



EARTH & SPACE 2024

19TH BIENNIAL INTERNATIONAL CONFERENCE

on engineering, science,
construction, and operations in
challenging environments

April 15-18, 2024
Miami, Florida

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Moss School of Construction,
Infrastructure and Sustainability

The ASCE Earth & Space 2024 Conference is being hosted by
the Moss Department of Construction Management at
Florida International University (cm.fiu.edu)

earthspace2024.fiu.edu

WELCOME

Welcome to Earth & Space 2024, the 19th ASCE Aerospace Division Biennial International Conference on Engineering, Science, Construction, and Operations in Challenging Environments!

On behalf of the Earth & Space 2024 Organizing Committee, welcome to Miami, Florida! We hope to build on the success of the past conferences with an even more enriching offering in the warm sunshine of Miami! We hope this gives us all the chance to connect with old colleagues and make new acquaintances who in time may become new colleagues. The Technical Planning Committee (Conference Chairs and Symposium Chairs/Co-Chairs), Session organizers and moderators, speakers, and organizing staff have worked diligently to create this conference. We are excited to present to you a variety of activities over the four-day course of the conference.

Conference highlights include

- Plenary speakers from government, industry and academia focusing on the state of the art in extraterrestrial/planetary exploration, including the Moon and Mars.
- Five multi-track symposia encompassing: Materials in Space Exploration; Exploration of Planetary Bodies; Advanced Materials and Designs for Aerospace Systems; Dynamics, Controls, Smart Structures and Health Monitoring; Space Engineering and Constructions for Moon, Mars and Beyond
- A student paper competition where finalists will have an opportunity to present in front of judges from industry and academia for prizes
- A pre-conference short course on the Lunar Geotechnics and Foundation Design
- Special presentations at lunch, including an overview update on the ASCE ASD Lunar Infrastructure Engineering Guidelines initiatives and 3 other features presentations
- An opening reception overlooking the beautiful Biscayne Bay
- Various ASCE ASD Technical Committee meetings

With over 250 attendees from academia, industry, and government, a diverse knowledge base is in attendance. We hope everyone will create new connections that will be remembered as having started here at this Conference. With many new opportunities just over the horizon for expanding human presence in the solar system, we hope that this conference will add a modest, but one of a kind extremely unique and valuable contribution to that effort.

Conference Honorary Chair:
Ramesh B. Malla, Ph.D., F. ASCE, Life Member; F. EMI, A.F. AIAA, Life M. ASME; University of Connecticut, Storrs, CT

Conference General Chair:
Justin Littell, Ph.D., M. ASCE, NASA Langley Research Center, Hampton, VA

Conference Technical Co-Chairs:
Sudarshan Krishnan, Ph.D., A.M. ASCE, University of Illinois, Urbana-Champaign, IL
Landolf Rhode-Barbarigos, Ph.D., A.M. ASCE, University of Miami, Coral Gables, FL

Conference Local Chair:
Nipesh Pradhananga, Ph.D., P.E., M. ASCE, Florida International University, Miami, FL

Conference Sponsorship Chair:
Seung Jae Lee, Ph.D., Florida International University, Miami, FL

CONFERENCE

LEADERSHIP COMMITTEE



CONFERENCE HONORARY CHAIR:
Ramesh B. Malla, Ph.D., F. ASCE,
Life Member; F. EMI, A.F. AIAA, Life
M. ASME, University of Connecticut,
Storrs, CT



CONFERENCE GENERAL CHAIR:
Justin Littell, Ph.D., M. ASCE, NASA
Langley Research Center, Hampton, VA



CONFERENCE TECHNICAL CO-CHAIRS:
Sudarshan Krishnan, Ph.D., A.M. ASCE,
University of Illinois, Urbana-Champaign, IL



Landolf Rhode-Barbarigos, Ph.D., AM. ASCE,
University of Miami, Coral Gables, FL



CONFERENCE LOCAL CHAIR:
Nipesh Pradhananga, Ph.D., P.E., M. ASCE,
Florida International University, Miami, FL



CONFERENCE SPONSORSHIP CHAIR:
Seung Jae Lee, Ph.D.,
Florida International University, Miami, FL

SYMPOSIUM 1 CO-CHAIRS:
Chris Dreyer, Ph.D., A.M. ASCE, Colorado School of Mine, Golden, CO
S. Joseph Antony, PhD, University of Leeds, Leeds, UK

SYMPOSIUM 2 CO-CHAIRS:
Robert Mueller, M. ASCE, NASA Kennedy Space Center, FL
Kris Zacny, Ph.D., M. ASCE, Honeybee Robotics, Altadena, CA

SYMPOSIUM 3 CO-CHAIRS:
Hongyu (Nick) Zhou, Ph.D., M. ASCE, University of Tennessee, Knoxville, TN
Michael Fiske, Jacobs/NASA Marshall Space Flight Centers, Huntsville, AL
Yulan "Emma" Zhang, Ph.D., University of Texas, Austin, TX

SYMPOSIUM 4 CO-CHAIRS:
Wei Zhang, Ph.D., P.E., M. ASCE, University of Connecticut, Storrs, CT
Gangbing Song, Ph.D., M. ASCE, University of Houston, Houston, TX

SYMPOSIUM 5 CO-CHAIRS:
Ramesh B. Malla, Ph.D., F. ASCE, F.EMI, A. F. AIAA,
University of Connecticut, Storrs, CT
Alexander M. Jablonski, Ph.D., P.Eng., M. ASCE,
Carleton University, Ottawa, Ontario, Canada

Melissa Sampson, Ph.D., Lockheed Martin Commercial Civil Space,
Littleton, CO

Gerald (Jerry) Sanders, NASA Johnson Space Center, Houston, TX

STUDENT PAPER COMPETITION CO-CHAIRS:
Krzysztof Skonieczny, Ph.D., M. ASCE, Concordia University,
Montreal, Canada

Robert Goldberg, Ph.D., F. ASCE, NASA Glenn Research Center,
Cleveland, OH

PRE-CONFERENCE SHORT COURSE ORGANIZERS:
Pooneh Maghoul, Ph.D., P.Eng., M. ASCE,
Polytechnique Montreal, Montreal, Canada

Roberto de Moraes, M. ASCE, AECOM, Oakland, CA

ASCE CTA LIAISON:
David Kerins, P.E., F. ASCE, The Woodlands, TX

ASD EXCOM REPRESENTATIVE:
Olga Bannova, Ph.D., Lic. Eng., M. ASCE, University of Houston, TX

ASCE STAFF:
Debi Denney, Director of Sustainability and Technical Advancement
Brian Sien, Senior Manager, Professional & Technical Advancement

THANK YOU TO OUR

SPONSORS

PLATINUM



GOLD



BRONZE



ASCE EARTH & SPACE 2024

RECEPTION

Tuesday, April 16, 2024
5:30 p.m. - 7:30 p.m.
Kovens Center Terrace

ASCE Earth & Space 2024 will host a reception for Conference attendees in the evening of Tuesday, April 16, 2024. The reception will take place on the Kovens Center Terrace overlooking the beautiful breathtaking views of Biscayne Bay between the hours of 5:30 pm and 7:30 pm.

A buffet and a variety of alcoholic and non-alcoholic drinks will be provided.

CONFERENCE AT A

GLANCE | MONDAY

MONDAY, 15, 2024			
8:00	Pre-conference Short Course Check-in and Light Breakfast		
8:45 - 17:40	<p style="text-align: center;">Pre-Conference Short Course on “LUNAR GEOTECHNICS AND FOUNDATION DESIGN”</p> <p style="text-align: center;">Time: 8:45 - 16:45 Room 117</p> <p style="text-align: center;">For more details, see conference website at: https://earthspace2024.fiu.edu/short-course/</p>		
17:40	BREAK		
18:00	<p style="text-align: center;">ASCE ASD Advanced Materials And Structures Technical Committee Room 124 6pm - 7pm</p>	<p style="text-align: center;">ASCE ASD Dynamics And Controls Technical Committee Room 126 7pm - 8pm</p>	<p style="text-align: center;">ASCE ASD Regolith Operations, Mobility And Robotics Technical Committee Room 128 6pm - 7pm</p>
(For more committee meetings, see Wednesday evening)			

GLANCE | TUESDAY

TUESDAY, APRIL 16, 2024						
8:00	Check-in, Registration, Light Breakfast					
8:30	Welcome and Opening Remarks - By Conference Chairs Bayview Ballroom 214					
8:45	Plenary - Mark Hilburger, Ph.D., NASA Headquarters, Washington, D.C. Bayview Ballroom 214					
9:45	ASCE ASD Overview - Olga Bannova, Ph.D., M.ASCE, University of Houston, TX					
10:00	COFFEE BREAK					
10:20 - 12:00	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 4	SYMPOSIUM 5	
	Low gravitational particulate structures, interactions and particulate mechanics	Robotic Mobility, Navigation and Enabling Technologies	Design and Construction of Structures in Extreme Terrestrial and Extraterrestrial Environments	Specialized Sensors-based Structural Damage Detection and Health Monitoring	Design and Analysis of Habitat Structures and Facilities on the Moon and Mars	Journal of Aerospace Engineering Meeting
	Room 124	Room 114	Room 126	Room 128	Room 117	Room 115
12:00 - 13:20	LUNCH BREAK (Lunch provided)					
	Special Presentation (60 Minutes):	"ASCE ASD Lunar Infrastructure Engineering, Design, Analysis, and Construction Guidelines Initiatives"		Ramesh B. Malla, Ph.D., F. ASCE, F. EMI, A.F. AIAA (Chair- Overview); Ramiro Besada & Naveen K. Muthumanickam, Ph.D. (Construction and Materials); Alexander M. Jablonksi, Ph.D., P.Eng. (Environmental Considerations); Pooneh Maghoul, Ph.D. & Roberto de Moraes (Geotechnical and Foundation Engineering); Ian Jehn, P.E. & Nerma Caluk, Ph.D. (Structural Design Loads); and Olga Bannova, Ph.D. & Sudarshan Krishnan, Ph.D. (Structural Design, Analysis and Architecture)		
13:20 - 15:20	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 5	SYMPOSIUM 5	
	The Physics of Regolith I: Mechanics, Heat, and Volatiles	In Situ Resource Utilization	Composite Materials for Aerospace	Lunar and Martian Habitats and Infrastructure: Design Considerations and Construction Challenges	Inflatable and Deployable Structures: Applications for Space and Planetary Environments	Speaker Practice
	Room 124	Room 114	Room 126	Room 115	Room 117	Room 110
15:20	COFFEE BREAK					
15:40 - 17:40	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 5	SYMPOSIUM 5		
	The Physics of Regolith II: Mechanics, Heat, and Volatiles	Technologies and Approaches to Planetary Drilling and Sampling	Engineering, Construction, and Materials Concepts for Resilient Deep Space (Lunar and Martian) Infrastructure	Lunar and Martian Geotechnics and Foundation Design		Speaker Practice
	Room 124	Room 114	Room 115	Room 117		Room 110
Opening Reception, Kovens Center Terrace 5:30pm - 7:30 pm						

