51st INTERNATIONAL CONFERENCE ON ENVIRONMENTAL SYSTEMS

ICES 2022

10-14 July 2022 | Saint Paul, Minnesota | Intercontinental Saint Paul Riverfront

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ICES 2022 Event Program

ORGANIZED BY

ICES STEERING COMMITTEE

SUPPORTED BY

ICES International Committee (IIC)

ICES Thermal and Environmental Control Systems Committee (TECS)

American Institute of Chemical Engineers (AIChE) Environmental Systems Committee

American Society of Mechanical Engineers (ASME) Crew Systems Technical Committee

American Institute of Aeronautics and Astronautics (AIAA) Life Sciences and Systems Technical Committee

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A new era in space travel has begun. Fueled by exciting partnerships between government and private sectors, today's pioneers are stretching the boundaries of what's possible to create a new vision of life in space, and Collins Aerospace is here to help make it a reality. With 50+ years of experience supporting space exploration, our ready-now space suits and life support systems are proven and affordable, empowering the most extraordinary missions for commercial, government and defense customers.

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- Environmental control and life support systems
- Power management and distribution systems
- Satellite momentum and reaction wheels
- Satellite payloads linking air and space
- Mission operations

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Chair's Welcome

Welcome to the 51st International Conference on Environmental Systems! We are proud to host the premier international conference for professionals involved in topics related to humans living in space and working in extreme environments including environmental control and life support systems, human factors, thermal control systems, and EVA system technology.

After cancelling the conference two years ago and holding the conference virtually last year, we are excited to be having the conference in person again this year in our host city of Saint Paul, Minnesota.Known as a friendly Midwestern city, Saint Paul offers numerous shopping, dining, entertainment, and recreational opportunities. Our conference hotel sits atop the bluffs right along the Mississippi River with stunning views and easy access to the Twin Cities metropolitan area.

We have a rich program scheduled with approximately 270 presentations in 37 technical sessions. Many of our students will be presenting their work in the Student Poster Competition on Monday. Students and early career professionals have an opportunity to participate in the Early Career Development Workshop on Wednesday morning. There will also be plenty of time for networking with the Welcome Reception on Sunday, the Student Poster Reception on Monday, and coffee breaks throughout the week. Tuesday night we will gather for a picnic and fun evening of minor league baseball with the St. Paul Saints.

A highlight of the week is the ICES Awards Banquet and Dessert Reception which will be held on Wednesday evening. With so much planned, we hope you join in all the fun as we finally gather together again for ICES 2022! We are pleased to welcome our distinguished speakers.
On Monday morning we will kickoff the conference with a plenary talk by Lara Kearney from NASA's Johnson Space Center. Lara has been a leader in many of NASA's human exploration programs including Constellation EVA Systems, Orion, and Gateway. Most recently she has been named the program manager for the newly createdExtravehicular Activity (EVA) and Human Surface Mobility (HSM) program.

At the banquet on Wednesday night, our keynote speaker will be Paul Geithner from NASA's Goddard Space Flight Center. Paul is the Deputy Project Manager –Technical for the James Webb Space Telescope. We look forward to hearing about the latestengineering and scientific successes of this great observatory.Along with Vice Chair Shawn Macleod,I want to thank all the authors and session organizers for their hard work in preparing the technical content of this conference. I also want to recognize our generous sponsors who help make the conference even more enjoyable. Special thanks to Collins Aerospace, Paragon Space Development Corporation, Leidos, Sierra Space, Axiom Space, ILC Dover, and Oceaneering for their support.

On behalf of the ICES Steering Committee, we are excited you have joined us, and we extend a friendly welcome to you for the 51st ICES in Saint Paul!

Tom Leimkuehler, Ph.D **- ICES 2022 Conference Chair**

ORGANIZING COMMITTEE

Conference Chair
Tom Leimkuehler
NASA Johnson Space Center

Conference Vice-Chair
Shawn Macleod
Leidos

STEERING COMMITTEE

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Draper Laboratory

Stéphane Lapensée
(Past Conference Chair 2020/2021)
European Space Agency

Tim Nalette
(Past Conference Chair 2019)
UTC Aerospace Systems (retired)

