

PRELIMINARY PROGRAM
SPACE RESOURCES ROUNDTABLE VII:
LEAG CONFERENCE ON LUNAR EXPLORATION

OCTOBER 25-28, 2005
LEAGUE CITY, TEXAS

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Tuesday, October 25, 2005
WELCOME
8:00 a.m. Marina Plaza Ballroom

Taylor G. J. and Mackwell S. J.
Welcome and Goals for the Meeting

NASA PLANS FOR RETURN TO THE MOON
8:15 a.m. Marina Plaza Ballroom

Moderator: S. J. Mackwell

Cooke D. * [Invited 20-Minutes]
Overview

Connolly J. * [Invited 45-Minutes]
Detailed Lunar Architecture

Borkowski M. * [Invited 30-Minutes]
Robotic Lunar Exploration Program

Dantzer A. * [Invited 30-Minutes]
The Science Mission Directorate's Role in Lunar Exploration

10:20–10:35 a.m. BREAK

LUNAR SCIENCE
10:35 a.m. Marina Plaza Ballroom

Moderator: B. L. Jolliff

Spudis P. D. * [Invited 30-Minutes]
Lunar Science Overview

Neal C. R. *
The Importance of Establishing a Global Lunar Seismic Network [#2065]

Bogard D. *
Bombardment History of the Moon: What We Think We Know, What We Don't Know, and How We Might Learn More [#2025]

Kring D. A. * Swindle T. D. Strom R. G. Ito T. Yoshida F.
Exploring Impact Cratering on the Moon and Its Implications for the Biologic Evolution of, and Habitable Conditions on, the Earth [#2017]

Garvin J. B. *
TBD

12:00–1:30 p.m. LUNCH Salon B & C

Tuesday, October 25, 2005 (continued)
BIOMEDICINE AND BIOLOGY
1:30 p.m. Marina Plaza Ballroom

Moderator: E. Wang

Pellis N. * [Invited 30-Minutes]
TBD

Paul A.-L. Schuenger A. Ferl R. J. *
In Situ Biological Response: Scalable Assay of Complex Biological Phenomena Using Genetically Engineered Plants [#2078]

Wrbanek J. D. Fralick G. C. Wrbanek S. Y. Chen L. Y.
Active Solid State Dosimetry for Lunar EVA [#2014]

Greenberg P. S.
Sensor Development for the Detection and Characterization of Lunar Dust [#2018]

2:45-3:00 BREAK

WHAT ROLE SHOULD THE MOON PLAY IN THE FUTURE OF ASTROPHYSICS
3:00 p.m. Marina Plaza Ballroom

Moderator: G. J. Taylor

Banerdt W. B. Chui T. Galitzki N. Herrin E. T. Paik H. J. Penanen K. Rosenbaum D.
Teplitz V. L. Young J.
Interdisciplinary Research on Small Lunar Seismic Signals [#2040]

Lester D. F. Lillie C.
Servicing the Single Aperture Far Infrared (SAFIR) Telescope from a Lunar-Exploration Enabled Gateway [#2066]

PANEL DISCUSSION:

Panelists: R. Angel, P. Worken, J. Mather, D. F. Lester

Opening Remarks [10-Minutes each]
P. Worden
J. Mather

MEETING OF BOARD OF DIRECTORS
OF THE SPACE RESOURCES ROUNDTABLE, INC.
5:15 p.m. AMPHITHEATER

Wednesday, October 26, 2005
ISRU AND ITS CONTRIBUTION TO SPACE EXPLORATION
8:00 a.m. Marina Plaza Ballroom

Moderators: G. B. Sanders
E. McCollough

Sanders G. B. * [Invited 30-Minutes]
Summary of ISRU Capabilities and Roadmapping Team Activities

Cardiff E. H. * Pomeroy B. R. Matchett J. P.
A Demonstration of Vacuum Pyrolysis [#2015]

Clark L. *
TBD

Berggren M. * Zubrin R. Carrera S. Rose H. Muscatello S.
Carbon Monoxide Silicate Reduction System [#2069]

Taylor L. A. * Hill E. Liu Y.
Unique Lunar Soil Properties for ISRU Microwave Processing [#2075]