GLANCE | WEDNESDAY

WEDNESDAY, APRIL 17, 2024							
8:00	Check-in, Registration, Light Breakfast						
8:30	Welcome and Opening Remarks - By Conference Chairs Bayview Ballroom 214						
8:45	Plenary - Bonnie Dunbar, Ph.D. - Texas A&M University, College Station, TX Bayview Ballroom 214						
9:45	ASCE CTA Overview - Robert Goldberg, Ph.D., F. ASCE, NASA Glenn Research Center, Cleveland, OH						
10:00	COFFEE BREAK						
10:20 - 12:00	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 4	SYMPOSIUM 5	ALL SYMPOSIA	
	Regolith Simulants I	Space Construction, Habitats and Structures	Coastal Resilience Under Extreme Weather Conditions	Structures under Extreme Environments: Theory and Applications	Architecture on the Moon and Mars: Designing for Human Space Exploration	Student Paper Finalists I	Speaker Practice
	Room 124	Room 114	Room 126	Room 128	Room 117	Room 115	Room 110
12:00 - 13:20	AWARDS LUNCHEON (Lunch provided)						
13:20 - 15:20	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 4	SYMPOSIUM 5	ALL SYMPOSIA	
	Regolith Simulants II	Planetary Drilling and Mining	Advanced and Alternative Cementitious Materials	Tensegrity – Concepts and Applications in Challenging Environments	Engineering & Construction of Lunar and Martian Infrastructure Utilizing In-Situ Materials	Student Paper Finalists II	Speaker Practice
	Room 124	Room 114	Room 126	Room 128	Room 117	Room 115	Room 110
15:20	COFFEE BREAK						
15:40 - 17:40	SYMPOSIUM 2	SYMPOSIUM 4	SYMPOSIUM 5	SYMPOSIUM 5	ALL SYMPOSIA		
	Space Mining	Applications of Artificial Intelligence and Machine Learning for Earth and Space Systems	Terrestrial, Lunar, and Martian Spaceports – Landing and Launching Pads and Supporting Infrastructure	Manufacturing, Development, and Modeling for ISRU-oriented Infrastructure Materials and Construction Technologies on the Moon and Mars	Student Paper Finalists III		Speaker Practice
	Room 114	Room 128	Room 117	Room 124	Room 115		Room 110
18:00	ASCE ASD Space Engineering and Construction Technical Committee Room 117 6pm - 8pm					ASCE Executive Committee Meeting Room 110 5:40 pm - 6:40 pm	

(FOR MORE COMMITTEE MEETINGS, SEE MONDAY EVENING)

GLANCE | THURSDAY

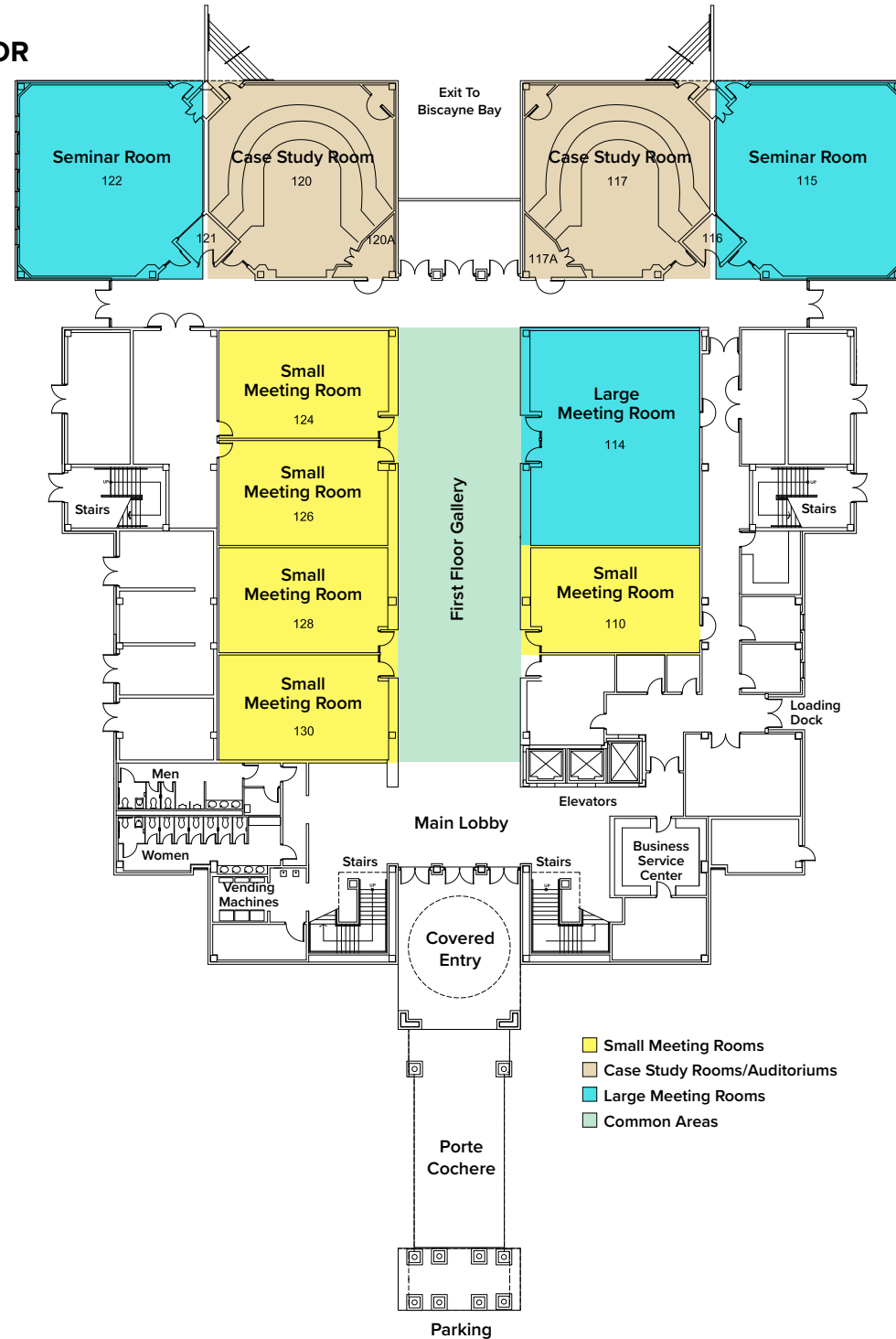
THURSDAY, APRIL 18, 2024						
8:00	Check-in, Registration, Light Breakfast					
8:30	Welcome and Opening Remarks - By Conference Chairs Bayview Ballroom 214					
8:45	Plenary - Peter Weiss, Ph.D. - Spartan Space, Marseille, France Bayview Ballroom 214					
9:45	Student Paper Award Ceremony					
10:00	COFFEE BREAK					
10:20 - 12:00	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 5	SYMPOSIUM 5	
	Modeling Methods for Regolith	Mission Concepts: Resource Prospecting, Instruments and Enabling Technologies	Architected Materials for Terrestrial and Extraterrestrial Structural Applications	Building Information Modeling (BIM): digital representation of physical and functional characteristics of space facilities	3D Printing Applications for Lunar and Martian Construction	
	Room 124	Room 114	Room 126	Room 117	Room 115	
12:00 - 13:20	LUNCH BREAK (Lunch provided)					
	Special Presentations (50 minutes):	“Future World Vision” by Jerry Buckwalter, Reston, VA (25 min) &		“Innovation through the lens of regolith-polymer composites for lunar construction” by Nathan Gelino, NASA Kennedy Space Center, FL (25 min)		
13:20 - 15:20	SYMPOSIUM 1	SYMPOSIUM 3	SYMPOSIUM 5	SYMPOSIUM 5		
	Rocket Exhaust Interactions with Regolith	Ballistic Impact and Crashworthiness of Aerospace Structures	Engineering Aspects for NASA’s Moon to Mars Architecture and other International Programs	Robotic Construction and Outfitting Advancements to Support Functional Buildings and Infrastructure in Earth, Moon and Beyond		
	Room 124	Room 126	Room 117	Room 115		

FLOOR PLANS

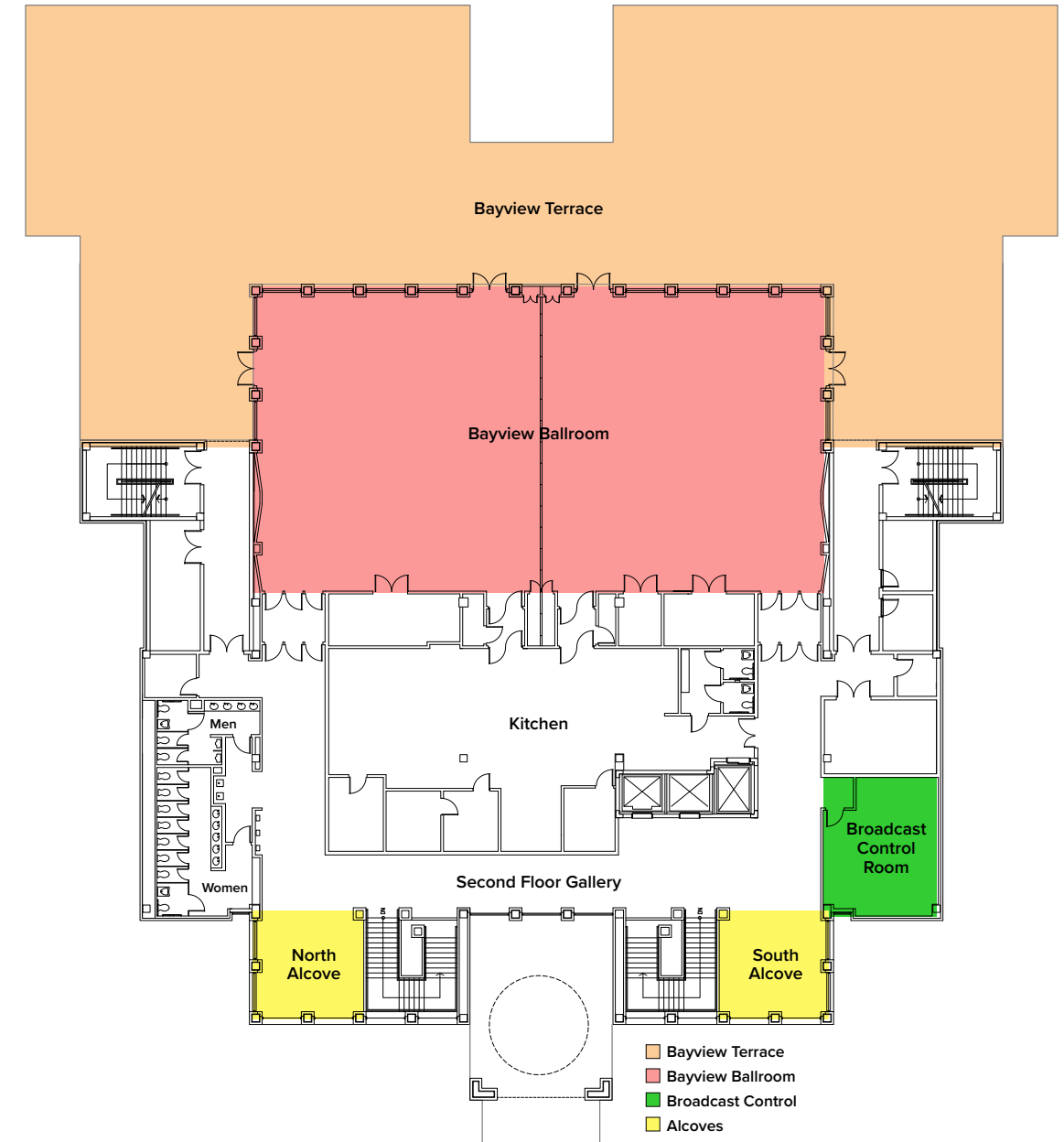
VENUE

Roz and Cal Kovens Conference Center
 Florida International University
 Biscayne Bay Campus
 3000 N.E. 151st Street
 North Miami, FL 33181-3000