Event Overview

Sunday 10-Jul	Monday 11-Jul	Tuesday 12-Jul	Wednesday 13-Jul	Thursday 14-Jul
	Session Chair & Speaker Breakfast 7:00-8:15 hrs ***Great River Ballroom***		**Early Career Workshop** 7:00-8:45 hrs ***Great River Ballroom***	
	Plenary Session 8:30-10:00 hrs ***Minnesota Ballroom***	**Technical Sessions** 8:00-10:00 hrs	**Technical Sessions** 09:00-10:30 hrs	Early Morning Coffee Break ***Minnesota Court + West*** **Technical Sessions** 08:30-10:30 hrs
	Networking Coffee Break ***Minnesota Court + West***	Networking Coffee Break ***Minnesota Court + West***	Networking Coffee Break ***Minnesota Court + West***	Networking Coffee Break ***Minnesota Court + West***
	Technical Sessions 10:30-12:30 hrs	**Technical Sessions** 10:30-12:30 hrs	**Technical Sessions** 11:00-12:30 hrs	**Technical Sessions** 11:00-13:00 hrs
	LUNCH on OWN 12:30-14:30	**LUNCH on OWN** 12:30-14:30	**LUNCH on OWN** 12:30-14:30	
Conference Registration & Check-in 13:00-19:00 hrs ***MN Event Office on Lower Level***	Student Poster Judging *Great River Ballroom*	Committee Meetings **AIChE** *Kellogg I* **AIAA LS&S** *Kellogg II* **TECS** *Kellogg III*	Committee Meetings **ASME** *Kellogg I* **IIC** *Kellogg III*	
	Technical Sessions 14:30-16:30 hrs	**Technical Sessions** 14:30-16:30 hrs	**Technical Sessions** 14:30-16:30 hrs	
	Networking Coffee Break ***Minnesota Court + West***	FREE TIME	FREE TIME	
Welcome Reception 17:30-19:30 hrs ***Great River Ballroom***	**Technical Sessions** 17:00-18:00 hrs	**St. Paul Saints Baseball Game** 17:30 hrs - Picnic 19:07 hrs - First Pitch ***CHS Field***		
	Student Poster Reception 18:00-19:30 hrs ***Great River Ballroom***		**Pre-Banquet Reception** 18:30 hrs - ***Great River Court*** **ICES 2022 Awards Banquet** 19:00 hrs ***Great River Ballroom*** *followed by* **Dessert Reception** ***Minnesota Ballroom & Court***	

REGISTRATION AND INFORMATION CENTER HOURS

The ICES Registration and Information Center will be located on the Lower Level in the Minnesota Event Office

Hours are as follows:

Sunday:	**10 July**	**13:00-19:00 hrs**
Monday:	**11 July**	**06:30-18:00 hrs**
Tuesday:	**12 July**	**07:30-16:30 hrs**
Wednesday:	**13 July**	**07:30-16:00 hrs**
Thursday:	**14 July**	**08:30-13:00 hrs**

COMMITTEE MEETINGS

AIChE Environmental Systems Committee

Tuesday, 12 July 12:30-14:30 hrs Kellogg I (Lobby Level)

AIAA Life Sciences & Systems Technical Committee

Tuesday, 12 July 12:30-14:30 hrs Kellogg II (Lobby Level)

ICES Thermal and Environmental Control Systems Committee

Tuesday, 12 July 12:30-14:30 hrs Kellogg III

ASME Crew Systems Technical Committee

Wednesday, 13 July 12:30-14:30 hrs Kellogg I (Lobby Level)

ICES International Committee

Wednesday, 13 July 12:30-14:30 hrs Kellogg III (Lobby Level)

NETWORKING COFFEE BREAKS

They will be located on the Lower Level in Minnesota Court and Minnesota West

Monday 11 July	**10:00-10:30 hrs**
	16:30-17:00 hrs
Tuesday 12 July	**10:00-10:30 hrs**
Wednesday 13 July	**10:30-11:00 hrs**
Thursday 14 July	**08:00-08:30 hrs**
	10:30-11:00 hrs

General **Information**

SESSION CHAIR REPORTS

All Session Chairs are asked to complete a session chair report to evaluate their session for future planning. The online report can be found on the conference app or on www.ices.space under the Session Chair Materials & Resources page.

AUDIO/VISUAL

Each session room will be preset with the following: one video/data projector, one screen, one microphone & sound system (if necessitated by room size) and one laser pointer/slide advancer.

ICES does not provide computers to connect to projectors – you must provide your own laptop. Please note that ICES does not provide security in the session rooms and recommends that items of value, including computers, not be left unattended. Any additional audiovisual requirements or equipment requested will be at the cost to the presenter. Technicians are on site from LUMENS AV.

LUMENS AV
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CONFERENCE PROCEEDINGS

The proceedings collection for ICES 2022 has been made available on the Texas Tech University Libraries site as of Sunday, 10 July 2022. Go to www.ices.space to access from the Conference Proceedings page or links can also be found on the conference app. If you are interested in obtaining a digital copy of ALL conference proceedings you can download to a USB at the ICES Registration Desk.

"NO PAPER, NO PODIUM" & "NO PODIUM, NO PAPER" POLICIES

If a written paper is not submitted by the final manuscript deadline, authors will not be permitted to present the paper at the conference. It is the responsibility of those authors whose papers or presentations are accepted to ensure that a representative attends the conference to present the paper. If a paper is not presented at the conference, it will be withdrawn from the conference proceedings. These policies are intended to eliminate no-shows and to improve the quality of the conference for attendees.

PUBLICATION POLICY

ICES will not consider for presentation or publication any paper that has been presented or published elsewhere.

