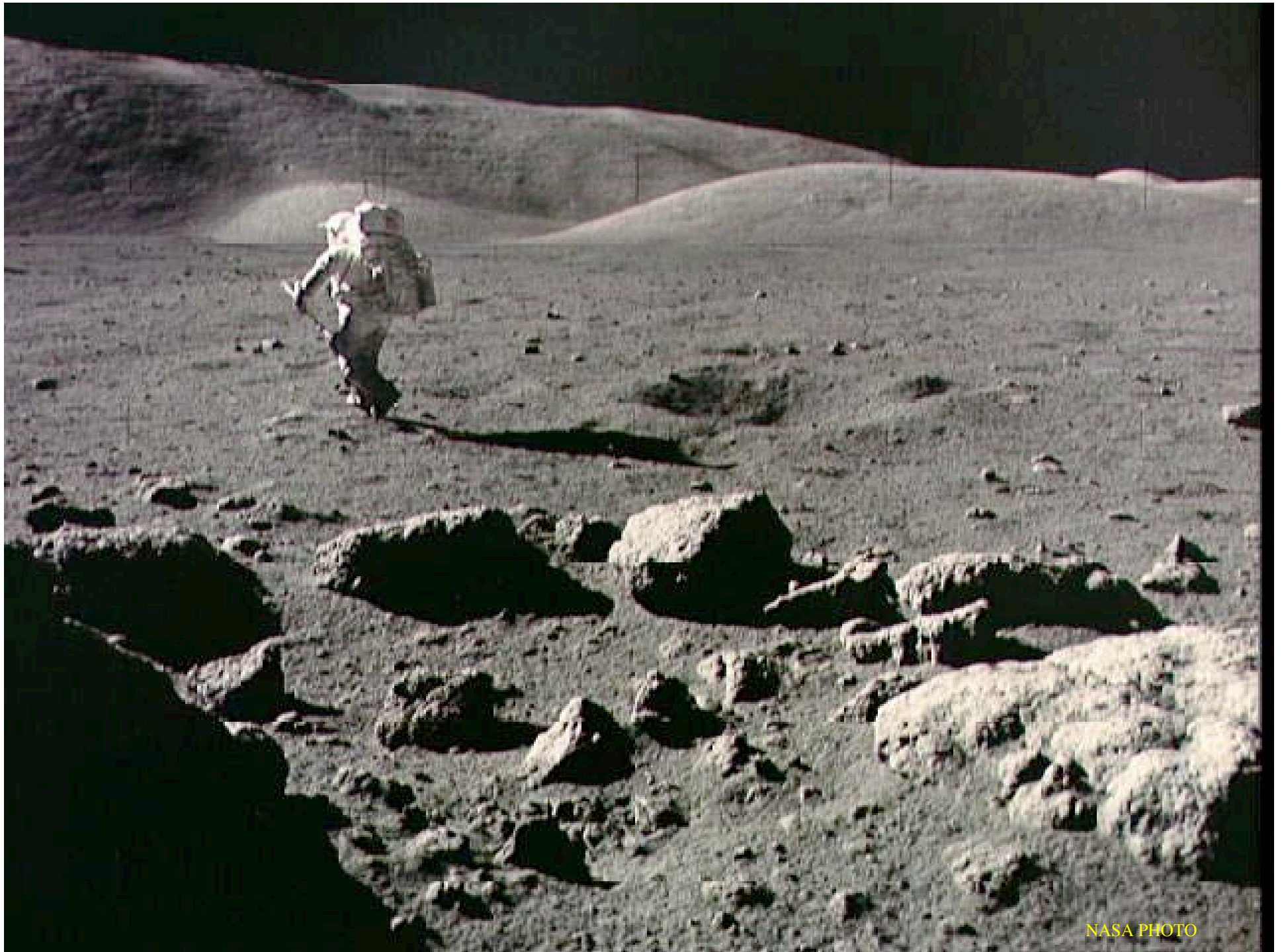
Lunar Flyers

Mars Rover Tests



Why Return to the Moon?

- **Satisfy basic human instincts for exploration**
 - Freedom, betterment, curiosity
 - New homelands, trade, and knowledge
 - **Continue over 150,000 years of exploration's benefits**
 - New homes, livelihoods, know-how, resources
 - Supported by both government and private initiatives
 - **Perpetuate exploration and settlement of space**
 - Comparable to past migrations into a global habitat
 - Opportunity for the expansion of free institutions
- 
- A photograph of the Moon's surface, showing a grey, cratered landscape. In the background, a thin crescent of the Earth is visible against the blackness of space. The image is used as a background for the text.



NASA PHOTO