FIRST FLOOR



SECOND FLOOR



PRE-CONFERENCE SHORT COURSE | MONDAY

COURSE TITLE	LUNAR GEOTECHNICS AND FOUNDATION DESIGN
Organized By	<ul style="list-style-type: none"> Pooneh Maghoul, Ph.D., PEng, M. ASCE, Associate Professor, Polytechnique Montréal, Montreal, QC, Canada Roberto de Moraes, PEng, M. ASCE, Geotechnical and Underground Excavation Senior Advisor, AECOM, Oakland, CA, USA
Sponsored By	Aerospace Division (ASD), American Society of Civil Engineers (ASCE)
Location	Roz and Cal Kovens Conference Center, Room 117 Florida International University Biscayne Bay Campus
Date and Time	Monday, April 15, 2023; 9 AM – 5 PM (U.S. Eastern time)
Duration	Net 6.5 hours (8:45 AM – 4:45 PM, including 1 hour lunch break and two 15-minute breaks)
Professional Development Credit	6.5 PDHs by ASCE

Brief Description: This short course is designed for engineers and researchers who work on and have interest in, various aspects of construction, structural and geotechnical design of infrastructure on the Moon. The morning session of the short course focuses on the basics of soil mechanics and foundation design in low gravity conditions. We will overview the theories and discuss the more important aspects to be considered in the foundation design of lunar infrastructure such as launching/landing pads, roads, lunar habitat, and lunar solar power towers. In the afternoon session, you will learn about the practical aspects for the geotechnical design such as site investigation, field testing using geophysics and geology rover equipped with geotechnical investigation tools, slope stability, excavation, and geotechnical seismic design. Several case studies based on our state-of-the-art knowledge will be discussed.

SHORT COURSE PROGRAM SCHEDULE			
Time (EST)	Topic	Instructor	
8:00 am	Check-in and breakfast		
8:45 am	Welcome and Short Course Introduction	<ul style="list-style-type: none"> Ramesh B. Malla, Ph.D., F. ASCE, F. EMI, A.F. AIAA; Professor, University of Connecticut, Storrs, CT, USA <i>(Honorary Chair, ASCE Earth & Space 2024 Conference and Chair, Space Engineering and Construction Technical Committee, ASCE Aerospace Division)</i> 	
9:00 am	Introduction to Foundation Design on the Moon	<ul style="list-style-type: none"> Pooneh Maghoul, Ph.D., P.Eng., Associate Professor, Polytechnique Montréal, Montreal, QC, Canada Randy States, P.E., M. ASCE, Geotechnical Consultant, CT, USA 	
10:00 am	BREAK		
10:15 am	Excavation and Regolith Work on the Moon	<ul style="list-style-type: none"> Nathan Gelino, Principal Investigator, NASA, Kennedy Space Center, Merritt Island, FL, USA Rob Mueller, Senior Technologist, NASA, Kennedy Space Center, Merritt Island, FL, USA 	
11:15 am	Site Investigations & Site Preparation for First Lunar Base Camps	<ul style="list-style-type: none"> Christopher Dreyer, Ph.D., Professor of Practice, Colorado School of Mine, Golden, CO, USA Matthew Waterman, Manager of Engineering Geology, Bechtel Corp., Reston, VA, USA 	
12:15 pm	LUNCH BREAK		
1:15 pm	Techniques and Equipment for Geotechnical Developments on the Moon	<ul style="list-style-type: none"> Robert C. Anderson, Ph.D., Group Supervisor & Research Scientist, NASA JPL, Pasadena, CA, USA David Slack, Chief Operating Officer, ConeTec, Burnaby, BC, Canada 	
2:15 pm	Geotechnical Aspects of Seismicity on the Moon	<ul style="list-style-type: none"> Dr. Alexander M. Jablonski, P.Eng., M. ASCE, MAE, Carleton University, Ottawa, Ontario, Canada Pooneh Maghoul, Ph.D., P.Eng., Associate Professor, Polytechnique Montréal, Montreal, QC, Canada 	
3:15 pm	BREAK		
3:30 pm	Geotechnical and Extreme Surface/Subsurface Temperature Considerations for Lunar Construction	<ul style="list-style-type: none"> Roberto de Moraes, PEng, Geotechnical and Underground Excavation Senior Advisor, AECOM, Oakland, CA, USA Ramesh B. Malla, Ph.D., F. ASCE, F. EMI, A.F. AIAA; Professor, University of Connecticut, Storrs, CT, USA 	
4:45 pm	Concluding Remarks Vote of Thanks & Course Closure	<ul style="list-style-type: none"> Pooneh Maghoul, Ph.D., P.Eng. and Roberto de Moraes, PEng, <i>(Short Course Organizers)</i> Ramesh B. Malla, Ph.D., F. ASCE, F. EMI, A.F. AIAA; <i>(Honorary Chair, ASCE Earth & Space 2024 Conference and Chair, ASCE ASD Space Engineering and Construction Technical Committee)</i> 	
18:00	ASCE ASD Advanced Materials And Structures Technical Committee Room 124 6pm - 7pm	ASCE ASD Dynamics And Controls Technical Committee Room 126 7pm - 8pm	ASCE ASD Regolith Operations, Mobility And Robotics Technical Committee Room 128 6pm - 7pm

(For more committee meetings, see Wednesday evening)

PLENARY SPEAKERS



DR. MARK HILBURGER
NASA Principal Technologist for Structures and Materials

Dr. Mark W. Hilburger was appointed Space Technology Mission Directorate (STMD) Principal Technologist (PT) for Structures, Materials, and Construction at NASA HQ in 2019. His roles and responsibilities include identifying technology needs and developing technology investment plans across his assigned discipline areas in coordination with NASA Exploration Programs and Mission Directorates. He is currently focused on developing capabilities for the autonomous excavation, construction, and outfitting of lunar infrastructure, and includes investments across the entire TRL pipeline, and in collaboration with US industry, academia, and OGA. Specific emphasis on early lunar infrastructure and technology demonstrations that will lead to a permanent lunar presence and robust industry-led economy.

Dr. Hilburger has over 25 years of experience in the field of structural mechanics and materials and specializes in the development and implementation of High-Fidelity Structural Analysis and Design Technology, Advanced Experimental Methods, and Design Criteria for Aerospace Structures. He has been presented with numerous awards and including the 2018 Middle Career Stellar Award presented by The Rotary National Award for Space Achievement; the NASA Exceptional Engineering Achievement Medal, 2010; selected as one of the nation's top 100 young engineers and scientist by the National Academy of Engineering, 2009; and the NASA Silver Snoopy Award, (Astronauts' Personal Achievement Award), 2006. He received his M.S.E. and Ph.D. in Aerospace Engineering from the University of Michigan in Ann Arbor, MI in 1995 and 1998, respectively, and his B.S. in Mechanical Engineering from Rutgers University in New Brunswick, NJ in 1993.

Dr. Hilburger's presentation is entitled "Envisioned Future for Lunar Infrastructure."



DR. BONNIE DUNBAR
Non-resident Fellow, Baker Institute Space Policy Program
Professor, Texas A&M University

Professor Bonnie J. Dunbar, Ph.D. NAE holds the John and Bea Slattery Chair in Aerospace Engineering at Texas A&M University where she directs the Aerospace Human Systems Laboratory (AHSL). She is also a retired NASA astronaut, having flown five prior missions on the Space Shuttle, two of them to the Russian Space Station, MIR. Dunbar previously was a Professor in the Mechanical Engineering Department at the University of Houston where she oversaw the growth of the MS program in Aerospace, and was Director of the SICSA program in Space Architecture. She also provided leadership in the development of a new science, technology, engineering and mathematics (STEM) center. Dr. Dunbar worked for NASA for 27 years as a flight controller and a mission specialist astronaut and then served for seven years as a member of the NASA Senior Executive Service. She was the Johnson Space Center assistant director for university research, deputy director for flight crew operations, associate director for International Space Station mission operations development, and the first NASA headquarters deputy associate administrator for the Office of Life and Microgravity Sciences and Applications (OLMSA). Prior to joining NASA, Dunbar worked for the Rockwell International Space Division Company building Space Shuttle Columbia. After retiring from NASA, Dunbar became

president and CEO of the Museum of Flight in Seattle, developing a new Space Gallery and growing their STEM programs. Dunbar has been awarded the NASA Space Flight Medal five times, the NASA Exceptional Leadership Medal and the NASA Distinguished Service Medal. She is a Fellow of the AIAA, ACerS and Royal Aeronautical Society. She was also elected into the Royal Society of Edinburgh, as well as the National Academy of Engineering. In 2020, she was awarded the national Sigma Xi McGovern Science and Society Medal. Dunbar holds bachelor's and master's degrees in ceramic engineering from the University of Washington and a Ph.D. in mechanical and biomedical engineering from the University of Houston. Dr. Dunbar is a nonresident fellow with Rice University's Baker Institute Space Policy Program.

Dr. Dunbar's talk will highlight importance of integrated design strategies for the development of a sustainable lunar infrastructure and will reflect on her current research work at TAMU that includes microgravity and partial gravity fluid physics, Digital Human Modeling, EVA Spacesuit System Design, and Space Systems Engineering.



DR. PETER WEISS
Founder and CEO of SPARTAN SPACE

Peter has more than 20 years of experience in the management of industrial and research projects in the maritime and space sector. He is the Founder and CEO of SPARTAN-SPACE, a start-up company specializing on the development of underwater and space habitats and platforms. SPARTAN SPACE is involved in the development of the European modules for the GATEWAY and develops, under CNES contract, a concept of a secondary habitat for the lunar surface (EUROHAB). SPARTAN SPACE is part of the selection of start-ups in the TECHNTHEMOON initiative by CNES. The start-up company is also involved in several underwater habitat developments.

During his career he tries to combine his passion for space and the oceans.

Peter worked at the DLR in Oberpfaffenhofen, Germany, on a motor drive of a lightweight robot arm, at the Massachusetts Institute of Technology in Boston, USA, on the development of artificial muscles for self-transforming robotic planetary explorers, at Cybernetix in Marseille, France, as Project Manager for European Commission on underwater robotics and AUV, at the Hong Kong Polytechnic University on a robotic microgravity sampling device for the PHOBOS-GRUNT mission and for over ten years as Director of the Space Department and Company Board member of COMEX in Marseille, France in underwater space simulations and astronaut training. He was Co-Founder and President until 2016 of POWERSEA, a start-up company for the development of connectors for marine renewables.