RESTRICTIONS

Photography, video, or audio recording of technical sessions is prohibited. ICES speakers and attendees are reminded that some topics discussed in the conference could be controlled by the International Traffic in Arms Regulations (ITAR). U.S. nationals (U.S. citizens and permanent residents) are responsible for ensuring that technical data they present in open sessions to non-U.S. nationals in attendance or in conference proceedings are not export restricted by the ITAR. U.S. nationals are likewise responsible for ensuring that they don't discuss ITAR export-restricted information with non-U.S. nationals in attendance.

PLEASE NOTE: There will be a photographer on site documenting all events other than technical sessions

WELCOME RECEPTION SPONSORED BY

Collins Aerospace

Join the entire ICES community for a welcome reception, sponsored by Collins Aerospace, on Sunday, 10 July from 17:30-19:30 hrs, in the Great River Ballroom. Take this opportunity to refresh old contacts and meet new participants the night before the conference begins. Tickets are included in registration fee where indicated. Additional tickets for students and guests may be purchased at the ICES Registration/Info desk.

SESSION CHAIR AND SPEAKER BRIEFING

All presenters and session chairs are invited for this early morning breakfast to coordinate presentations and schedules for the week on Monday, 11 July from 07:00-08:15 hrs. A buffet breakfast will be served in the Great River Ballroom.

OPENING PLENARY SESSION SPONSORED BY

ILC DOVER
BEYOND BOUNDARIES™

To kick off the week we will gather for the Opening Plenary Session on Monday, 11 July from 08:30-10:00 hrs in the Minnesota Ballroom. There will remarks by the 2022 ICES Conference Chair, Tom Leimkuehler, and a keynote speech by Lara Kearney, Manager - EVA and Human Surface Mobility Program Office at NASA Johnson Space Center.

STUDENT POSTER RECEPTION SPONSORED BY AXIOM SPACE

All attendees are invited to this "happy hour" reception to view and discuss the work presented by the students participating in this year's poster competition. The reception will be held Monday, 11 July from 18:00-19:30 hrs in the Great River Ballroom.

ST. PAUL SAINTS BASEBALL GAME SPONSORED BY SIERRA SPACE

The ICES community will enjoy a picnic dinner at CHS Field on the Cub a Cabana Lawn starting at 17:30 in plenty of time to grab a bite before the first inning. We will then sit all together in reserved seating sections to watch the game between the Saints - hometown team and Triple-A affiliate for MLB Minnesota Twins and the Toledo Mud Hens. First pitch is at 19:07! Tickets are included in registration fee where indicated. Additional tickets for students and guests may be purchased at the ICES Registration/Info desk.

EARLY CAREER WORKSHOP

This casual forum is designed to allow for a unique networking opportunity for students and young professionals to connect with veterans in the field to ask about how to best develop their future careers in the domain of environmental systems. This Workshop will take place on Wednesday, 13 July at 07:00-08:45 hrs in the Great River Ballroom. If you have not had an opportunity to RSVP for this event, please stop by the ICES Registration/Information desk on the lower level to let us know you are interested in attending.

Breakfast will be provided to all participants courtesy of : OCEANEERING®

ICES AWARDS BANQUET SPONSORED BY leidos

The ICES 2022 Awards Banquet will be held at the Intercontinental Saint Paul Riverfront on Wednesday, 13 July, beginning with a pre-banquet reception at 18:30 hrs in the Great River Court. The reception will be followed by dinner in the Great River Ballroom which includes an awards presentation and a keynote speech by Paul Geithner, Deputy Project Manager (Technical) James Webb Space Telescope at Goodard Space Flight Center.

Immediately following the awards presentation there will be a Dessert Reception in the Minnesota Ballroom on the lower level sponsored by: PARAGON® SPACE DEVELOPMENT CORPORATION

Opening Plenary Session

Monday, 11 July - 8:30 hrs | *Minnesota Ballroom*

PLENARY SESSION SPEAKER:

Lara Kearney

Manager – EVA and Human Surface Mobility Program Office
NASA Johnson Space Center

Ms. Kearney serves as Manager of the Extravehicular Activity (EVA) and Human Surface Mobility (HSM) Program at NASA's Johnson Space Center (JSC), where she is responsible for implementation of the Program's goals and objectives, ensuring consistency with the Agency's exploration strategy and delivering the EVA and HSM systems within technical and programmatic requirements. She is responsible for the day-to-day management of the Program, including recommending and implementing program policy and directing the Program's development, test, certification, production, integration, and operations activities. She manages NASA, contractor, private industry, and international partner contributions throughout the Program's life cycle life, ensuring programmatic and technical integration of the EVA and HSM capabilities across ISS and Artemis EVA, the Lunar Terrain Vehicle, and the Pressurized Rover.

