Wednesday, November 2, 2016

GUEST SPEAKER
CONGRESSMAN JIM BRIDENSTINE (R-OK)
Update on the American Space Renaissance Act
7:00 p.m.   USRA Conference Center

The Congressman’s remarks will touch on how NASA can leverage the private sector when conducting lunar missions as well as the policies needed to ensure free enterprise can occur on the Moon and in cislunar space.

POSTER SESSION
6:00–8:00 p.m.   USRA Education Gallery

Sarkarati M.   Reggestad V.   Merri M.
Common Standards for Collaborative Inter-Agency Operations as Key Enabler for the Moon Village [#5042]
Our paper will provide an overview of standardization landscape for mission operations of a future Moon Village and elaborate on how existing standards, such as CCSDS Standards, can provide a solid basis for collaborative operations of Moon Village.

Kramer W. R.
Defining a Need for Assessing the Extraterrestrial Environmental Impacts of Lunar Activities [#5006]
Protocols guiding an extraterrestrial environmental impact assessment process are warranted. Industry-developed and -managed standards and an environmental code of conduct based, in part, on best management practices are proposed.

Amoroso E.   Jones H.   Otten N.   Wettergreen D.   Whittaker W.
Quantitative Evaluation of a Planetary Renderer for Terrain Relative Navigation [#5037]
A ray-tracing computer renderer tool is presented based on LOLA and LROC elevation models and is quantitatively compared to LRO WAC and NAC images for photometric accuracy. We investigated using rendered images for terrain relative navigation.

Cash T. J.   Blair B. R.
Selective Heating of Regolith Grains Using Dynamic Phase and Frequency [#5078]
This paper will present concepts for heating lunar granular media using a dynamic strategy that varies phase and frequency to maximize the coupling efficiency of inbound radiation to a hypothetical work zone.

Blair B. R.   Dula A. M.
IAA-SMR Propellant Demand Forecasting for Lunar Mineral Resources [#5077]
Access to the exponential mineral wealth of space begins with lunar resources, where commercial technologies can be developed, tested, and debugged. A custom-developed economic forecast is presented.

Elvis M.   Milligan T.   Krolikowski A.
The Peaks of Eternal Light: A Near-Term Property Issue on the Moon [#5001]
The Peaks of Eternal Light at the lunar poles are an example of rare, valuable lunar real estate. They can be effectively appropriated quite easily under the Outer Space Treaty. We consider the resulting legal, policy, and ethics issues.

Cunningham C.   Jones H.   Amato J.   Horchler A.   Holst I.   Otten N.   Kitchell F.   Whittaker W.
Route Planning Software for Lunar Polar Missions [#5062]
Rover mission planning on the lunar poles is challenging due to the long, time-varying shadows. This abstract presents software for efficiently planning traverses while balancing competing demands of science goals, rover energy constraints, and risk.
Otten N. D.   Amoroso E.   Jones H. L.   Kitchell F.   Wettergreen D. S.   Whittaker W. L.
Mission to Malapert [#5066]
This work presents methodology for evaluating lunar landing site amenability and identifies promising sites for landing on Malapert Mountain, which features shallow slopes, uninterrupted Earth visibility, and ten-plus days of uninterrupted sunlight.

Carpenter J. D.   Fisackerly R.   Houdou B.   Landgraf M.
Establishing Lunar Resource Viability [#5051]
We describe an approach to assessing the viability of lunar resources, emphasizing water ice, and the transition from prospecting to utilization.

Fisackerly R.   Carpenter J.   Landgraf M.
A Lunar ISRU Pilot Plant: An Anchor for Driving PreCursor Mission Planning and Human Architecture Preparation [#5053]
We propose a pilot plant as the transition step from resource prospecting to resource utilization.