Peter was awarded in the APOPHIS MISSION DESIGN COMPETITION, organized by NASA, ESA and the PLANETARY SOCIETY. He received the French Medal of Internal Security for the intervention and psychological support of the families of the Germanwings airplane crash in 2015 (as member of the French Red Cross), the OCEANS X SPACE Business Applications Competition prize by European Space Agency in 2018 and a special mention by the Concours Jacques Rougerie International Architecture and Arts prizes in 2020 for the EUROHAB concept.

Dr. Weiss's presentation is entitled "A secondary habitat as potential European contribution to the US ARTEMIS missions – from the point of view of a European start-up."

AEROSPACE DIVISION

AWARD WINNERS

COLUMBIA MEDAL WINNER



JENNIFER HARRIS TROSPER

JPL Fellow, NASA's Jet Propulsion Laboratory, Pasadena, CA

Jennifer Harris Trospen is the Planetary Directorate Chief Engineer leading JPL's Strategic Imperative for project performance improvements. She served as the Integrated Systems Engineering Manager for the Psyche mission from October 2022 – October 2023. Prior to her most recent assignments, Jennifer was the Project Manager (PM) for NASA's Mars 2020 Perseverance rover. In the thirty years since her initial hiring at the Jet Propulsion Laboratory, Ms. Trospen has held critical engineering leadership roles on every spacecraft ever to have roved the surface of Mars. Her leadership roles include Project Manager (PM) for NASA's Mars 2020 Perseverance rover; Mission System Development Manager and Surface Phase Lead after serving as Project System

Engineer and Engineering Technical Authority for the Perseverance team since 2015; Deputy Project Manager and then Project Manager leading Perseverance and Ingenuity teams post-landing after transitioning to Mars 2020. In her prior roles on JPL missions, Ms. Trospen was the Deputy Project Manager and Mission Manager for the Mars Science Lab (MSL) Curiosity rover. She has provided leadership of systems engineering and operations for the Mars Exploration Rovers, SMAP, Mars 2001 Odyssey, and the Mars Pathfinder missions. She also worked at NASA HQ on robotic exploration mission definition. She has also been a key leader in the infusion of on-board autonomy and state of the art ground operations systems into the JPL Mars rover missions. Jennifer was named a JPL Fellow in 2013.

Ms. Trospen holds a Bachelor's in Aerospace Engineering from the Massachusetts Institute of Technology and a Master of Science degree in the same from the University of Southern California. Raised on a farm in Ohio, inspired by her father's stories of rocket launches he saw as a member of the Army Corps of Engineers, Ms. Trospen, together with her husband, Air Force Lt. Col. (Ret) Randy Trospen resides in Southern California. They have four children.



COLUMBIA MEDAL AWARD WINNER

JENNIFER TROSPER – NASA Jet Propulsion Laboratory, Pasadena, CA

JOURNAL OF AEROSPACE ENGINEERING

2022 BEST PAPER AWARD

ASENG-3774, "A 3D-Printing Centered Approach to Mars Habitat Architecture and Fabrication" by Matthew Troemner, Elham Ramyar, Jonathan Meehan, Benton Johnson, Nima Goudarzi and Gianluca Cusatis (Northwestern Univ., USA; Owings & Merrill LLP, USA)

2022 HONORABLE MENTION: ASENS-3997 "Rate-Dependent Fracture Behavior of Aerospace Epoxies: PR-520 and 3502" by Emily Pittman, Stylianos Koumlis, Htet Naing Aung, Amanda Bellafatto and Leslie Lamberson (Colorado School of Mines, USA; Drexel University, USA)

2023 BEST PAPER AWARD: ASENS-4770 "Mechanical and Thermal Properties of Phase Change Aerated Concrete with Paraffin Microcapsule" by Jing Sun, Wenting Shang and An Chen (Beijing Jiaotong Univ., China; Shanghai Electric Power Generation Environment Protection Engineering Co., Ltd., China)

2023 HONORABLE MENTION: ASENS-4485 "Regolith-Based Polymer Matrix Composites for In Situ Material Creation for Long-Term Extraterrestrial Missions" by Christopher Matetich and Jessica Vold (North Dakota State Univ., USA)



2022 OUTSTANDING TECHNICAL CONTRIBUTION AWARD

Juan H. Agui, NASA Glenn Research Center, Cleveland, OH

2022 OUTSTANDING PROFESSIONAL SERVICE AWARD

Christopher Dreyer, Ph.D., Colorado School of Mines, Golden, CO

2023 OUTSTANDING TECHNICAL CONTRIBUTION AWARD

Paul van Susante, Michigan Technological University, Houghton, MI

2023 OUTSTANDING PROFESSIONAL SERVICE AWARD

Justin Littell, Ph.D., NASA Langley Research Center, Hampton, VA



SCHEDULE | TUESDAY

TUESDAY, APRIL 16, 2024						
8:00	Check-in, Registration, Light Breakfast					
8:30	Welcome and Opening Remarks - By Conference Chairs Bayview Ballroom 214					
8:45	Plenary Lecture: <i>Envisioned Future for Lunar Infrastructure</i> - by Mark Hilburger, Ph.D., NASA Headquarters, Washington, D.C. Bayview Ballroom 214					
9:45	ASCE ASD Overview - Olga Bannova, Ph.D., M.ASCE, University of Houston, TX					
10:00	COFFEE BREAK					
	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 4	SYMPOSIUM 5	
Session Title:	Low gravitational particulate structures, interactions and particulate mechanics	Robotic Mobility, Navigation and Enabling Technologies	Design and Construction of Structures in Extreme Terrestrial and Extraterrestrial Environments	Specialized Sensors-based Structural Damage Detection and Health Monitoring	Design and Analysis of Habitat Structures and Facilities on the Moon and Mars	
Session Co-Chairs:	S. Joseph Antony, Ph.D (University of Leeds, Leeds, UK) and Phil Metzger, Ph.D. (Florida Space Institute, University of Central Florida, Orlando, FL)	Colin Creager (NASA Glenn Research Center, Cleveland, OH) and Robert Ambrose, Ph.D. (Texas A&M University, College Station, TX)	Sudarshan Krishnan, Ph.D. (University of Illinois at Urbana-Champaign, IL) and Nilanjan Mitra, Ph.D. (Johns Hopkins University, Baltimore, MD)	Gangbing Song, Ph.D. (University of Houston, Houston, TX) and T. Tafsirojjaman, Ph.D. (The University of Adelaide, Adelaide, Australia)	Ramesh B. Malla, Ph.D., F. ASCE (University of Connecticut, Storrs, CT) and Juan H. Agui, Ph.D. (NASA Glenn Research Center, Cleveland, OH)	
	Room 124	Room 114	Room 126	Room 128	Room 117	Room 115
10:20	9976 Dilatancy phenomenon in fine soils - Microstructural considerations <i>by Mahdia Hattab, Dan Zhao, Qian-Feng Gao, Fares Bennai and Pierre-Yves Hicher</i>	100 The Development and Characterization of the Shape Memory Alloy Spring Tire for Mars <i>by Colin Creager, Santo Padula, Vivake Asnani, Heather Oravec, John Breckenridge, Jim Benzing and Paria Naghipour</i>	5715 Decentralized Earth Housing system derived from Space habitats design <i>by Samer El Sayary</i>	8521 Detection of Crack Propagation of Reinforced Three-Point Bending Beams Using Smart Aggregate Transducers Enabled Time Reversal Method <i>by Lingzhu Zhou, Yu Zheng, Gangbing Song and Lifei Zhang</i>	902 Design, Analysis, and Implementation of Modular Blocks for Lunar Habitable Infrastructure <i>by Nerma Caluk and Atorod Azizinamini</i>	Journal of Aerospace Engineering Meeting 10:20am-12:00pm
10:40	2105 Modelling the continuous and staggered granular flows under reduced gravitational environments <i>by S. Joseph Antony, Babatunde Arowosola, Lutz Richter and Tulegen Amanbayev</i>	1647 ISRU Pilot Excavator Wheel Testing in Lunar Regolith Simulant <i>by Liz Zhang, Jason Schuler, Adam Dokos, Yinan Xu, Evan Bell and Thomas Muller</i>	4814 Structural Analysis of Sandbag Topology for Lunar Infrastructure Applications <i>by Yinan Xu, Siva Muniyasamy, Carlos Doe and Jekan Thangavelautham</i>	9129 Quantifying the Impact of Sensor Degradation on Data-Driven Fault Detection Strategies in Resilient Space Habitats <i>by Zixin Wang, Manuel Salmerón, Herta Montoya, Mohammad Jahanshahi and Shirley Dyke</i>	1307 Engineering Design of Lunar Structure Regolith Shielding to Resist Hypervelocity Meteoroid Impacts <i>by Sushrut Vaidya and Ramesh Malla</i>	
11:00	9683 The development of the resonant pulse-elevator for granular materials <i>by Patrick Harkness, Xuan Li, Kevin Worrall, Andrew Scott-George and Bridgette Buss Crawford</i>	1471 A System for Exploring Craters and Shadowed Regions of the Lunar South Pole <i>by Robert Ambrose, Micah Oevermann and Meghali Dravid</i>	5761 Material response at extreme lunar environments <i>by Nilanjan Mitra</i>	5900 Damage Identification of Concrete Structures Using Hybrid Method Based on Piezoelectric Signal <i>by Lei Wang, Lingzhi Ou and Lizhao Dai</i>	9754 Seismic Vulnerability Assessment of Non-Structural Elements Inside an Inflatable Lunar Habitat <i>by Oscar Forero, Julio A. Ramirez and Shirley J. Dyke</i>	
11:20		2991 Real-Time Visual-Inertial Odometry for Planetary Exploration: Preliminary Tests <i>by Junho Gong, Jong-Ho Na, Sungchul Hong, Tae-Hoon Kim and Hyu-Soung Shin</i>	8138 Hot deformation of metallic honeycombs: Mechanisms and modelling <i>by Yuanbo Tang, Yunlan Zhang, Enrique Alabort and Roger Reed</i>	2967 An Edge-Computing-based structural health monitoring system and applications <i>by Peng Zhang, Ran An, Zhengjie He and Liang Ren</i>	6415 Dynamic Response Analysis of Lunar Structures with Regolith Covers <i>by Hamed Seifamiri, Pooneh Maghoul, Roberto de Moraes and Ramesh B. Malla</i>	
11:40		1369 Reverse-Ephemeris Lunar Navigation for NASA and Commercial Exploration <i>by Robert Moses and Michael McBeth</i>	178 A Mesoscale Framework to Model the Deformation Behavior in Metals under Hypervelocity Impact <i>by Ching Chen and Avinash M. Dongare</i>			
12:00	LUNCH BREAK (LUNCH PROVIDED)					