King R. H. * Duke M. B. Johnson L.
Evaluation of Lunar-Regolith Excavator Concepts for a Small, ISRU Oxygen Plant [#2080]

Lenard R. X. Rodriguez G.
Lunar Power Architectures: A Power Transmission system for the Shackleton Crater [#2083]

10:00–10:15 a.m. BREAK

Gump D. Whittaker W. * DiGioia M. E.
Pragmatics of Propellant Production on the Moon [#2046]

Blair B. R. * Sanders G. B. Nall M. E. Heiss K. P. Anderson S. H. Curreri P. A. Sacksteder K. R.
Rice E. E. McCullough E. D. Duke M. B. Magelssen T. C.
The Enabling Role of ISRU for Space Commercialization [#2054]

Duke M. B. * Fort B. O.
Lunar Resources Consortium: A Private/Public Partnership in Space Resource Development [#2064]

Nally J. A. * Komerath N.
Modeling and Analysis of the Interactions in a Space-based Economy [#2028]

11:30 a.m.–Noon DISCUSSION

12:00–1:30 p.m. LUNCH — DEMO OF MODERN SPACE SUIT Salon B & C

Wednesday, October 26, 2005 (continued)
EXPLORATION TECHNIQUES
1:30 p.m. Marina Plaza Ballroom

Moderators: C. Culbert
S. J. Lawrence

O'Dale C. D. *

Using Secondary Objectives to Guide the Development of Lunar Industry [#2063]

Eppler D. B. * [Invited 30-Minutes]

Human-Machine Integration for Exploration Science and Operations: History, Levels of Integration, and Open Questions [#2052]

Garry W. B. * Clancey W. J. Sierhuis M. X. Graham J. S. Alena R. L. Dowding J. Semple A.
Human-Robotic Field Relations for the Moon: Lessons from Simulated Martian EVAs [#2002]

Damer B. * Rasmussen D. Newman P. Blair B. Duke M. King R. Muff T.
 Shirley M. Shen W.-M. [Invited 30-Minutes]

Design Simulation of Lunar Exploration and ISRU Prototype Vehicles and Mission Scenarios [#2004]

Culbert C. * [Invited 15-Minutes]

Summary of Human Systems and Mobility Capabilities Roadmapping

3:15–3:30 p.m. BREAK

Reiners E. A. Corcoran P. T. *

Earth Moving Industry — Laboratory and Numerical Modeling Tools Applied to Lunar Environments [#2036]

Kummert J. Boldoghy B. Bérczi Sz. Szilágyi I. Varga T. *

Organizational Concept of Buildings of Levelled Temperature Interior Space on the Moon [#2007]

Benaroya H. *

Performance-based Engineering for Lunar Settlements [#2011]

Shen W.-M. * Bogdanowicz J. Chun W. Yim M. Will P. M. Sims M. Colombano S.
 Kortenkamp D. Vanderzyl S. Baumgartener E. Taylor J.

Superbots: Modular, Multifunctional, Reconfigurable Robotic System for Space Exploration [#2013]

Taylor G. J. Lentz R. C. F. Lawrence S. J. Martel L. M. Shen W.-M. Will P. M. Sims M. H.
 Colombano S. Kortenkamp D. Damer B. Chun W.

SuperBots on the Lunar Surface: Mini-Mobile Investigation System (Mini-MIS) [#2050]

Magelssen T. * Hooker S.

Risk Assessment of ISRU in Lunar Base Mission Scenarios [#2072]