Wilson J. K.   Schwadron N. A.   Spence H. E.   Jordan A. P.   Stubbs T. J.   Hurley D. M.   Farrell W. M.
Petro N. E.   McClanahan T. P.   Looper M. D.   Pieters C.   Townsend L. W.
Extracting Lunar Albedo Protons from Sparse Particle Data [#5018]
A new and robust method for extracting high energy protons from CRaTER data works well even for small data intervals and sparse particle counts.

Lucey P. G.   Fisher E. A.   Greenhagen B. T.   Lemelin M.   McClanahan T. P.   Mazarico E.
Neumann G. A.   Siegler M. A.   Smith D. E.   Zuber M. T.   Paige D. A.
Search for Transient Surface Water Ice at the Lunar South Pole: Results from LOLA and Diviner [#5048]
Frost that accumulates during the lunar night and is lost during the day is sought using LRO LOLA reflectance data and Diviner temperature measurements.

Day B. H.   Law E. S.
Moon Trek: NASA’s New Online Portal for Lunar Mapping and Modeling [#5015]
This presentation introduces Moon Trek, a new name for a major new release of NASA’s Lunar Mapping and Modeling Portal (LMMP). The new Trek interface provides greatly improved navigation, 3D visualization, performance, and reliability.

Archinal B.   Lee E.   Weller L.   Richie J.   Edmundson K.   Laura J.   Robinson M.   Speyerer E.   Boyd A.
Controlling High-Resolution LROC NAC Polar Mosaics to LOLA Track Data [#5044]
We describe our progress on completing 1 m resolution geodetically controlled LROC NAC illumination mosaics of both lunar poles out to 85 degrees latitude, constrained using matching to LOLA track data.

Ogasawara K.   Ehresmann B.   Retherford K. D.   Mandt K. E.   Livi S. A.   Schwadron N.   Bloser P.
Legere J. S.   McConnell M.   McClanahan T. P.   Okada T.
Required Performances for Future Lunar and Asteroid Neutron Spectroscopy [#5028]
Future neutron spectroscopy requires better spatial resolution than the conventional omni-directional observations. The current issues for lunar and asteroid mission and possible solutions will be discussed in this presentation.

Williams D.   Taylor P.   Nagihara S.   Nakamura Y.   Kiefer W.
The Search for Apollo Era ALSEP Data and Its Restoration and Archiving [#5033]
Not all of the Apollo ALSEP data have been accounted for nor archived. We are searching for acquiring, restoring, and archiving as much of these data as we are able. In addition, we are including METADATA for several experiments.
Eubanks T. M.  Radley C. F.
*Logistical Support of Lunar Exploration and Economic Activity with a Lunar Space Elevator* [#5058]
An examination of proposed early deployments of a Lunar Space Elevator (LSE) and how these could be used for scientific research and to support a Moon Village on the farside.

Roux V. G.  Roth M.  Widdowson J.
*"Test It Like You Fly It" — Developing a Large Lunar Surface Simulation Lab* [#5043]
We are currently developing a large Lunar Surface Simulation Lab with high fidelity lunar highland regolith simulant that will allow researchers to “test it like you fly it.”

Sarantos M.  Colaprete A.  Szalay J. R.  Halekas J. S.  Wooden D. H.  Horanyi M.  Janhes D.
*Generation and Migration of Potassium in the Lunar Exosphere* [#5063]
We modeled what the recent LADEE measurements of potassium in the lunar exosphere imply about how gases are generated from and interact with the lunar surface.

*Grain-Scale Supercharging on the Moon* [#5061]
Under lunar solar wind bombardment and photoemission levels, accumulated electric charge can produce grain-to-grain electric field strengths exceeding the dielectric breakdown limit, even away from the cold, relatively non-conductive lunar poles.

Shusterman M. L.  Izenberg N. R.  Wing B. R.  Irvin B. L.  Liang S. X.
*Laboratory Simulation of Dielectric Breakdown of Lunar Regolith Simulant JSC-1A* [#5056]
Laboratory simulations of dielectric breakdown of surface regolith in the lunar polar regions has shown that resulting alterations may provide an explanation for anomalous physical and optical features detected in permanently shadowed regions.