CONTINUED | TUESDAY, APRIL 16, 2024

12:20	<p>Special Presentation (60 Minutes): "ASCE ASD Lunar Infrastructure Engineering, Design, Analysis, and Construction Guidelines Initiatives"</p> <p>by Ramesh B. Malla, Ph.D., F. ASCE, F. EMI, A.F. AIAA (Chair- Overview); Ramiro Besada and Naveen K. Muthumanickam, Ph.D. (Construction and Materials); Alexander M. Jablonski, Ph.D., P.Eng. (Environmental Considerations); Pooneh Maghoul, Ph.D. and Roberto de Moraes (Geotechnical and Foundation Engineering); Ian Jehn, P.E., S.E. and Nerma Caluk, Ph.D. (Structural Design Loads); and Olga Bannova, Ph.D. and Sudarshan Krishnan, Ph.D. (Structural Design, Analysis and Architecture)</p>					
	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 5	SYMPOSIUM 5	
Session Title:	The Physics of Regolith I: Mechanics, Heat, and Volatiles	In Situ Resource Utilization	Composite Materials for Aerospace	Lunar and Martian Habitats and Infrastructure: Design Considerations and Construction Challenges	Inflatable and Deployable Structures: Applications for Space and Planetary Environments	
Session Co-Chairs:	Mahdia Hattab, Ph.D. (University of Lorraine, France) and Siddharth Parida, Ph.D. (Embry-Riddle Aeronautical University)	Gerald "Jerry" Sanders (NASA Johnson Space Center, Houston, TX) and Joey Palmowski (Honeybee Robotics, Altadena, CA)	Mike Fiske, Ph.D. (Jacobs Engineering/NASA Marshall Space Flight Center Huntsville, AL) and Jialai Wang, Ph.D. (The University of Alabama, Tuscaloosa, AL)	Alexander M. Jablonski, Ph.D., P.Eng. (Carleton University, Ottawa, Canada) and Melissa Sampson, Ph.D. (Lockheed Martin Commercial Civil Space, Littleton, CO)	Sudarshan Krishnan, Ph.D. (University of Illinois at Urbana-Champaign, Urbana, IL) and Pezhman Mardanpour, Ph.D. (Florida International University, Miami, FL)	
	Room 124	Room 114	Room 126	Room 115	Room 117	Room 110
13:20	349 Experimental Study on the Effects of Severe Lunar Conditions on Physical and Mechanical Properties of Lunar Construction Materials <i>by Aina Narvasa, Marta Miletic, Elisa Torresani and Douglas Cortes</i>	2056 Improvements in Testing of Microwave Sintering Technology <i>by Alexander Madison and Julie Brisset</i>	1267 In-plane Elasto-plastic characterization of 3K70PW Carbon Fabric/INF14 for MAT 213 material model <i>by Suresh Keshavanarayana, Shritha Jagadheeswaran and Ganesh Neta Yerram</i>	9178 Impact of Recent Lunar Missions on the Understanding of Lunar Environments <i>by Alexander Jablonski and Kin F. Man</i>	1945 Stability and Kinematics of Deployable Space Structures made of Scissor Linkages <i>by Sudarshan Krishnan</i>	
13:40	1873 Ice is Hot! Sintering of Ice on the Moon <i>by Daniel Johnson and Christopher Dreyer</i>	2498 Magnetic Separation of Lunar Regolith Simulants with Applications to In-Situ Resource Utilization on the Moon <i>by Peter Bachle, Charles Wood, Jack Vortmeier, Rachel Adcock, Matthew Sherman, Jeffrey Smith, Fateme Rezaei, David Bayless, William Schonberg and Daoru Han</i>	7129 A Rational Approach to Building Cohesive Zone Model for Use in Modeling Impact Analysis <i>by Mohammed Raihan, Ashutosh Maurya and Subramaniam Rajan</i>	5212 Design Approaches for Lunar Missions: Uncertainties, Risk, and Challenges in Applying Earth-based Practices <i>by Roberto De Moraes</i>	3838 Kresling Origami-inspired Structures: Exploring Structure Types, Applications, Properties, and Analysis Methods <i>by Hadi Ebrahimi Fakhari, Mojtaba Moshtaghzadeh and Pezhman Mardanpour</i>	Speaker Practice
14:00	2634 An experimental study of the influence of particle size heterogeneity on seismic wave velocities <i>by Jules Marti, Santiago Quinteros, Dylan Mikesell, Ludovic Margerin, Pierre Delage and Naomi Murdoch</i>	2547 Exploring Lunar Simulant-Based Geopolymers for Sustainable Space Construction: Mechanical Properties and Dynamic Analysis. <i>by Akm Rahman and Nikhil Gupta</i>	2401 Calculation of Stress Intensity Factors for a multiple crack-hole interaction problem <i>by Asif Khawaja and Wieslaw Binienda</i>	5678 Lunar Lava Tubes for Segmented Base Architectures on the Moon <i>by Claire Pedersen, Aleksandar Antonic, Farah Alqaraghuli, Riley Mayes and Jekan Thangavelautham</i>	5097 Fatigue Life Optimization and Design of a Reconfigurable Cylindrical Origami-Inspired Structure with Miura-Ori Pattern <i>by Hadi Ebrahimi Fakhari, Mojtaba Moshtaghzadeh and Pezhman Mardanpour</i>	
14:20		6962 Extraction of silica and alumina from lunar highland simulant <i>by Bertrand Thibodeau, Alex Ellery and Xavier Walls</i>	4678 Advancements in the Characterization and Utilization of the MAT 213 Composite Dynamic Model <i>by Robert Goldberg and Trenton Ricks</i>	6224 Off-World Surgical Room Construction: Minimal Design Criteria for Operating/Procedure Rooms in Off-World Environments <i>by Sean Mulholland</i>		
14:40		7061 Laboratory Demonstration of Aluminium Metal Extraction from a Lunar Highland Simulant using Electrochemistry <i>by Xavier Walls, Alex Ellery, Priti Wanjara and Katherine Marczenko</i>	4728 Multi-Scale Experimental Characterization for LS-DYNA MAT213 Modeling of Composite Structures under High Strain Rate <i>by Jakob Black, Robert Goldberg, Trenton Ricks, Troy Lyons and Han-Gyu Kim</i>	4185 Defining Space Infrastructure <i>by Eric Wilson</i>		
15:00		9939 The Grind Begins Here – Criticality of Physical Pre-processing for Sophisticated In-Situ Resource Utilisation on the Moon <i>by Satinder Shergill, Alex Ellery and Jenny Kingston</i>	1561 Characterization of Post-peak stress degradation of 3K70PW Carbon Fabric/INF14 for MAT 213 material model <i>by Suresh Keshavanarayana, Ganesh Neta Yerram and Shritha Jagadheeswaran</i>			
15:20	COFFEE BREAK					

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	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 5	SYMPOSIUM 5			
Session Title:	The Physics of Regolith II: Mechanics, Heat, and Volatiles	Technologies and Approaches to Planetary Drilling and Sampling	Engineering, Construction, and Materials Concepts for Resilient Deep Space (Lunar and Martian) Infrastructure	Lunar and Martian Geotechnics and Foundation Design			
Session Co-Chairs:	Anil Misra, Ph.D., P.E., F. ASCE (Florida International University, Miami, FL) and Adrienne Dove, Ph.D. (Florida Space Institute, University of Central Florida, Orlando, FL)	Brian Glass (NASA Ames Research Center, Mountain View CA) and Kris Zacny (Honeybee Robotics, Altadena, CA)	Jibu Abraham (JHU Applied Physics Laboratory-APL, Laurel, MD) and Gerald "Jerry" Sanders, Ph.D. (NASA Johnson Space Center, Houston, TX)	Pooneh Maghoul, Ph.D. (Polytechnique Montréal QC, Canada) and Roberto de Moraes, P.Eng. (AECOM, Oakland, CA)			
	Room 124	Room 114	Room 115	Room 117			Room 110
15:40	4699 A Framework for Application of Conditional Graphical Neural Network (cGAN) on Optimal Coordination for 3D-Printed Concrete in Extraterrestrial Environments <i>by Duy Hoang Pham, Hyosoo Moon and Yonghan Ahn</i>	9384 Development of Trident Drill for Ice Mining on the Moon with NASA Prime1 and Viper Missions <i>by Kris Zacny, Phil Chu, Vince Vendiola, Paul Creekmore, Phil Ng, Samuel Goldman, Emily Seto, Kathryn Bywaters, Ezra Bailey, Raymond Zheng, Isabel King, Ashkan Rashedi, Paul Chow, Robert Huddleston, Gale Paulsen, Alex Wang, Jack Wilson, Jackie Quinn, Amy Eichenbaum, Janine Captain, Julie Kleinhenz, Erin Rezich, Darlene Lim, Zara Mirmalek, David Lees, Richard Elphic, Kimberley Ennico Smith and Anthony Colaprete</i>	4164 Control Towers as Navigation Beacons for Lunar Surface Construction Operations <i>by Sivaperuman Muniyasamy, Athip Thirupathi Raj, Min Kang and Jekan Thangavelautham</i>	1501 Preliminary analysis of regolith-foundation-structure interactions <i>by Tomasz Adach, Thomas Dylan Mikesell, Samuel Ximenes, Miranda Fateri and Aidan Cowley</i>			
16:00	6722 Exploring the Potential of Casting Lunar Regolith Simulants into Durable Materials <i>by Kyla Edison and Kevin Cannon</i>	1334 TRIDENT Drill Validation Testing in Haughton Crater, Devon Island, Canada <i>by Brian Glass, Carter Fortuin, Thomas Stucky, Isabel King and Hashem Battah</i>	2560 The Role of Earth Anchors in Space (Space Anchor) <i>by Hamed Niroumand and Lech Balachowski</i>	3518 Compaction testing on lunar highland simulant using a vibrating drum roller <i>by Akshay Kumar Agarwal, Mark Jaksa, Brendan Scott and Yien Lik Kuo</i>			
16:20	8966 Investigating the physical and spectral properties of icy lunar regolith for exploration and excavation <i>by Luke Griffiths, Taeheon Kim, Benjamin Lange, Diana Alves de Silva, Santiago Quinteros and Dylan Mikesell</i>	1128 Drilling for Lunar Surface Exploration and Shear Strength Evaluation Based on Drilling Information <i>by Byunghyun Ryu, Jangguen Lee and Jin HyunWoo</i>	6357 An ontology to represent and combine multi-disciplinary design knowledge for lunar habitat design, deployment, and maintenance <i>by Arne Martensen and Timo Hartmann</i>	9136 Preliminary Guidelines for Geotechnical Site Investigation and Site Preparation for Construction of Lunar infrastructure <i>by Pooneh Maghoul, Roberto de Moraes, Nathan Gelino, Peter Carrato, Matthew Waterman and Ramesh B. Malla</i>			Speaker Practice
16:40	9333 Radiation Dissipation Capacity of Lunar Regolith Simulants for Efficient GCR and SPE Protection for Planetary Construction <i>by Kaitlin Roberts, Jake Branham, Meghan Quadrino, Reza Aashtiani and Joel Sloan</i>	7493 Optimization of bio-inspired drill design for lunar exploration <i>by Liang Zhang, Lei Wang, Quan Sun, Qiushi Chen and Jesus Badal</i>	1674 Filtration Challenges and Approaches for Space-based Oxygen Recovery Systems <i>by Gordon Berger and Juan Agui</i>	9744 Crushing Potential of Lunar Regolith Simulants: Implications for Strength Degradation <i>by Reza S. Ashtiani and Jesus Baca</i>			
17:00			6075 Spacecraft Filtration Investigations in NASA's Specialized Analog Filter Test Stands <i>by Juan Agui, Gordon Berger and R. Vijayakumar</i>	8191 Towards Ground Motion Estimation Model Development for Mars <i>by Dewan Mohammad Enamul Haque, Suniti Karunatilake and Juan M Lorenzo</i>			
17:20				4328 Bearing capacity estimation in nonlinear granular deposits under reduced gravity field: lunar applications <i>by Reza Jamshidi Chenari and Pooneh Maghoul</i>			
Opening Reception, Kovens Center Terrace 5:30 pm - 7:30 pm							

