

# 7<sup>th</sup> Joint Space Resources Roundtable/Planetary & Terrestrial Mining Sciences Symposium Final Agenda

**TUESDAY, JUNE 7, 2016**

7:30 AM		<b>Continental Breakfast (Petroleum Hall, CSM Green Center)</b>	
8:00 -	Opening remarks	Angel Abbud-Madrid & Dale Boucher	
8:30	SRR scholarships		
<b>Technical Session 1 – MARS I</b>			
<b>Session Chair: Angel Abbud-Madrid (Colorado School of Mines)</b>			
8:30	<b>First Landing Site-Exploration Zone for Human Missions to the Surface of Mars</b> Richard Davis, NASA Headquarters		
8:55	<b>Benefits of Mars ISRU Regolith Water Processing: a Case Study for the NASA Evolvable Mars Campaign</b> Julie Kleinhenz, NASA Glenn Research Center		
9:20	<b>Description of Water Resources on Mars that Have the Potential to Become Reserves as Part of a Human Exploration Zone: The M-WIP Study, Part 1</b> David Beaty, NASA Jet Propulsion Laboratory		
9:45	<b>Engineering Analysis of Candidate Ore Cases for ISRU Water Production on Mars: The M-WIP Study, Part 2</b> Paul Van Susante, Michigan Technological University		
10:10	<b>Engineering Sensitivities to Ore Characteristics for Water Resources on Mars and Implications for Resource Exploration Approaches: M-WIP Study, Part 3</b> Charles Whetsel, NASA Jet Propulsion Laboratory		
10:35		<b>Coffee Break</b>	
<b>Technical Session 2 – MARS II</b>			
<b>Session Chair: David Beaty (NASA Jet Propulsion Laboratory)</b>			
10:55	<b>System Maturation Team Assessment of ISRU for NASA's Evolvable Mars Campaign</b> Jerry Sanders, NASA Johnson Space Center		
11:20	<b>The Mars Oxygen ISRU Experiment (MOXIE) on the Mars 2020 Rover</b> Michael H. Hecht, Massachusetts Institute of Technology		
11:45	<b>Efficient Microwave Approaches for Extracting Water from Hydrated Minerals</b> Martin Barmatz, NASA Jet Propulsion Laboratory		
12:10	<b>Integrated Economics Model for ISRU in Support of a Mars Colony—Initial Results</b> Robert Shishko, NASA Jet Propulsion Laboratory		
12:35	<b>The Journey to Mars with ISRU Pathway</b> John Hamilton, PISCES, University of Hawaii, Hilo		

1:00	<b>Lunch (Friedhoff Hall, CSM Green Center)</b>
<b>Roundtable Discussion</b>	
<b>Session Chairs: Angel Abbud-Madrid &amp; Dale Boucher</b>	
2:00 – 3:30	<b>Mars Roundtable Discussion</b>
<b>Technical Session 3 - ISRU Construction and Manufacturing Technologies</b>	
<b>Session Chair: Sherry Schmidt (Deltion Innovations)</b>	
3:30	<b>Manufacturing for Planetary Construction using Polymeric Concrete</b> Byung Chul Chang, International Space Exploration Research Institute of Hanyang University
3:55	<b>Transforming Lunar Regolith into a Digital Printable Material</b> Richa Batra, Columbia University
4:20	<b>Coffee Break</b>
<b>Technical Session 3 - ISRU Construction and Manufacturing Technologies (cont.)</b>	
<b>Session Chair: Sherry Schmidt (Deltion Innovations)</b>	
4:40	<b>Reaction Mechanisms in Combustible Regolith/Magnesium Mixtures</b> Armando Delgado, The University of Texas at El Paso
5:05	<b>PISCES: "PAVING" the Way to Planetary Basalt ISRU Construction - Lunar Launch/Landing Pad</b> John Hamilton, PISCES, University of Hawaii, Hilo
5:30	<b>VADERS: Voxel Advanced Digital-manufacturing for Earth and Regolith in Space</b> A. J. Nick, NASA Kennedy Space Center

## WEDNESDAY, JUNE 8, 2016

8:00 AM	<b>Continental Breakfast (Petroleum Hall, CSM Green Center)</b>
<b>Technical Session 4 - Space Commerce &amp; Space Policy</b>	
<b>Session Chair: Dale Boucher (Deltion Innovations)</b>	
8:30	<b>Space Mineral Resources: Market Modeling and Propellant Demand Forecasting</b> Brad Blair, Newspace Analytics LLC
8:55	<b>Resource Considerations for Enabling Sustainable Trans-Earth Habitation</b> Donald Barker, MAXD, Inc
9:20	<b>The Policy Context for Space Resources Development</b> Ian Christensen, Secure World Foundation
9:45	<b>ULA Cislunar 1000 Plan</b> George Sowers, United Launch Alliance
10:10	<b>Analysis and Economics of Emerging Space Industry: Lunar Resource Extraction</b> Andrew J. Gemer, University of Colorado, Boulder
10:35	<b>Coffee Break</b>
<b>Technical Session 5 – Moon</b>	
<b>Session Chair: Jerry Sanders (NASA Johnson Space Center)</b>	
10:55	<b>Google Lunar XPRIZE TEAM HAKUTO's Lunar Mission</b> Kyle Acierno, ispace Technologies
11:20	<b>Proposed Lunar Geotechnical GIS</b> Leon Croukamp, Stellenbosch University, South Africa
11:45	<b>Moon Rocks into Spacecraft LOX: Modernizing a Study and Comparing Reactions</b> Christopher Buelke, University of North Dakota
12:10	<b>Drilling for Water on the Moon</b> Warren Platts, Groundhog GeoScience, LLC