Guven U. G.
*Utilization of Nuclear Power for Moon Missions: Nuclear Based Power and Propulsion Techniques for Spacecraft and Nuclear Power Generation Methods for Moon Habitats* [#5060]
With a nuclear reactor, all of the power requirements in a Moon-based station with reduced gravity conditions can be met for several years without any difficulty. Nuclear reactor can be useful for Moon-bound spacecraft for the Moon and habitats.

Miller T. F.  Paul M. V.
*A Power Source for Sunless Lunar Missions Using Lithium Combustion* [#5072]
Some lunar exploration targets require non-solar power due to shading. Batteries provide very brief excursions into sunless areas. Undersea powerplants that burn metals have significantly higher specific energy than primary batteries and no exhaust.

Looper M. D.  Mazur J. E.  Blake J. B.  Schwadron N. A.  Wilson J. K.  Spence H. E.  Case A. W.  Kasper J. C.  Townsend L. W.
*Differing Lunar Regolith Hydrogen Distributions as a Possible Source of Variations in Proton Albedo: Geant4 Simulations* [#5019]
We use Geant4 to model the effect of varying mixing of hydrogen-bearing compounds with the near-surface regolith on the yield of upgoing lunar "albedo" protons produced by cosmic ray nuclear interactions, for comparison with LRO/CRA TER measurements.

Townsend L. W.  Zaman F.  Schwadron N. A.  Wilson J. K.  Spence H. E.  Case A. W.  Kasper J. C.  Mazur J. E.  Looper M. D.
*Energy and Angular Spectra of Albedo Protons and Neutrons Emitted from Hydrated Layers of Lunar Regolith* [#5022]
Energy and angular yields of albedo protons and neutrons emitted from the lunar surface as a function of hydration layer thickness in the lunar regolith using the MCNP computer code developed at Los Alamos National Laboratory are presented.
Petro N. E. Cohen B. A. Jolliff B. L. Moriarty D. P.

*Estimating the Contribution of Basins and Large Craters to the Regolith of the South Pole-Aitken Basin* [#5032]

Here we revisit the question of how much non-SPA material may have been introduced to SPA. Data from recent lunar missions provides new insight into the composition and geologic evolution of the Moon. We assess the resurfacing effects of large impacts.

Fang E. Suresh S. Whittaker W.

*Camera-Only Kinematics for Small Lunar Rovers* [#5026]

Knowledge of the kinematic state of rovers is critical. Existing methods add sensors and wiring to moving parts, which can fail and adds mass and volume. This research presents a method to optically determine kinematic state using a single camera.

Visscher P. Edmundson P. Ghafoor N. Jones H. Kleinhenz J. Picard M.

*Results of Lunar Rover Drivetrain TRL-6 Environmental Testing* [#5027]

Latest results of work performed by Ontario Drive and Gear Ltd., Canadensys Aerospace Corporation, and partners on Canadian lunar rover development activities for the Canadian Space Agency, including "dirty" thermal vacuum testing of drivetrain unit.

Cataldo R. L.

*A Concept for a Radioisotope Powered Lunar CubeSat* [#5081]

Presented is a concept for a small lander or CubeSat lunar mission that would benefit from a low-power milli-watt radioisotope power source (RPS). A RPS would provide long-lived electrical and thermal power enabling a long-lived lunar mission.

Ethridge E. C.

*Proposed Experiment for Prospecting and Mining Water from Lunar Permafrost from Boreholes Using RF Energy* [#5024]

The extraction of water from planetary permafrost has been demonstrated with experiments using RF heating and capture of water in a cold trap. We will describe an experiment to demonstrate the process at the lunar poles.

Indyk S.

*Structural Members Produced from Unrefined Lunar Regolith* [#5082]

Manufacturing structural components directly from unrefined lunar regolith would be advantageous compared to refining the lunar regolith for its raw elements. Quantification of sintered JSC-1A mechanical material properties was performed through compression testing of sintered samples.