SCHEDULE | WEDNESDAY

WEDNESDAY, APRIL 17, 2024						
8:00	Check-in, Registration, Light Breakfast					
8:30	Welcome and Opening Remarks - By Conference Chairs Bayview Ballroom 214					
8:45	Plenary - Bonnie Dunbar, Ph.D. - Texas A&M University, College Station, TX Bayview Ballroom 214					
9:45	ASCE CTA Overview - Robert Goldberg, Ph.D., F. ASCE, NASA Glenn Research Center, Cleveland, OH					
10:00	COFFEE BREAK					
	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 4	SYMPOSIUM 5	ALL SYMPOSIA
Session Title:	Regolith Simulants I	Space Construction, Habitats and Structures	Coastal Resilience Under Extreme Weather Conditions	Structures under Extreme Environments: Theory and Applications	Architecture on the Moon and Mars: Designing for Human Space Exploration	Student Paper Finalists I
Session Co-Chairs:	Jason Schuler (NASA Kennedy Space Center, FL) and Seung Jae Lee (Florida International University, FL)	Nathan Gelino (NASA Kennedy Space Center, FL) and Mark Hilburger (NASA Headquarters, Washington DC)	Landolf Rhode-Barbarigos, Ph.D. (University of Miami, Coral Gables, FL) and Othman Oudghiri-Idrissi, Ph.D. (University of Michigan, Ann Arbor, MI)	Wei Zhang, Ph.D., P.E. (University of Connecticut, Storrs, CT) and Bin Xu, Ph.D. (Huaqiao University, Quanzhou, China)	Olga Bannova, Ph.D., Lic.Eng. (SICSA, University of Houston, Houston, TX) and Romolo S. Capitanio (European Space Agency-ESA, Warmond, Netherlands)	Robert K. Goldberg, Ph.D., F. ASCE (NASA Glenn Research Center, Cleveland, OH) and Krzysztof Skonieczny, Ph.D. (Concordia University, Montreal, Canada)
	Room 124	Room 114	Room 126	Room 128	Room 117	Room 115
10:20	5053 Optimized development of lunar regolith ceramic with reduced content of sodium silicate <i>by Usman Javed and Faiz Shaikh</i>	5694 EUROHAB Secondary Habitat - A potential European contribution to ARTEMIS <i>by Peter Weiss, Makthoum Peer Mohamed, Nisheet Singh and Thibaud Gobert</i>	6632 Aerostructural UAV main rotor optimisation algorithm considering mass and strength limitations <i>by Jakub Kocjan, Stanisław Kachel and Robert Rogólski</i>	4825 Origami Infrastructure: A Viable Solution to Construction for Challenging Environments <i>by Claudia Calle Müller, Alvaro Ballon Bordo and Mohamed Elzomor</i>	891 Moonfiber: Design of a lunar lavatube outpost using regolith-composite fibers <i>by Vittorio Netti, Paolo Mangili, Alessandro Angione, Ivana Fuscello and Isabella Paradiso</i>	3304 A new launch pad failure mode: Analysis of fine particles from the launch of the first Starship orbital test flight <i>by Brandon Dotson, Philip Metzger, Jason Hafner, Autumn Shackelford, Kyra Birkenfeld, Daniel Britt, Kenneth Purvis, Murray Scudder, C. Scott Johnson, John Galloway and Jay DeShetler</i>
10:40	9582 Lightweight Lunar Regolith Simulant for Lunar Regolith Operations Studies <i>by Mehran Pourakbar, Marta Miletic and Douglas Cortes</i>	9698 Advancements in Extraterrestrial Infrastructure Construction using Microwave-Processed Regolith and Minerals <i>by Aleksandra Radlińska, Peter Collins and Sven Bilén</i>	7404 Investigation on the Pressure Distribution of Buildings with Irregular-shape Plans <i>by Manuel Matus and Ioannis Zisis</i>	6906 Livability Index for Residential Homes in a Changing and Extreme Climate Condition <i>by William Hughes, Wei Zhang, Zhiqing Li and Steven Matile</i>	4422 Importance of psychological factors for extraterrestrial base and site planning <i>by Olga Bannova, Sheryl Bishop, James Wise and Sandra Haeuplik-Meusburger</i>	4265 D.N.A. - Designing New Abodes on the Moon: Pioneering the First Permanent Lunar Station <i>by Marta Rossi, Federica Joe Gardella, Mariapia Mammino, Elif Kirmiziyesil, Ebru Nur Yavuz and Valentina Sumini</i>
11:00	6044 Laser particle sizer for lunar-lander dust plumes <i>by Robert Peale, Nagendra Dhakal, Cameron Kelley, Dinidu Hathnagoda, Christian Walker, Phillip Metzger, Chris Fredricksen and Adrienne Dove</i>	6165 APPLICATIONS OF FUNDAMENTAL CONSTRUCTION PLANNING FOR LUNAR BASES <i>by Kyle Foley and Patrick Suermann</i>	8038 Mega Project- Modification of DEZ Dam Power Plant Intake, based on the Spinal Cord Innovation Simulation Design through Submerging of Steel Rings <i>by Afshin Turk, Syed Mahmood Ahmed and Shabnam Ghanavatizadeh</i>	1969 Building shape effect on wind induced torsion, shear, and lift for low-rise structures. <i>by Hrishikesh Dev Sarma and Ioannis Zisis</i>	6560 Exploring multi-directional 3D Printing for Enclosures on Earth and Beyond: Sensitivity Analysis of Buildability <i>by Nusrat Tabassum and José Pinto Duarte</i>	799 Stresses and Deflection of a Lunar Habitat under Extreme Daily Temperature with and without Regolith Cover <i>by Sachin Tripathi and Ramesh B. Malla</i>
11:20	7408 RIDER: A World-Class Facility in Planetary Terramechanics Investigations <i>by Jared Long-Fox, Michael Lucas, Gabriel Blandin, Michael Conroy, Joshua Conway, Abigail Glover, Austin Hacker, Clive Neal and Daniel Britt</i>	7146 Re-evaluation of the Design of Buried Structures as Lunar Habitats under Extraterrestrial Loads <i>by Parisa Haji</i>	3156 A Sustainable and Efficient Structural Solution for Hybrid Coral Reefs <i>by Sandesh Lamsal, Gustavo Aguilar, Peisen Tan, Gerald Clark, Brian Haus and Landolf Rhode-Barbarigos</i>		8003 Analysis of the end-to-end integration strategy for development of planetary surface architectures. <i>by Olga Bannova</i>	9225 Micromechanical and microstructural analysis of lunar concrete <i>by Mohammad Sulaiman Dawood, Peter J. Collins, Aleksandra Radlińska and Robert J. Thomas</i>
11:40		1117 Development of an in-situ sample reception and pre-analysis facility for a secondary habitat on the lunar surface <i>by Peter Weiss, Serge Chevrel, Yves Daydou, Makthoum Peer Mohamed, Nisheet Singh and Thibaud Gobert</i>	3532 Investigating hurricane-induced wind and wave loads through scaled physical testing <i>by Gustavo Aguilar, Sandesh Lamsal, Peisen Tan, Alba Uriarte, Brian Haus and Landolf Rhode-Barbarigos</i>		8639 Towards Resilient Lunar Architecture: A Literature Review of Earth-based Repair Frameworks for Use in Lunar Regolith Construction <i>by Monika Stankiewicz and Amit Srivastava</i>	5867 Thermal and Structural Analysis of Modular Autonomously Assembled Truss Modules for Space and Lunar Surface Applications <i>by Nicholas Gross, Athip Thirupathi Raj and Jekan Thangavelautham</i>
12:00	AWARDS LUNCHEON (LUNCH PROVIDED)					