Ms. Kearney has over twenty-nine years of experience building and operating human spaceflight hardware. She has hands on experience in every phase of the flight hardware process, from hardware proof of concept and preliminary design through testing, certification, production, and flight operations. Prior to her EVA and HSM Program duties, Ms. Kearney served as the Deputy Manager for the Gateway Program, where she was responsible for the technical and programmatic performance of the Gateway Program across its Power and Propulsion, Habitation, Logistics, Robotics, and Airlock Elements. Prior to that, she served as the Manager of the Orion Crew and Service Module Office, where she was responsible for programmatic management and engineering oversight of the Orion Crew and Service Module systems. Prior to that, she served as the Constellation Extravehicular Activity (EVA) Systems Project Manager, where she managed the entire range of technical, business, and administrative activities of the organization responsible for EVA and space suit development for the Constellation Program. In addition, Ms. Kearney has served in JSC's Human Health and Performance and Engineering Directorates.

Ms. Kearney has a B.S. and an M.E., both in Biomedical Engineering, from Texas A&M University, and an Executive MBA from the Naval Postgraduate School. She holds a Federal Acquisition Certification for Program and Project Managers (FAC-P/PM) and a Project Management Professional (PMP)® Credential. She is the recipient of the NASA's Spaceflight Awareness Leadership Award, Silver Snoopy Award and Outstanding Leadership Medal, as well as the 2022 NASA Federal Engineer of the Year Award.

LETS GO BEYOND BOUNDARIES TOGETHER

PG#

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Thank you Sponsors!

The ICES Steering Committee would like to thank our sponsors for supporting and enabling many of our productive and enjoyable networking events. We greatly appreciate their generosity and commitment to enhancing the ICES conference experience

Program At A Glance

Sunday, 10 July 2022

13:00 hrs	**CONFERENCE REGISTRATION**	MN Event Office–lower level
17:30 hrs	**WELCOME RECEPTION** – *Sponsored by* **Collins Aerospace**	Great River Ballroom

Monday, 11 July 2022

07:00 hrs	**SESSION CHAIR & SPEAKER BREAKFAST**	Great River Ballroom
08:30 hrs	**OPENING PLENARY SESSION**	Minnesota Ballroom
10:00 hrs	Networking Coffee Break	Minnesota Court + West
10:30 hrs	**TECHNICAL SESSIONS**	

• Life Science/Life Support Research Technologies	ICES500-A	Governors I
• Physio-Chemical Life Support – Water Recovery & Management Systems – Technology and Process Development	ICES303-A	Governors II
• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	ICES302-A	Governors III
• Extravehicular Activity: Space Suits	ICES400-A	Governors IV
• Fire Safety in Spacecraft and Enclosed Habitats	ICES509-A	State I
• Radiation Issues for Space Flight	ICES503	State II
• Thermal Design of Cubesats, Nanosats, and Other Small Satellites	ICES107	State III

12:30 hrs	Lunch Break — Attendees on Own	
12:30 hrs	**STUDENT POSTER JUDGING** *(Lunch provided to students and judges)*	Great River Ballroom
14:30 hrs	**TECHNICAL SESSIONS**	

• Life Science/Life Support Research Technologies	ICES500-B	Governors I
• Physio-Chemical Life Support – Water Recovery & Management Systems – Technology and Process Development	ICES303-B	Governors II
• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	ICES302-B	Governors III
• Extravehicular Activity: Space Suits	ICES400-B	Governors IV
• Fire Safety in Spacecraft and Enclosed Habitats	ICES509-B	State I
• Management of Air Quality in Sealed Environments	ICES504-A	State II
• Satellite, Payload, and Instrument Thermal Control	ICES202-A	Kellogg II

16:30 hrs	Networking Coffee Break	Minnesota Court + West
17:00 hrs	**TECHNICAL SESSIONS**	

• Life Science/Life Support Research Technologies	ICES500-C	Governors I
• Physio-Chemical Life Support – Water Recovery & Management Systems – Technology and Process Development	ICES303-C	Governors II
• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	ICES302-C	Governors III
• Extravehicular Activity: Space Suits	ICES400-C	Governors IV
• Spacecraft Water/Air Quality: Maintenance and Monitoring	ICES406	State I
• Management of Air Quality in Sealed Environments	ICES504-B	State II
• Crewed Orbiting Infrastructures, Habitats, Space Station and Payload Thermal Control	ICES206	State III
• Satellite, Payload, and Instrument Thermal Control	ICES202-B	Kellogg II

18:00 hrs	**STUDENT POSTER RECEPTION** – *sponsored by* **Axiom Space**	Great River Ballroom

