

Microsymposium 60

Solar System Exploration Research Virtual Institute (SSERVI)

Forward to the Moon to Stay: Undertaking Transformative Lunar Science with Commercial Partners

The Woodlands Waterway Marriott Hotel and Convention Center
Montgomery A-C, 1601 Lake Robbins Drive, The Woodlands, Texas, USA
March 16-17, 2019
NASA Conference Tracking System Number NCTS# 38166-19

Saturday, March 16, 2019

1PM - 6PM (with reception to follow)

1:00 PM: Introduction

- **Jim Head** (Brown University).
- **Gregory Schmidt**, Director (Solar System Exploration Virtual Institute-SSERVI).

1:10 PM: The View From NASA Headquarters:

- NASA's Lunar Discovery Exploration Program
Steve Clarke/Ben Bussey (NASA HQ).
- NASA's Commercial Lunar Payload Services Initiative: Getting Payloads to Providers
Sarah Noble (NASA HQ).

1:40 PM: The View from the European Space Agency (ESA):

- **James Carpenter** (ESA).

1:50 PM: The View from the Scientific Community: Transformative Lunar Science (10' each):

- Overview: **Carle Pieters** (Brown University): The Transformative Lunar Science Document (<https://sservi.nasa.gov/articles/transformative-lunar-science/>).
- Impact Crater Flux and Lunar Chronology: **Bill Bottke** (Southwest Research Institute).
- Volcanism and Magmatic Chronology: **Lionel Wilson** (Lancaster University).
- Petrology and Geochemistry: **Clive Neal** (Notre Dame).
- Lunar Geophysics: **Alex Evans** (Brown University).
- Regolith Formation and Evolution: **Brett Denevi** (Applied Physics Lab).
- Volatile Acquisition and Migration: **James Carpenter** (ESA).
- The Lunar Space Environment: **Mihály Horányi** (University of Colorado, Boulder).
- General Discussion: Additional Perspectives.

3:20 PM: Dawn of The New Era:

- SpaceIL Mission to the Moon: Oded Aharonson (Weizmann Institute). (<http://www.spaceil.com/mission/>)

3:30-5:30 PM: Lightning Talks (5' each):

- Lunar Magnetotelluric Sounder. **Robert Grimm** (SwRI) et al.
- Lunar Surface Gravimetry Investigation Concept. **Kieran A. Carroll** (GEDEX) et al.
- Testing of Miniature Laser Retroreflector Arrays for Commercial Lunar Landers. **Daniel Cremons** (NASA Goddard Space Flight Center) et al.
- Next-Gen Laser Retroreflectors for the Lunar Interior. **Simone Dell'Agnello** (INFN-LNF) and **Douglas Currie** (University of Maryland).
- A MEMS Seismometer for Commercial Lunar Landers. **Ceri Nunn** (JPL) et al.
- Characterizing the lunar magnetic field to further our understanding of energy and particle pathways. **Michael Purucker** (NASA Goddard Space Flight Center) et al.
- Investigating the lunar surface magnetic field by mobile magnetometers. **Peter Chi** (UCLA) et al.
- XTRA: An Extraterrestrial Regolith Analyzer to quantitatively determine the mineralogical and chemical composition of lunar soil. **Jeff Taylor and Linda Martel** (University of Hawaii) et al.
- The Potassium-Argon Laser Experiment (KArLE) for in situ geochronology on the Moon. **Barbara Cohen** (NASA Goddard Space Flight Center).
- PROSPECT-Ion Trap Mass Spectrometer for surface Volatiles and Exosphere. **Barbara Cohen** (NASA Goddard Space Flight Center).
- Laser-Induced Breakdown Spectroscopy for Rapid Remote and In Situ Geochemical and Geochronological Analyses of Lunar Materials (LunaLIBS). **Ann Martha Ollila** (Los Alamos National Laboratory) et al.
- Elpasolite Planetary Ice and Composition Spectrometer Lunar In-situ deTection of Elements (EPICS-LITE). **Daniel D. S. Coupland** (Los Alamos National Laboratory) et al.
- NIR Experiment Targeting Lunar Volatile Distribution and Characterization. **Alian Wang** (Washington University in St. Louis) et al.
- Lunar Laser Surface Solar Occultation (LLSSO), a Payload Concept for Lunar Landers. **Winslow Farrell** (Jacobs Missile Defense Group) et al.
- High Priority Measurements from SmallSats and Commercial Landers for Lunar Volatiles and Composition. **Bethany Ehlmann** (Caltech) et al.
- Using the Chemistry, Organics and Dating Experiment (CODEX) to Revise Lunar and Inner Solar System Chronology. **Scott Anderson** (Southwest Research Institute) et al.
- Lunar Tethered Resource Explorer (Lunar T-REx) mission concept. **Timothy Stubbs** (NASA Goddard Space Flight Center).
- Heimdall: A Flexible Build-to-Print Camera System for Conducting Lunar Science. **Aileen Yingst** (PSI) et al.
- An Approach to Situational Awareness for Lunar Landings. **Jason Mezilis** (Zandef Deksit, Inc.).
- Development of an Integrated Vision System for lunar surface missions. **Gordon Osinski** (University of Western Ontario) et al.

5:30 PM: STEM Education Perspective:

-An Example of Working with Commercial Partners: The OrbitBeyond Lunar Mare Imbrium Lava Flow Design Reference Mission. **Ariel Deutsch** and **Ashley Palumbo** (Brown University).

5:40 PM: Additional Perspectives and Discussion:

-Selling Lunar Resources for Fun, Profit, and Export: A Test That the OST Cannot Pass? **John D. Rummel** (SETI Institute and McGill Institute of Air and Space Law)

-Transformative Lunar Operations: Working in Fine Moondust. **Brian J. O'Brien** (Brian J. O'Brien & Assoc.; University of Western Australia) www.brianjobrien.com.

-Discussion.

6:00 PM: Reception

Sunday: March 17, 2019

8:30AM - 12NOON

8:30 AM: How Do We Get to the Moon?: Presentations by a selection of participating CLPS providers and others (20'+5' each):

-Astrobotic Technology, Inc. <https://www.astrobotic.com/>

-Deep Space Systems <http://www.deepspacesystems.com/>

-Lockheed Martin Space <https://www.lockheedmartin.com/en-us/capabilities/space.html>

-Masten Space Systems <https://www.masten.aero/>

-Moon Express <http://www.moonexpress.com/>

-OrbitBeyond <https://www.orbitbeyond.com/>

-SpaceX (<https://www.spacex.com/>), a non-CLPS lunar service provider.

-Special Presentation: Our Way to the Moon: The Beresheet Story
Meir Nissim Nir, Director, Advance Space Systems, Israeli Aerospace Industries.

11:50 AM: Closing Remarks

-**Jim Head** (Brown University).

12:00 Noon: Adjourn

Late Sunday Afternoon Follow-up Meeting: 4:30-5:30 PM: How to Do Science on a Commercial Lunar Lander: A focus on operational logistics with commercial partners. Waterway 1.