CONTINUED | WEDNESDAY, APRIL 17, 2024

	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 4	SYMPOSIUM 5	ALL SYMPOSIA	
Session Title:	Regolith Simulants II	Planetary Drilling and Mining	Advanced and Alternative Cementitious Materials	Tensegrity – Concepts and Applications in Challenging Environments	Engineering & Construction of Lunar and Martian Infrastructure Utilizing In-Situ Materials	Student Paper Finalists II	
Session Co-Chairs:	Christopher Dreyer, Ph.D. (Colorado School of Mines) and William O’Hara (Blue Origin, Denver, CO)	Brian Glass (NASA Ames Research Center, Mountain View CA) and Kris Zacny (Honeybee Robotics, Altadena, CA)	Chris Farraro, Ph.D. (University of Florida, Gainesville, FL) and Hongyu "Nick" Zhou, Ph.D. (University of Tennessee, Knoxville, TN)	Landolf Rhode-Barbarigos, Ph.D. (University of Miami, Coral Gables, FL) and Sushrut Vaidya, Ph.D. (University of Connecticut, Storrs, CT)	Melodie Yashar (ICON Technology Inc. Austin, TX) and Tai Sik Lee, Ph.D. (Korea Federation of Science & Technology Societies(KOFST) and Hanyang University, Ansan, Korea)	Robert K. Goldberg, Ph.D., F. ASCE (NASA Glenn Research Center, Cleveland, OH) and Krzysztof Skonieczny, Ph.D. (Concordia University, Montreal, Canada)	
	Room 124	Room 114	Room 126	Room 128	Room 117	Room 115	Room 110
13:20	175 Lunar Regolith and its Potential for Space Construction and Geotechnical Engineering: A Review <i>by Hamed Niroumand, Lech Balachowski and Matthias Sperl</i>	4340 Unoccupied Aerial System Coring Drill Sampler Development for Applications on Earth and Other Planetary Bodies <i>by Colin Chen, Kathryn Bywaters, Kris Zacny, Nicklaus Traeden and Christopher Hamilton</i>	5668 On the Development of Sulfur Concrete as an ISRU-Based Construction Material for Lunar Infrastructure Applications <i>by Ilerioluwa Giwa, Mary Dempsey, Joseph Lamendola, Ali Kazemian and Mike Fiske</i>	5046 Tensegrity - an underexploited structural concept for terrestrial and space applications <i>by Landolf Rhode-Barbarigos</i>	2686 Application of Regolith Polymer Composite Fused Granular Fabrication Construction in Simulated Lunar Conditions <i>by Nathan Gelino, Evan Bell, David Malott, Stephen Pfund, Matt Nugent and Marco Gudino</i>	8998 Behavior of Stuffed Whipple Shields Subjected to Micrometeoroid and Orbital Debris Impact <i>by Md Abdur Rakib, Scott T Smith and T. Tafsirojjaman</i>	
13:40	651 Selection of a Lunar highland simulant for the Luna Analogue Facility (ESA, EAC): A fine-particle testbed <i>by Aliz Zemeny and Kamini Manick</i>	192 Sublimation of water vapor from icy lunar drill cuttings <i>by Philip Metzger</i>	7067 3D printed geopolymer concrete made of lunar regolith simulant for use in space construction <i>by Ehsan Mohseni, Peyman Zandifaez and Hongyu Zhou</i>	530 The optimal dynamical model for 3D tensegrity morphing airfoils <i>by Muhao Chen, Yuling Shen and Robert E. Skelton</i>	7222 Topological Interlocking Bricks for Habitat Construction in Extraterrestrial Environment <i>by Maëlle Mathieu, Parisa Haji Abdulrazagh, Alexander Jablonski and Pooneh Maghoul</i>	6672 On a Nonlinear, Locally Resonant Metamaterial With Topological Features <i>by Arun Malla, Joshua LeGrande and Oumar Barry</i>	
14:00	3610 Densification Kinetics of Synthetic Lunar Regolith Using Optical Dilatometry <i>by Joseph Naikeng Wang, Jonathan Lapeyre and Jeffrey Bullard</i>	7667 RedWater: Water Mining System for Mars <i>by Joey Palmowski, Kris Zacny, Bolek Mellerowicz, Bernice Yen, Jack Schultz and Kathryn Bywaters</i>	2618 Effects of lunar surface temperature swing on the mechanical properties of 3D printed concrete <i>by Peyman Zandifaez, Reese Sorgenfrei, Ehsan Mohseni and Hongyu Zhou</i>	2996 Design of multi-stable tensegrity lattices for energy dissipating and shape-morphing structures <i>by Ranganathan Parthasarathy, Srinivasan Sivakumar, Anil Misra, Hriday Roy, Paul Resch, Kehinde Omotayo, Andrew Mikhaeil, Mohammad Amin Hodaei, Lin Li, Catherin Armwood-Gordon and Roger Painter</i>	4097 Quality Assurance for Construction on the Moon, Mars and Beyond <i>by Ramiro Besada</i>	4991 Effects of printing defects on the mechanical performance of 3D printed concrete structures and retrofitting <i>by Reese Sorgenfrei, Ehsan Mohseni, Hongyu Zhou and Peyman Zandifaez</i>	Speaker Practice
14:20	3948 LHS-2 and LSP-2: Expanding Exolith Lab’s Lunar Regolith Simulants to Particle Sizes >1mm <i>by Parks Easter, Konrad Krol, Isabel Wilburn, Jared Long-Fox, Dan Britt and Julie Brisset</i>	5388 RocketM – A Propulsive Excavation System for the Moon and Mars <i>by Jon Slavik, Travis Vazansky and Connor Luken</i>	4282 Engineered Ultra-flexible Construction Composites using Lunar and Martian Regolith Simulants for Extraterrestrial Construction on the Moon and Mars: Bendable LunarCrete and MartianCrete <i>by Qingxu Jin, Matias Leon-Miquel and Nathan Denning</i>	4887 Sensor Fault Detection Approach to Tensegrity Structures Using Markov Parameters <i>by Yuling Shen, Muhao Chen, Ed Habtour and Robert Skelton</i>	7575 Sustainable Material in Space Construction Has Equitable Effect on Earth <i>by Erika Rivera and Mohamed Elzomor</i>	4374 Bolted flange looseness detection using percussion-induced sound and deep clustering <i>by Jian Chen and Gangbing Song</i>	
14:40		4010 The Effect of Bending Vibration Modes on Penetration of Bio-Inspired Drilling Tool in Granular Materials: An Experimental Study <i>by Mahdi Alaei Varnosfaderani, Pooneh Maghoul and Nan Wu</i>	1749 Unlock CO2 sequestration potential of concrete through a biomolecule-regulated carbonation process <i>by Xiaodong Wang, Monica Amaral and Jialai Wang</i>			2057 Physics Informed Neural Network for Inverse Estimation in Presence of Sparse Data <i>by Anthony G. Lore Starleaf, Siddharth S. Parida, Souvik Chakraborty, Georgios Apostolakis and Nidhish Jain</i>	
15:00							
15:20	COFFEE BREAK						

CONTINUED | WEDNESDAY, APRIL 17, 2024

	SYMPOSIUM 2	SYMPOSIUM 4	SYMPOSIUM 5	SYMPOSIUM 5	ALL SYMPOSIA		
Session Title:	Space Mining	Applications of Artificial Intelligence and Machine Learning for Earth and Space Systems	Terrestrial, Lunar, and Martian Spaceports – Landing and Launching Pads and Supporting Infrastructure	Manufacturing, Development, and Modeling for ISRU-oriented Infrastructure Materials and Construction Technologies on the Moon and Mars	Student Paper Finalists III		
Session Co-Chairs:	Robert Mueller (NASA Kennedy Space Center, FL) and Laurent Sibille (Southeastern Universities Research Association, NASA Kennedy Space Center, FL)	Dexter Johnson, Ph.D. NASA Glenn Research Center, Cleveland, OH and Siddharth Parida, Ph.D. (Embry-Riddle Aeronautical University)	Jennifer Edmunson, Ph.D. (NASA Marshall Space Flight Center, Huntsville AL); and Mike Fiske, Ph.D. (Jacobs Engineering/NASA Marshall Space Flight Center Huntsville, AL)	Yong-Rak Kim, Ph.D., P.E., F. EMI, F. ASCE (Texas A&M University, College Station, TX); Xijun Shi, Ph.D., P.E. (Texas State University, San Marcos, TX); Hyu Shin, Ph.D. (Korea Institute of Civil Engineering and Building Technology, South Korea)	Robert K. Goldberg, Ph.D., F. ASCE (NASA Glenn Research Center, Cleveland, OH); Krzysztof Skonieczny, Ph.D. (Concordia University, Montreal, Canada)		
	Room 114	Room 128	Room 117	Room 124	Room 115		Room 110
15:40	2980 Discrete Element Modeling of IPEX Bucket Drum-Lunar Regolith Interactions <i>by Daniel Gaines, Qiushi Chen and Laura Redmond</i>	1783 Temporal Deep Learning for Crack Pattern Classification Using Acoustic Emission Signals <i>by Donghuang Yan, Shuo Wang and Wenxi Wang</i>	2209 Comparative Evaluation of Lunar Regolith-Based Tiles for Lunar and Launching Pads: Static Load and Thermal Performance Analysis <i>by Shezreen Khan, Sama Ahmed, Eduardo Bonilla, Aina Narvasa, Marta Miletic and Douglas Cortes</i>	485 Fiber-Reinforced Lunar Geopolymers for Future Lunar Construction <i>by Solomon Debbarma, Xijun Shi, Anthony Torres and Mehrab Nodehi</i>	7406 Electrostatic Sorting of Lunar Regolith Simulants for Sustainable Resource Utilization: Modeling and Characterization of Particle Size Distributions <i>by Fateme Rezaei, Daaru Han, Jeffrey Smith, David Bayless, William Schonberg, Peter Bachle, Kyle Newport and Abdullah Al Moinee</i>		
16:00	9662 Volatile Production Model from Optically Spalled CI/CM Asteroid Simulant <i>by Timofey Broslav, Chris Dreyer and Joel Sercel</i>	2057 Physics Informed Neural Network for Inverse Estimation in Presence of Sparse Data <i>by Anthony G. Lore Starleaf, Siddharth S. Parida, Souvik Chakraborty, Georgios Apostolakis and Nidhish Jain</i>	2518 A Comprehensive Analysis of Autonomous Construction of Lunar Landing Pads (LLPs) Using a Network of Small Robots <i>by Sivaperuman Muniyasamy and Jekan Thangavelautham</i>	2115 Additive manufacturing of polyether ether ketone (PEEK)/ lunar regolith composites via fused filament fabrication <i>by Mohammad Azami, Pierre-Lucas Aubin-Fournier and Krzysztof Skonieczny</i>	6270 Inflatable Tetrahedron Rover Concept for Lunar Lava Tube Exploration <i>by Anna Dinkel and Jekan Thangavelautham</i>		
16:20	6887 Moon Trades: Unlocking the Potential of Lunar Mining and Resource Utilization <i>by Eronim Mihoc, Madison C. Feehan, Wintta Ghebreyesus and Fabio Giuseppe Bisciotti</i>	5485 Decision tree approach to interfacial debonding detection for steel-concrete-steel structure by impulse-response measurement <i>by Shiyu Gan, Xin Nie, Yuanyuan Li and Hongbing Chen</i>	5905 Constructing Lunar Landing Pads from Regolith Feedstocks Fused by Concentrated Solar Energy <i>by Alan Carter, Andrew Brewer and Ryan Garvey</i>	3218 Vacuum microwave sintering of lunar regolith simulant for lunar construction <i>by Young-Jae Kim, Taeil Chung, Li Zhuang, Hyunwoo Jin, Sun Yeom, Jangguen Lee and Hyu-Soung Shin</i>	148 LIBS-Raman Multimodal Architecture for Automated Lunar Prospecting <i>by Jérôme Pigeon, Pooneh Maghoul, Foutse Khomh, Richard Boudreault and Ahmed Ashraf</i>		
16:40	8313 EURO2MOON: Leverage lunar resources exploration to foster international collaboration and benefit sustainability in Space and Earth <i>by Pierre-Alexis Joumel and Bertrand Baratte</i>		9162 Site Preparation for a Lunar Launch and Landing Pad <i>by Samuel Ximenes, Barney Gorin, Sazzad Shafique, Ibukun Awolusi, Chinedu Okonkwo, Mark Jaksa, Gary Bastin, Oskar Fryckowski, Marek Wilgucki, Codie Petersen, Joshua Torgerson, Jaret Matthews, Joe Redfield, Ronald Wells, Lutz Richter, Damian Pietrusiak, James Johnson, Reynaldo Trevino and Donald Hooper</i>	4916 Spark Plasma Sintering of NUW-LHT-5M Lunar Highland Simulant: Effects of Sintering Temperature on Physical, Mechanical, and Microstructural Properties <i>by In Kyu Jeon and Yong-Rak Kim</i>	3435 Effects of Extreme Daily Temperature on Tall Truss-Type Solar Power Structure on the Moon <i>by Hernan Cortez Jr and Ramesh Malla</i>		Speaker Practice
17:00	4923 Outcompeting Starship: the cost of lunar-mined rocket propellant will drop faster than the cost of launching it from Earth <i>by Philip Metzger</i>		6544 Mobile Launcher Refresh for Kennedy Space Center <i>by Kevin MacLeod, Pete Carrato and Luis Moreschi</i>	9475 Mechanical Properties of Regolith-Resin-Based Composite (RRC) for Off-Earth Construction Utilising In-Situ Resources <i>by Mohammad Altaf Hossain, Scott T Smith and T. Tafsirojjaman</i>	Student Paper Competition Judges Meeting Room 115 5pm - 6pm		
17:20			7304 On The Incorporation of Both Function-Driven and Topology Optimization in The Development of Lunar Launch & Landing Pads <i>by Luke Scharber and Mike Fiske</i>				
18:00	ASCE ASD Space Engineering and Construction Technical Committee Room 117 6 pm - 8 pm						ASCE Executive Committee Meeting Room 110 5:40 pm - 6:40 pm

(For more committee meetings, see Monday evening)