Tuesday, 12 July 2022

08:00 hrs	**TECHNICAL SESSIONS**		
	• Space Architecture	**ICES502-A**	Great River I
	• Human Exploration Beyond Low Earth Orbit: Missions and Technologies	**ICES506-A**	Governors I
	• Physio-Chemical Life Support – Water Recovery & Management Systems – Technology and Process Development	**ICES303-D**	Governors II
	• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	**ICES302-D**	Governors III
	• Extravehicular Activity: Space Suits	**ICES400-D**	Governors IV
	• Thermal and Environmental Control Engineering Analysis and Software	**ICES207-A**	State I
	• Advances in Thermal Control Technology	**ICES104-A**	State II
	• Planetary and Spacecraft Dust Properties and Mitigation Technologies	**ICES510-A**	State III
10:00 hrs	Networking Coffee Break		Minnesota Court + West
10:30 hrs	**TECHNICAL SESSIONS**		
	• Space Architecture	**ICES502-B**	Great River I
	• Human Exploration Beyond Low Earth Orbit: Missions and Technologies	**ICES506-B**	Governors I
	• Physio-Chemical Life Support – Water Recovery & Management Systems – Technology and Process Development	**ICES303-E**	Governors II
	• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	**ICES302-E**	Governors III
	• Extravehicular Activity: Space Suits	**ICES400-E**	Governors IV
	• Thermal and Environmental Control Engineering Analysis and Software	**ICES207-B**	State I
	• Advances in Thermal Control Technology	**ICES104-B**	State II
	• Planetary and Spacecraft Dust Properties and Mitigation Technologies	**ICES510-B**	State III
12:30 hrs	Lunch Break — Attendees on Own		
12:30 hrs	**COMMITTEE MEETINGS** *(Lunch provided to committee meeting attendees)*		
	AIChE Environmental Systems Committee		Kellogg I
	AIAA Life Sciences & Systems Technical Committee		Kellogg II
	TECS Thermal and Environmental Control Systems Committee		Kellogg III
14:30 hrs	**TECHNICAL SESSIONS**		
	• Space Architecture	**ICES502-C**	Great River I
	• Human Exploration Beyond Low Earth Orbit: Missions and Technologies	**ICES506-C**	Governors I
	• Physio-Chemical Life Support – Water Recovery & Management Systems – Technology and Process Development	**ICES303-F**	Governors II
	• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	**ICES302-F**	Governors III
	• Extravehicular Activity: Space Suits	**ICES400-F**	Governors IV
	• *ICES 207: Thermal and Environmental Control Engineering Analysis and Software	**ICES207-C***	State I
	*ICES 203: Thermal Testing *(*combined sessions)*	**& ICES 203***	
	• Two-Phase Thermal Control Technology	**ICES201-A**	State II
	• Planetary and Spacecraft Dust Properties and Mitigation Technologies	**ICES510-C**	State III
16:30 hrs	Free Time		
17:30 hrs	**St. Paul SAINTS Baseball Game** - *sponsored by* **SIERRA Space** Pre-game Picnic on Cub-a-Cabana Lawn at 17:30; First Pitch at 19:07		CHS Field

Program At A Glance

Wednesday, 13 July 2022

07:00 hrs	**EARLY CAREER WORKSHOP** – *Sponsored by* **Oceaneering**		Great River Ballroom
09:00 hrs	**TECHNICAL SESSIONS**		
	• Space Architecture	**ICES502-D**	Great River I
	• Advanced Technologies for In-Situ Resource Utilization	**ICES308-A**	Governors I
	• Physio-Chemical Life Support – Waste Management Systems – Technology and Process Development	**ICES304-A**	Governors II
	• Physio-chemical Life Support – Air Revitalization Systems – Technology and Process Development	**ICES302-G**	Governors III
	• Extravehicular Activity: PLSS Systems	**ICES402-A**	Governors IV
	• Spacecraft and Instrument Thermal Systems	**ICES101-A**	State I
	• Two-Phase Thermal Control Technology	**ICES201-B**	State II
	• Environmental and Thermal Control of Commercial and Exploration Spacecraft	**ICES305**	State III
10:30 hrs	Networking Coffee Break		Minnesota Court + West
11:00 hrs	**TECHNICAL SESSIONS**		
	• Advanced Technologies for In-Situ Resource Utilization	**ICES308-B**	Governors I
	• Physio-Chemical Life Support – Waste Management Systems – Technology and Process Development	**ICES304-B**	Governors II
	• International Space Station ECLS: Systems	**ICES404**	Governors III
	• Extravehicular Activity: PLSS Systems	**ICES402-B**	Governors IV
	• Spacecraft and Instrument Thermal Systems	**ICES101-B**	State I
	• Two-Phase Thermal Control Technology	**ICES201-C**	State II
	• Advanced Life Support Systems Control	**ICES301**	State III
	• Bioregenerative Life Support	**ICES204-A**	Kellogg II
12:30 hrs	Lunch Break — Attendees on Own		
12:30 hrs	**COMMITTEE MEETINGS** *(Lunch provided to committee meeting attendees)*		
	ASME Crew Systems Committee		Kellogg I
	IIC - ICES International Committee		Kellogg III
14:30 hrs	**TECHNICAL SESSIONS**		
	• Advanced Technologies for In-Situ Resource Utilization	**ICES308-C**	Governors I
	• Physio-Chemical Life Support – Waste Management Systems – Technology and Process Development	**ICES304-C**	Governors II
	• *ICES 405: Human/Robotics System Integration *ICES 403: Extravehicular Activity: Operations *(*combined sessions)*	**ICES405* & ICES403***	Governors III
	• Extravehicular Activity: PLSS Systems	**ICES402-C**	Governors IV
	• Spacecraft and Instrument Thermal Systems	**ICES101-C**	State I
	• Two-Phase Thermal Control Technology	**ICES201-D**	State II
	• ECLSS Modeling and Test Correlations	**ICES300**	State III
	• Bioregenerative Life Support	**ICES204-B**	Kellogg II
16:30 hrs	Free Time		
18:30 hrs	**PRE-BANQUET RECEPTION**		Great River Court
19:00 hrs	**ICES 2022 AWARDS BANQUET** – *Sponsored by* **Leidos**		Great River Ballroom
Followed by	**DESSERT RECEPTION** – *Sponsored by* **Paragon Space Development Corp**		Minnesota Ballroom