Wednesday, October 26, 2005 (continued)
POSTER SESSION
5:00 p.m. Salons B, & C

- Archinal B. A. Rosiek M. R. Kirk R. L. Redding B. L.
Unified Lunar Topographic Model [#2060]
- Archinal B. A. Rosiek M. R. Kirk R. L. Redding B. L.
Update on the Unified Lunar Control Network 2005 [#2061]
- Banerdt W. B. Albert D. G. Pike W. T.
The Crux Seismic Profiler for Shallow Sounding of the Lunar Regolith [#2076]
- Barmatz M. Chui T. Zhang B.
Development of Radiators for Future Moon Missions [#2048]
- Becker T. Weller L. Gaddis L. Soltesz D. Cook D. Bennett A. McDaniel T. Redding B.
Richie J. Astrogeology Team
Lunar Orbiter Digital Mosaics: A Foundation for Lunar Reconnaissance Mapping [#2057]
- Bérczi Sz. Boldoghy B. Kummert J. Varga T. Szilágyi I.
Use of Lunar Soil and Lunar Surface Rocky Materials in Insulation of Buildings on the Moon [#2008]
- Bogard D. D.
Lunar Directed Science and Suggested Mission Architecture and Mobility: An Overview [#2026]
- Boldoghy B. Kummert J. Bérczi Sz. Szilágyi I. Varga T.
Functional Program of Buildings for Conditions on the Moon [#2006]
- Boldoghy B. Kummert J. Bérczi Sz. Varga T. Szilágyi I.
Planning Project for Establishing Buildings on the Moon to be Operated Cost-effectively [#2005]
- Criswell D. R.
Sustainable Human Prosperity: Earth, Moon, and Beyond [#2001]
- Carpenter P. Sibille L. Wilson S.
Development of Standardized Lunar Regolith Simulant Materials [#2084]
- Damer B. Rasmussen D. Newman P. Blair B. Cochrane T. Kohut J. Head J.
Mission Visualization for Precursor Lunar Telerobotic Base Preparation [#2027]
- Díaz J.
ISRUS Integrated Space Resources Utility Software [#2074]
- Durst S.
Stanford on the Moon Alumni Initiative, 2000–2015 [#2024]
- Foing B. H. Racca G. D. Grande M. Huovelin J. Josset J.-L. Nathues A. Keller H. U.
Malkki A. Heather D. Koschny D. Almeida M. Frew D. Lumb R. Volp J. Zender J.
Camino-Ramos O. SMART-1 Science and Technology Working Team
ESA'S SMART-1 Mission: First Results at the Moon, Status and Next Steps [#2037]
- Földi T. Bérczi Sz.
Economic Device System for Extracting the Dust and Aerosols from the Atmosphere of the Permanent Lunar or Martian Buildings [#2071]

Gaddis L. R. Skinner J. A. Jr. Keszthelyi L. Hare T. M. Howington-Kraus E.
Rosiek M. Astrogeology Team

Volcanoes in Alphonsus Crater: 3-D Analysis of a Future Lunar Landing Site [#2056]

Garrick-Bethell I.

Meeting Nighttime Power and Thermal Requirements by Manipulation of the Lunar Surface Albedo and Emissivity [#2079]

Grimmett D. L.

Processing of Lunar Simulant by Partial Oxidation and Magma Electrolysis [#2042]

Hahn I. Penanen K. Eom B.

Can MRI be Used in Space?: A Recent Development of Ultra Low-Field Magnetic Resonance Imaging System [#2031]

Hays C. C. Hollen S. M. Barmatz M. Chui T.

In-Situ Calorimetric Measurements for Space Exploration: An Instrument Concept [#2055]

Jenkin B.

Production of Steel Products in Space Using ISRU Iron Sources and Carbonyl Metallurgy [#2012]

Jordan J. L. Irwin G. M. Miller S. A.

CO₂ Laser-heating Experiments on Apollo 11 Lunar Fines 10084 [#2047]

Kring D. A. Rademacher J. Dobson B. Dyster J. Kopplin J. Harvey D. Clark C.

Lunar Surface Explorer: A Rover-based Surveyor Suitable for Multiple Mission Scenarios [#2021]

Kummert J. Boldoghy B. Bérczi Sz. Szilágyi I. Varga T.

Using the Sun's Radiating Energy for Heat-Storage as Energy Source of Buildings on the Moon [#2009]

Lawrence S. J. Taylor G. J. Lentz R. C. F. Martel L. M. Shen W.-M. Will P. M. Sims M. H.
Colombano S. Kortenkamp D. Damer B. Chun W.

Superbots on the Lunar Surface: A Habitat Operations and Maintenance System (HOMS) [#2032]

Lentz R. C. F. Taylor G. J. Lawrence S. J. Martel L. M. Shen W.-M. Will P. M. Sims M. H.
Colombano S. Kortenkamp D. Damer B. Chun W.