SCHEDULE | THURSDAY

THURSDAY, APRIL 18, 2024						
8:00	Check-in, Registration, Light Breakfast					
8:30	Welcome and Opening Remarks - By Conference Chairs Bayview Ballroom 214					
8:45	Plenary Lecture: <i>A secondary habitat as potential European contribution to the US ARTEMIS missions – from the point of view of a European start-up</i> - By Peter Weiss, Ph.D. - Spartan Space, Marseille, France Bayview Ballroom 214					
9:45	Student Paper Award Ceremony					
10:00	COFFEE BREAK					
	SYMPOSIUM 1	SYMPOSIUM 2	SYMPOSIUM 3	SYMPOSIUM 5	SYMPOSIUM 5	
Session Title:	Modeling Methods for Regolith	Mission Concepts: Resource Prospecting, Instruments and Enabling Technologies	Architected Materials for Terrestrial and Extraterrestrial Structural Applications	Building Information Modeling (BIM): digital representation of physical and functional characteristics of space facilities	3D Printing Applications for Lunar and Martian Construction	
Session Co-Chairs:	Patrick Harkness, Ph.D. (University of Glasgow, Scotland, GB) and Robert Anderson (NASA Jet Propulsion Laboratory, Pasadena, CA)	Ramiro Besada (Burns & McDonnell, Kansas City, MO) and Jeffrey Hopkins (Serenity Space Technologies, Pittsburgh, PA)	Yunlan “Emma” Zhang, Ph.D (The University of Texas at Austin, TX) and Justin Littell, Ph.D. (NASA Langley Research Center, Hampton, VA)	Luis M. Moreschi, PhD, PE (Bechtel Corporation, Reston, VA) and Timo Hartmann, Ph.D. (Technische Universität Berlin, Germany).	Nathan Gelino (NASA Kennedy Space Center, FL) and Seung Jae Lee, Ph.D. (Florida International University, Miami, FL)	
	Room 124	Room 114	Room 126	Room 117	Room 115	Room 110
10:20	240 Discrete Element Modeling of LHS-1 Lunar Highlands Simulant and the Cone Penetrometer-Regolith Interactions <i>by Jesus Badal, Qiushi Chen, Liang Zhang and Lei Wang</i>	2370 Top-down, bottom-up: exploring science traceability matrix models for human exploration of planetary surfaces <i>by Ryan Ewing, Cherie Achilles, Maria Banks, Jared Broddrick, David Charney, Brett Denevi, Lauren Edgar, Ben Feist, Brent Garry, Alex Huff, Jose Hurtado, Nina Lanza, Matthew Miller, Zachary Morse, Jacob Richardson, James Skinner, Chelsea Trainor, Catherine Weitz and Kelsey Young</i>	5869 Architected Material Analogs of Shape Memory Alloys <i>by Yunlan Zhang, Pablo Zavattieri and Nilesh Mankame</i>	138 Bare basing on the Moon and Mars: How to utilize emerging Artificial Intelligence (AI) and Building Information Modeling (BIM) to Optimize Construction Planning for Future Lunar Habitats. <i>by John Borland and Patrick Suermann</i>	3666 Are 3D Printers Universal Constructors? <i>by Alex Ellery</i>	
10:40	9784 Wear Testing and Modeling of Tools Interacting With Icy Granular Soil <i>by Zamir Syed, Mehari Tekeste and Paul Schafbuch</i>	5340 Inflatable reflectors for multiple human space exploration application <i>by Thomas Lagarde, Vincent Alder and Marc Cohen</i>	5960 Design of in-space manufacturable spacecraft incorporating metamaterial technologies <i>by Othman Oudghiri-Idrissi, Avinkrishnan Vijayachandran, James McInerney, Wei-Chun Lu, Karina Heye-Smith, Andrea Poli, Ellen Arruda, Xiamoing Mao, Anthony Waas and Serife Tol</i>	4178 An information model for representing fault-symptom relationships in Temperature and Humidity Control Systems (THCS) <i>by Min Young Hwang, Burcu Akinci and Mario Bergés</i>	5052 Economic Analysis of Practical Additively Manufactured Parts for use on the Lunar Surface. <i>by David Purcell and Christopher Dreyer</i>	
11:00	1295 ISRU Pilot Excavator (IPEX): Lunar Excavation Simulation Partnership with Caterpillar <i>by Jason Schuler, Eric Reiners, Kurt Leucht and Liz Zhang</i>	7121 Mineralogical, Elemental, and Tomographic Reconnaissance Investigation for CLPS (METRIC): A Payload Designed for Exploration of Terrestrial Planetary Bodies <i>by Elizabeth Rampe, Philippe Sarrazin, David Blake, Paul Lucey, Dean Bergman, Rachel Obbard, Albert Yen, Christopher Haberle, Kevin Cannon, Joseph Hamilton and Ryan Ewing</i>	4838 Advancing 3D Concrete Printing for Extreme Environments: A Focus on Alaska <i>by Gonçalo Marques Duarte, Jose Pinto Duarte, Nate Watson, Sven Bilén, Shadi Nazarian and Aleksandra Radlińska</i>	9216 BIM Uses for the Automation of Construction and Operation of Outer-planet Facilities <i>by Bitu Aastaneh Asl</i>	3568 Strengthening and 3D Printing of Magnesium Silicate Hydrate (MSH) Binder for Martian Construction <i>by Shayan Gholami, Yong-Rak Kim and Faezeh Salehi</i>	Speaker Practice
11:20	1131 Evaluating the capability of the SPARTA toolkit to quantitatively characterize planetary regolith <i>by Robert Anderson, Danielle Wyrick, Debra Buczkowski, Jared Long-Fox, Luke Sollitt, James Dohm, Keith Chin and Kris Zacny</i>				1342 RENEST – Low Energy Additive Construction for the Moon and Mars <i>by Travis Vazansky, Jon Slavik and Connor Luken</i>	
11:40	1839 Micromorphic Continuum Models derived from Granular Micromechanics <i>by Anil Misra</i>					
12:00	LUNCH BREAK (Lunch provided)					

CONTINUED | THURSDAY, APRIL 18, 2024

12:20 Special Presentations (50 minutes): "Future World Vision" by Jerry Buckwalter, ASCE, Reston, VA (25 min) & "Innovation through the lens of regolith-polymer composites for lunar construction" by Nathan Gelino, NASA Kennedy Space Center, FL (25 min)							
	SYMPOSIUM 1	SYMPOSIUM 3	SYMPOSIUM 5	SYMPOSIUM 5			
Session Title:	Rocket Exhaust Interactions with Regolith	Ballistic Impact and Crashworthiness of Aerospace Structures	Engineering Aspects for NASA's Moon to Mars Architecture and other International Programs	Robotic Construction and Outfitting Advancements to Support Functional Buildings and Infrastructure in Earth, Moon and Beyond			
Session Co-Chairs:	Christopher Dreyer, Ph.D. (Colorado School of Mines) and S. Joseph Antony, Ph.D. (University of Leeds, Leeds, UK)	Justin Littell, Ph.D. (NASA Langley Research Center, Hampton, VA) and Lucas Laughery, Ph.D. (ICON Technology Inc. Austin, TX)	Robert W. Moses, Ph.D. (Tamer Space, LLC, Richmond, VA) and Robert Mueller (NASA Kennedy Space Center, FL)	Naveen Kumar Muthumanickam, Ph.D. (National Renewable Energy Lab NREL, Boulder, CO) and Nipesh Pradhananga, Ph.D., P.E., (Florida International University, Miami, FL)			
	Room 124	Room 126	Room 117	Room 115			Room 110
13:20	800 Predictive Theory for Rocket Exhaust Eroding Soil <i>by Philip Metzger</i>	8560 Impact-resistant Instability-based Architected Materials (IAMs) for Extraterrestrial Construction and Expeditionary <i>by Li Wan, Sergio Diaz and Yunlan Zhang</i>	355 Lunar Base Planning: Driving Consensus on Development Logics Informing a Morphological Approach to Lunar Infrastructure <i>by Melodie Yashar</i>	366 Exploring Task Performance and Mental Workload in Time-Delayed Teleoperation for Extraterrestrial Construction <i>by Miran Seo and Youngjib Ham</i>			
13:40	1515 Direct Comparison of Mitigated and Unmitigated Plume Surface Interactions in a Drop Tower Vacuum Experiment <i>by Kayla Schang, Alexander Nicola, Helen Carson, Kaveon Smith, Alyssa Bulatek and Andres Campbell</i>	157 Analysis of a Landing System for Planetary Payloads Utilizing Passive Energy Absorbing Composite Structure <i>by Jacob Putnam, Matlock Mennu and Justin Littell</i>	454 Understanding the effects of moonquakes on the lunar infrastructure based on the data obtained from ALSEP <i>by Nerma Caluk and Dean Whitman</i>	2984 Identification of Surface Defects of 3D Printed Concrete Structures Using Computer Vision and Machine Learning <i>by Zachary Graham, Reese Sorgenfrei and Hongyu Zhou</i>			
14:00	1544 A Hybrid CFD/Engineering Model Tool for Lunar Lander Surface Erosion Prediction <i>by Andrew Weaver, Thomas Shurtz, Peter Liever, Timothy Dawson, Jason Howison and Jeffrey West</i>	1759 Trade Study of Impacting Resisting Structures on the Lunar Surface <i>by Arsalan Majlesi, Amir Behjat, Adnan Shahriar, David Avila, Shirley Dyke, Julio Ramirez and Arturo Montoya</i>	6531 A Portable SCscalable High Energy Density Technology for Powering Space Missions including Surface Operations during Lunar Nights <i>by Robert Moses, Sang Choi and Dennis Bushnell</i>	9197 Modeling Deformable Linear Objects for Autonomous Robotic Outfitting of Lunar Surface Systems <i>by Amy Quartaro, John Cooper, Erik Komendera and Joshua Moser</i>			
14:20	6846 Understanding The Effect of Geotechnical Properties on Plume Surface Interactions <i>by Brandon Dotson, Aiden St. John, Dhaka Sapkota, Dan Britt and Philip Metzger</i>		8087 Trials & Tribulations of Asteroid Mining <i>by Alex Ellery</i>	9444 Robotics for systems integration in buildings – Pilot study of viable approaches <i>by Naveen Kumar Muthumanickam, Luke Boyd and Shanti Pless</i>			Speaker Practice
14:40	7615 Gas-granular mechanics observed in a subscale, reduced pressure plume-surface interaction test <i>by Kayla Schang</i>		1894 Decommissioned Fighters as Airborne Launch Platforms for Space Operations <i>by Piotr Zalewski, Lukasz Kiszkiwiak, Stanislaw Kachel, Robert Rogólski and Michał Frant</i>	4464 Development of an autonomous site preparation vehicle for the Moon <i>by Christopher Dreyer, Adrew Petruska, Neil Dantam, George Sowers, Kevin Cannon, Jamal Rostami, Daniel Johnson, Daniel Hammer, David Purcell, Rik Banerjee, Elise Skirde, Daniel Abel, Chukwuebuka Okwor, Paul van Susante, Chuck Carey and Van Wagner</i>			
15:00			0019 Korea's Space Vision: Opening of KASA and Building a Global Cooperation Network <i>by Tai Sik Lee, Jinyoung Lee, and Yoonsun Lee</i>				

EMERGENCY PROCEDURES

Venue Information

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