Thursday, 14 July 2022

08:00 hrs	Early Morning Coffee Break		Minnesota Court + West

08:30 hrs **TECHNICAL SESSIONS**

08:30 start

• Extravehicular Activity: Emerging Space Suit Technologies	**ICES407-A**	Governors IV

09:00 start

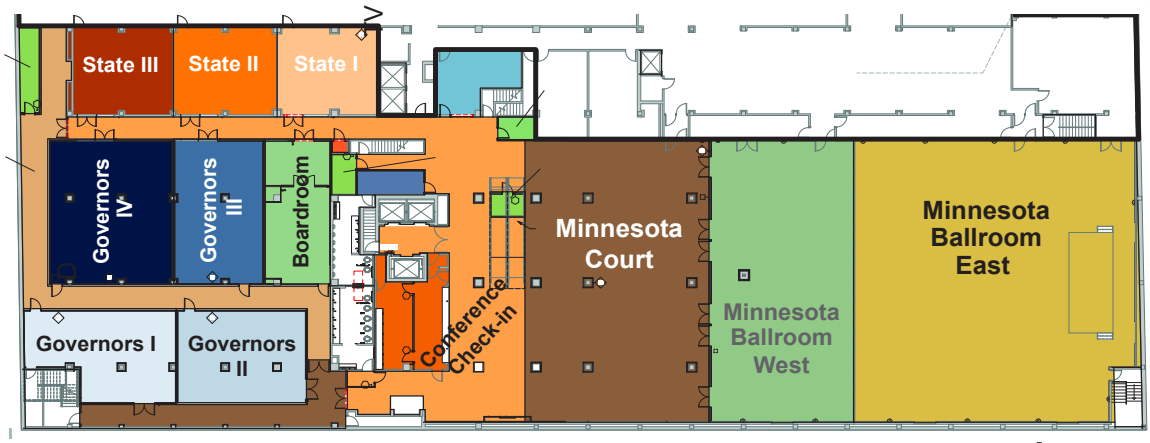
• Thermal and Environmental Control of Exploration Vehicles and Habitats	**ICES103**	Governors I
• Thermal Control for Planetary and Small Body Surface Missions	**ICES102-A**	Governors II
• Advanced Life Support Sensor and Control Technology	**ICES205-A**	Governors III
• Extravehicular Activity: Systems	**ICES401-A**	State I
• Life Support Systems Engineering and Analysis	**ICES501-A**	State II
• Human Health and Performance Analysis	**ICES513**	State III
• Bioregenerative Life Support	**ICES204-C**	Kellogg II

10:30 hrs	Networking Coffee Break	Minnesota Court + West

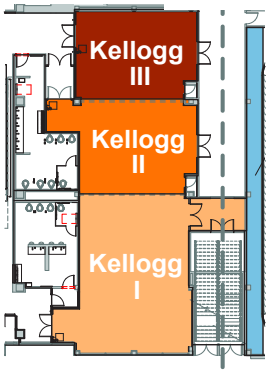
11:00 hrs **TECHNICAL SESSIONS**

• Thermal Control for Planetary and Small Body Surface Missions	**ICES102-B**	Governors II
• Advanced Life Support Sensor and Control Technology	**ICES205-B**	Governors III
• Extravehicular Activity: Emerging Space Suit Technologies	**ICES407-B**	Governors IV
• Extravehicular Activity: Systems	**ICES401-B**	State I
• Life Support Systems Engineering and Analysis	**ICES501-B**	State II
• Collaboration, Educational Outreach, and Public Engagement	**ICES307**	State III
• Bioregenerative Life Support	**ICES204-D**	Kellogg II