SuperBots on the Lunar Surface: A Robotic Multi-Use Lunar Explorer (MULE) [#2020]

Litvak M. L. Shevchenko V. V. LEND/LRO Instrument Team

Search for Water Ice in the Moon Cold Traps (Polar Craters) with Lunar Exploration Neutron Detector Onboard LRO Mission [#2033]

Liu Y. Taylor L. A. Thompson J. R. Patchen A. Hill E. Park J

Lunar Agglutinitic Glass Simulants with Nanophase Iron [#2077]

Maejima H. Sasaki S. Takizawa Y.

Development of Selenological and Engineering Explorer (SELENE) [#2022]

Matchett J. P. Pomeroy B. R. Cardiff E. H.

An Oxygen Production Plant in the Lunar Environment: A Vacuum Pyrolysis Approach [#2016]

Matsui K. Aoki S. Takizawa Y.

Japan's Moon Exploration — First Lunar Resources Utilization Workshop [#2003]

Mishra B. * Duke M. Olson D. L. Roubidoux J. McDermott J. Tordonato D.

Low Temperature Molten Salt Electrolysis for Oxygen Production from Lunar Soil [#2029]

- Mitrofanov I. G. LEND/LRO Instrument Team
Lunar Exploration Neutron Detector Onboard LRO Mission [#2035]
- Muscatello A. Zubrin R. Ohman C. Booth S.
Integrated Mars In-Situ Propellant Production System [#2067]
- Pieters C. M. M3 Team
Science and Exploration Opportunities Through Moon Mineralogy Mapper [#2059]
- Sanin A. B. Starr R. D. LEND Instrument Team
The Numerical Modeling of Sensitivity of the Lunar Exploration Neutron Detector for the NASA Lunar Reconnaissance Orbiter [#2034]
- Schlagel J. D. Jensen H. M.
The CRUX-Mapper/DSS: A Real-Time Decision Support System for In-Situ Resource Utilization [#2038]
- Sharma R. Srirama P. K. Johnson C. E. Mazumder M. K. Pruessner K. Clark D. W.
Electrostatic Properties of Mars/Lunar Dust Simulants and Their Effects on the Performance of Dust Mitigation Devices [#2081]
- Sibille L. Carpenter P. Schlagheck R. A.
Toward a Suite of Standard Lunar Regolith Simulants for NASA's Lunar Missions: Recommendations of the 2005 Workshop on Lunar Regolith Simulants Materials [#2085]
- Silva J. Benaroya H.
Reliability and Lunar Base Concepts [#2010]
- Sorensen K. F. Bonometti J. A.
Cislunar Transportation Architecture Influences in ISRU and Science [#2082]
- Strayer D. Liu Y. Hays C. Kidd R. Israelsson U. E.
Simulating the Moon's Gravity on Earth Using Magnetic Levitation [#2030]
- Stubbs T. J. Vondrak R. R. Farrell W. M.
Impact of Electrically-charged Dust on Lunar Exploration [#2043]
- Taylor G. J. Lentz R. C. F. Lawrence S. J. Martel L. M. Shen W.-M. Will P. M. Sims M. H. Colombano S. Kortenkamp D. Damer B. Chun W.
SuperBots on the Lunar Surface: Mini-Mobile Investigation System (Mini-MIS) [#2050]
- Van Cleve J. E. Reinert R. Santarius J. F. Kulcinski G. L. Blair B.
Initiating an Interplanetary He-3 Economy with Lunar Propellant Generation and In-Situ Resource Exploration [#2041]
- Wanis S. S. Komerath N. M.
In-Situ Space Based Construction Using Tailored Force Fields [#2062]
- Weller L. Becker T. Gaddis L. Soltesz D. Cook D. Bennett A. McDaniel T. Redding B. Richie J. Astrogeology Team
Lunar Orbiter Very High-Resolution Views of Lunar Apollo Sites of Interest [#2058]
- Wilson T. L.
Physics and Astrophysics from the Moon [#2051]

Thursday, October 27, 2005
LUNAR COMMERCE
(JOINT MEETING WITH LUNAR COMMERCE EXECUTIVE ROUNDTABLE)
8:00 a.m. Marina Plaza Ballroom

