Wednesday, October 11, 2017
RESOURCES AND THE LUNAR ECONOMY
1:30 p.m.    USRA Conference Center

Chairs:    Lisa Gaddis
            G. Wesley Patterson

1:30 p.m.    Plescia J. B. *

Lunar SKGs: What’s Really Needed and What Do We Already Know? [#5077]
The distinction between enabling and enhancing SKGs must be maintained. The key unknown is the
species, form, and distribution of H in polar regions and it can only be addressed by in situ exploration.
The commercial role in resource SKGs is unclear.

1:45 p.m.    Blair B. *

Modeling PPP Economic Benefits for Lunar ISRU [#5081]
A new tool is needed for selecting the PPP strategy that could maximize the rate of lunar
commercialization by attracting private capital into the development of critical infrastructure and robust
capability. A PPP model under development for NASA-ESO will be described.

2:00 p.m.    Greenblatt J. B. *

Quantifying Elements of a Lunar Economy Based on Resource Needs [#5018]
We model a simplified lunar economy from human life support, Earth materials consumption, and
energy and propulsion requirement estimates, constrained by lunar elemental abundances; estimate
likely imports/exports and “gross interplanetary product.”

2:15 p.m.    Ho K. *   Chen H.

Space Transportation Network Analysis for Cislunar Space Economy with Lunar Resources [#5089]
This work provides a transportation network analysis of lunar exploration architecture and cislunar
mission design with lunar in-situ resource utilization (ISRU).

2:30 p.m.    Schmitt H. H. *

Drilling Regolith: Why Is It So Difficult? [#5028]
The Apollo rotary percussive drill system penetrated the lunar regolith with reasonable efficiency;
however, extraction of the drill core stem proved to be very difficult on all three missions. Retractable
drill stem flutes may solve this problem.

            Thomas T.   Hyman C.   Mellerowicz B.   Yaggi B.   Fitzgerald Z.   Ridilla A.   Atkinson J.

We present update on development and testing of a sampling drill for the Resource Prospector mission.

3:00 p.m.    Jordan A. P. *   Wilson J. K.   Schwadron N. A.   Spence H. E.

Synthesizing Surface and Subsurface Measurements of Water Ice in the Polar Regions
of the Moon [#5022]
Though surface and subsurface data may disagree about the location of water ice near the lunar poles on
small scales, we show they are well-correlated on very large scales, with water ice being distributed
down to about ±70 degrees latitude.

3:15 p.m.    Break

3:30 p.m.    Cataldo R. L. *   Kleinhenz J. E.   Sanders G. B.

Technology Demonstration of Extended Operations for Volatile Prospecting and Processing in Lunar
Permanently Shadowed Regions Enabled by Advanced Radioisotope Power [#5063]
An extended demonstration mission for the purpose of validating advanced radioisotope power system
in concert with ISRU systems in a permanently shadowed region.
The quantity of hydrogen or hydrogen-bearing molecules in the top ~10 cm of lunar regolith may vary significantly with local time, according to albedo proton data collected by LRO/CRaTER.

LRO-LAMP is able to observe scattered sunlight within the south pole PSRs. We compare these observations to illumination models and other LRO datasets.

4:15 p.m. Patterson G. W. * Carter L. M. Stickle A. M. Cahill J. T. S. Nolan M. C. Morgan G. A. Schroeder D. M. Mini-RF Team **Mini-RF S- and X-Band Bistatic Radar Observations of the Moon** [#5046]
Mini-RF is operating in concert with the Arecibo Observatory and the Goldstone DSS-13 antenna to collect bistatic radar data. We will provide an update on science questions being addressed by the Mini-RF team in the current LRO extended mission.

4:30 p.m. Li S. * Lucey P. G. Milliken R. E. **Water in Pyroclastic Deposits and Cold Traps on the Moon: Possible Resources for Future Exploration** [#5055]
We propose two types of water reservoirs for future exploration of the lunar resources. Both advantages and challenges of exploring the two types of water reservoirs are analyzed.

Spectral modeling of the Aristarchus pyroclastic deposit shows that the Moon’s largest explosive volcanic deposit is rich in high-titanium volcanic glass. This lunar pyroclastic deposit is of importance for both scientific and exploration purposes.

5:00 p.m. Kring D. A. * **Conducting Subsurface Surveys for Water Ice Using Ground Penetrating Radar and a Neutron Spectrometer on the Lunar Electric Rover** [#5014]
Teleoperation of the Lunar Electric Rover can survey large areas of the Moon for subsurface volatile deposits in permanently shadowed regions such as Cabeus and Amundsen craters.

5:15 p.m. **DISCUSSION OF PRELIMINARY FINDINGS**