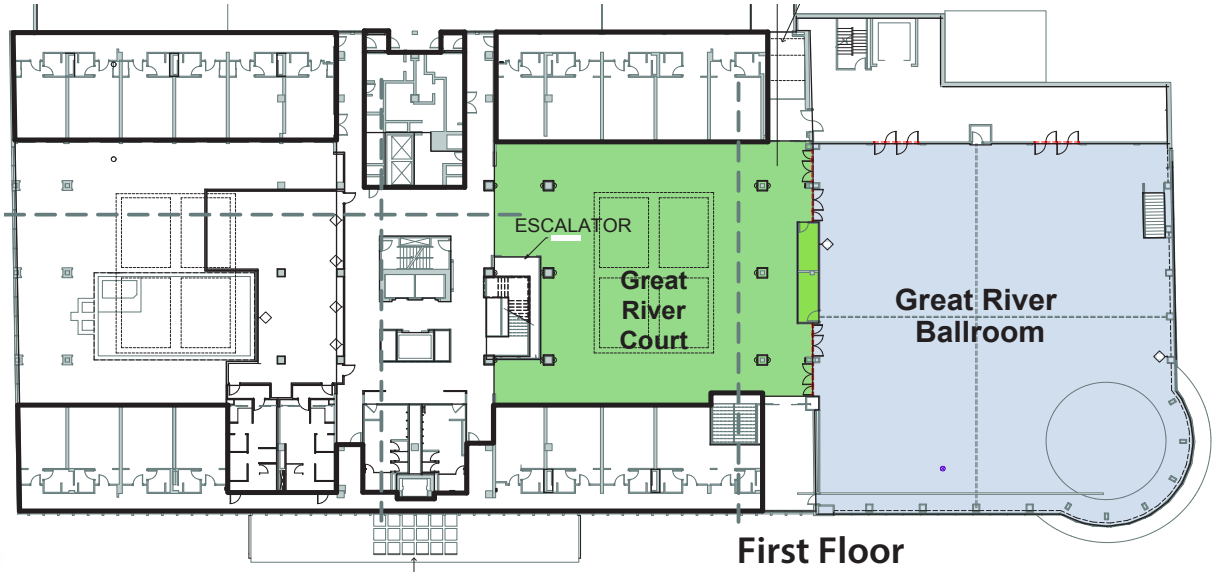
Meeting Space Floor Plan



Lower Level



Lobby Level



First Floor

TECHNICAL SESSIONS
MONDAY / 11 JULY *Late Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES500-A: AIAA LS&S/AIChE	**ICES303-A: AIChE/IIC**	**ICES302-A: AIChE/ASME/IIC**	**ICES400-A: ASME**
	Life Science/Life Support Research Technologies	**Physio-Chemical Life Support - Water Recovery & Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: Space Suits**
	10:30-12:30	**10:30-12:30**	**10:30-12:30**	**10:30-12:30**
	Organizers: ***Bob Morrow, Sierra Nevada Corporation*** ***John Wetzel, Sierra Nevada Corporation*** ***Jean Hunter, Cornell University*** ***John Hogan, NASA Ames Research Center*** *(Session 1/3 - see following pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Mike Flynn, NASA Ames Research Center* *Andrew Jackson, Texas Tech University* *Cesare Lobascio, Thales Alenia Space* *Petr Andreychuk, RSC Energia* *(Session 1/6 - see following pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 1/7 - see following pages for more)*	*Organizers:* ***Jinny Ferl, ILC Dover*** *Kristine Davis, NASA Johnson Space Center* *(Session 1/6 - see following pages for more)*
10:30	**The Microbiology of Microgreens Grown in Controlled Environment Chambers under ISS Conditions** **ICES-2022-267**	**Status of ISS Water Management and Recovery** **ICES-2022-98**	**Recent development status of Oxygen Generation System for future exploration missions** **ICES-2022-174**	**NASA Advanced Space Suit Pressure Garment System Status and Development Priorities 2022** **ICES-2022-253**
	Mary Hummerick (Amentum Services), Aaron Curry (Amentum Services), Jennifer Gooden (Amentum Services), Cory Spern (Amentum Services), Lashelle Spencer (Amentum Services), Matthew Romeyn (NASA) and Jason Fischer (Amentum)	*Jill Williamson (NASA), Andrew Gleich (Boeing) and Jonathan Wilson (NASA)*	*Shotaro Futamura, Chiaki Yamazaki, Satoshi Matsumoto, Asuka Shima, Masato Sakurai and Hideki Saruwatari (Japan Aerospace Exploration Agency)*	*Shane Mcfarland (NASA), Richard Rhodes (NASA) and Don Campbell (KBR/NASA-JSC)*
11:00	**Plant Water Management Experiments: Hydroponics 3 & 4** **ICES-2022-12**	**Closing the Water Loop for Exploration: 2021-2022 Status of the Brine Processor Assembly** **ICES-2022-317**	**Status of the Advanced Oxygen Generation Assembly Design** **ICES-2022-199**	**NASA Advanced Space Suit xEMU Development Report – Liquid Cooling and Ventilation Garment** **ICES-2022-257**
	Marc Wasserman (Portland State University), Mark Weislogel (IRPI LLC), Logan Torres (IRPI LLC), Tyler Hatch (NASA Glenn Research Center) and John McQuillen (NASA Glenn Research Center)	*Stephanie Boyce, Sunday Molina, Walter Harrington, Connor Joyce, Patrick Pasadilla, Philipp Tewes (Paragon Space Development Organization), Jill Williamson, Jay Perry (NASA Marshall Space Flight Center), Katherine Toon, Caitlin Meyer (NASA Johnson Space Center) and Susana Tapia Harper (NASA White Sands Test Facility)*	*Kevin Takada (NASA), Alesha Ridley (NASA), Steven Van Keuren (S&K Global Solutions, Inc.), Phillip Baker (Collins Aerospace), Stephen McDougle (Aegis Aerospace, Inc.) and David Hornyak (NASA)*	*Shane Mcfarland (NASA) and David Cox (NASA JSC)*