- 8:00–8:15 a.m. Introduction
P. Eckert
- 8:15–8:30 a.m. Synergy of Science, Engineering, and Commerce
R. Tumlinson and G. J. Taylor
- 8:30–8:45 a.m. Bringing Technology to Market: Developing Sound Business Plans
- 8:45–9:15 a.m. Lunar Energy Roadmap Discussion
SRR/LEAG Speakers: Technical Issues
- 9:15–10:00 a.m. Lunar Energy Roadmap Discussion
Executive Speakers: Business Issues
- 10:00–10:15 a.m. BREAK**
- 10:15–12:15 Breakout Groups
Clarifying Business and Technical Success Factors for Lunar Enabled Enterprises
- Marina Plaza Ballroom**
Solar Power – Moderator: A. Ignatiev
- Hunt Room**
Oxygen-Hydrogen Propellant – Moderator: L. A. Taylor
- Amphitheater**
Multiple-Customer Industrial/Scientific/Exploration Facility – Moderator: H. Benaroya
- Poolside**
Civil Engineering Enterprises – Moderator: D. Carrier
- Oasis Room**
Media and Related Products and Services – Moderator: S. Heard
- 12:15–1:15 p.m. LUNCH – SPEAKER: REX GEVEDEN, NASA Associate Administrator Salon A, B & C**

PLENARY BREAKOUT GROUP REPORTS AND DISCUSSION
1:15 p.m. Marina Plaza Ballroom

Plenary session in which each of the five panel discussion groups report the essence of their discussions: points of agreement, disagreement, next steps to take, etc.

3:15–3:30 p.m. BREAK

Thursday, October 27, 2005 (continued)
WHAT NEXT FOR THE SRR AND LEAG?
3:30 p.m. Marina Plaza Ballroom

G. M. Cadenhead

Lunar Entrepreneurs Student Competition [#2087] (15-Minutes)

Open discussion of what activities, products, white papers, etc. should be produced by the Space Resources Roundtable and LEAG. We should have time to outline what the products should contain and what the scope of an analysis activity should be. At the last SRR meeting, for example, we wrote two white papers. One concerned the need for ISRU in the vision for space exploration and the second emphasized the need for developing good lunar soil simulants as soon as possible. The discussion could include how to continue to foster ties with space commerce, consideration of ISRU funding needs, near-term studies that help define robotic and early human missions. NOTE: This part of the afternoon is done without our colleagues from the Lunar Commerce Executive Roundtable

**JOINT RECEPTION FOR THE
LUNAR COMMERCE EXECUTIVE ROUNDTABLE AND SRR-LEAG,
AND POSTER SESSION**
5:00 p.m. Salon A, B, & C

Friday, October 28, 2005
FROM THE MOON TO MARS AND BEYOND
8:00 a.m. Marina Plaza Ballroom

Moderator: D. W. Beaty

Thronson H. A. * Lester D. Watson J. J. Moe R. [Invited 30-Minutes]
Enabling the Exploration Vision: NASA Goals and a Libration Point "Gateway" [#2073]

Shearer C. K. * [Invited 30-Minutes]
Potential Science and Exploration Linkages Between the Moon and Mars [#2039]

Lee P. * Braham S. Mungas G. Silver M. Thomas P. West M.
Phobos: A Critical Link Between Moon and Mars Exploration [#2049]

Beaty D. W. * [Invited]
TBD

Reiter J. W. * Guerrero J. L. Wu D. Wang G. Y.
Advanced Planetary Drill Technology and Applications to Future Space Missions [#2023]

Head J. N. * Price C. R. Blair B. R.
NEOs as Moon-Mars Risk and Cost Reduction [#2045]

10:00–10:15 a.m. BREAK

Berggren M. * Zubrin R. Rose H. West M. Harber D. Kilgore J. Muscatello A. McNulty M.
Mars Aqueous Processing System [#2070]

Zubrin R. * Harber D. Snyder G. Kilgore J. Johnson K. Jameson N.
The Mars Gashopper Airplane [#2053]

11:00 a.m.–Noon DISCUSSION

12:00 p.m. ADJOURNMENT