12:35	<b>Lunch (Friedhoff Hall, CSM Green Center)</b>
<b>Technical Session 6 – Near Earth Asteroids</b>	
<b>Session Chair: Christopher Dreyer (Colorado School of Mines)</b>	
1:35	<b>Assessing the Availability of Low Delta-V Targets for ISRU Development and Water Extraction</b> Robert Jedicke, University of Hawai'i, Honolulu
2:00	<b>Asteroid Provided In-Situ Supplies (APIS): Technology and Mission Architecture</b> Joel Sercel, TransAstra, Corp
2:25	<b>Preliminary Experimental Volatiles Recovery from Carbonaceous Asteroid Simulants</b> Egboche Unobe, Missouri University of Science and Technology
2:50	<b>Carbonaceous Asteroid Volatile Recovery System</b> Mark Berggren, Pioneer Astronautics
3:15	<b>Coffee Break</b>
<b>Technical Session 6 – Near Earth Asteroids (cont)</b>	
<b>Session Chair: Christopher Dreyer (Colorado School of Mines)</b>	
3:35	<b>Enabling Technologies for Asteroid Mining</b> Grant Bonin, Deep Space Industries, Inc
4:00	<b>Excavation and Volatile Analysis in Icy Asteroid Simulant</b> Laurent Sibille, NASA Kennedy Space Center
4:25	<b>Lofted Regolith Sampling of Small Bodies</b> Jay McMahon, University of Colorado, Boulder
4:50-6:20	<b>Moon and NEAs Roundtable Discussion</b> <b>Session Chairs: Angel Abbud-Madrid &amp; Dale Boucher</b>
6:30	<b>Dinner (Friedhoff Hall, CSM Green Center)</b>

**THURSDAY, JUNE 9, 2016**

8:00	<b>Continental Breakfast (Petroleum Hall, CSM Green Center)</b>
<b>Technical Session 7 – ISRU Technologies and Propulsion</b>	
<b>Session Chair: Julie Kleinhenz (NASA Glenn Research Center)</b>	
8:30	<b>TransFormers for Ensuring Long-Term Operations in Lunar Extreme Environments</b> Jim Mantovani, NASA Kennedy Space Center
8:55	<b>Evaluation of Regolith-Based Radiation Shielding Materials</b> Jim Mantovani, NASA Kennedy Space Center
9:20	<b>Implantation of Helium into JSC-1A Lunar Regolith Simulant for Volatile Extraction System Testing</b> Aaron Olson, University of Wisconsin-Madison
9:45	<b>In-Space Propulsion and Power using Volatile Space Resources</b> Laurent Sibille, NASA Kennedy Space Center
10:10	<b>Droplet Stream Momentum Exchange as the Basis for an Extremely Efficient Solar System Transportation System</b> Thomas Joslyn, Omitron Corporation
10:35	<b>ISRU of Water for Interplanetary Steam Propulsion using Carbon Nanoparticles</b> Jekan Thanga, Arizona State University
11:00	<b>Coffee Break</b>
<b>Technical Session 8 – ISRU Programs &amp; New Destinations</b>	
<b>Session Chair: Jim Richard (Deltion Innovations)</b>	
11:20	<b>Overview of Proposed ISRU Technology Development</b> Diane Linne, NASA Glenn Research Center
11:45	<b>MoonRIDERS: NASA and Hawaii’s Lunar Surface Flight Experiment for Late 2017 in ISRU Dust Removal Technologies</b> John Hamilton, PISCES, University of Hawaii, Hilo
12:10	<b>South Korea Space Resources Program</b> Tai Sik Lee, President of Korea Institute of Civil and Building Technology
12:35	<b>Proposed ISRU on the Planet Mercury</b> Gregory Konesky, National NanoTech, Inc

1:00	<b>Lunch (Friedhoff Hall, CSM Green Center)</b>
<b>Technical Session 9 – Robotic Excavation and Extraction</b>	
<b>Session Chair: Diane Linne (NASA Glenn Research Center)</b>	
2:00	<b>Thermal Vacuum Drill Testing</b> Dale Boucher, Deltion Innovations, Ltd
2:25	<b>Planetary Volatiles Extractor (PVEX) for In Situ Resource Utilization (ISRU)</b> Kris Zacny, Honeybee Robotics
2:50	<b>Design of an Excavation Robot: Regolith Advanced Surface Systems Operations Robot (RASSOR) 2.0</b> A. J. Nick, NASA Kennedy Space Center
3:15	<b>Mechanizing Extraterrestrial Excavation – Transfer Potentials from the TBM Industry</b> Ruben Duhme, Herrenknecht AG
3:40	<b>Underground Resource Prospecting Using a Semi-Autonomous, Multi-Instrumented Robot</b> John Meyer, Colorado School of Mines
4:05- 5:00	<b>General Roundtable Discussion</b> <b>Session Chairs: Angel Abbud-Madrid &amp; Dale Boucher</b>