11:30	**Plasma Assisted Acid Leaching of Inedible Biomass for Nutrient Recovery** **ICES-2022-186**	**Microgravity Effect on Bacterial Growth: A Literature Review** **ICES-2022-269**	**Development of CO2 hydrogenation-water electrolysis tandem reactor** **ICES-2022-85**	**Performance of the Shortened Liquid Cooling Warming Garment During Simulated MicroG EVA** **ICES-2022-144**
	Kenneth Engeling (NASA), Ryan Gott (Oak Ridge Associated Unniversities), Griffin Lunn (Amentum), Carolina Franco (Amentum), Misle Tessema (NASA) and Bruce Link (Southeastern Universities Research Associaton)	*Wenyan Li (URS Federal Services), Angie Diaz (URS Federal Services Inc), Tesia Irwin (The Bionetics Corporation), Aubrie Orourke (NASA) and Luz Calle (NASA)*	*Asuka Shima (JAXA), Yoshitsugu Sone (JAXA), Masato Sakurai (JAXA), Hironori Nakajima (Kyushu Univ.), Mitsuhiro Inoue (Univ. of Toyama) and Takayuki Abe (Univ. of Toyama)*	*Sophie Bielawski (University of North Dakota, Department of Space Studies), Pablo de Leon (University of North Dakota, Department of Space Studies) and Gloria R. Leon (University of Minnesota, Department of Psychology)*
12:00	**Plant Water Management in Microgravity** **ICES-2022-11**	**Experience of Water Supply Systems Working on the ISS Russian Segment and Development Prospects** **ICES-2022-273**	**"Getter" Development for International Space Station Sabatier Assembly** **ICES-2022-54**	**Orthostatic Intolerance Garments for Spaceflight: Posture-Informed Design for Improving Garment Comfort** **ICES-2022-151**
	Tyler Hatch (NASA Glenn Research Center), Marc Wasserman (Portland State University), John McQuillen (NASA Glenn Research Center) and Mark Weislogel (IRPI LLC)	*Petr Andreychuk (RSC Energia), Sergey Romanov (RSC Energia), Alexander Zeleznyakov (RSC Energia), Leonid Bobe (NIICHIMMASH), Alexey Kochetkov (NIICHIMMASH), Alexander Tsygankov (NIICHIMMASH) and Dmitry Arakcheev (NIICHIMMASH)*	*Ping Yu, Julius Woods, Matthew Corcoran (Collins Aerospace), Oscar Monje, Riley Finn (NASA Kennedy Space Center), Jay Perry, Matthew Kayatin (NASA Marshall Space Flight Center), Lynda Gavin, John Garr and Stephanie Walker (NASA Johnson Space Center)*	*Ruth Bunford (RMIT University), Braid MacRae (RMIT University), James Waldie (Human Aerospce), Rajiv Padhye (RMIT University) and Gordon Cable (Human Aerospace)*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES509-A: AIAA LS&S	**ICES503: AIAA LS&S**	**ICES107: TECS/IIC**	
	Fire Safety in Spacecraft and Enclosed Habitats	**Radiation Issues for Space Flight**	**Thermal Design of Cubesats, Nanosats, and Other Small Satellites**	
	10:30-12:30	**10:30-12:30**	**10:30-12:30**	
	Organizers: ***Grunde Jomaas, University of Edinburgh*** ***Gary A. Ruff, NASA Glenn Research Center*** ***David Urban, NASA Glenn Research Center*** ***Stephen Peralta, NASA White Sands*** ***Michael Johnston, NASA, Glenn Research Center*** *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Ron Turner, ANSER*** ***Elizabeth Marandola, Sierra Space***	*Organizers:* ***Stephanie Mauro, NASA Marshall Space Flight Center*** *Robert Coker, Johns Hopkins University Applied Physics Laboratory* *Brian Briggs, NASA Jet Propulsion Laboratory* *Hosei Nagano, Nagoya University*	
10:30	**Limiting Oxygen Concentration of Burning PMMA Cylinders under External Radiant Heating and Subatmospheric Pressures** **ICES-2022-100** *Charles Scudiere (University of California - Berkeley), Christina Liveretou (University of California - Berkeley), Carlos Fernandez-Pello (University of California - Berkeley), Michael Gollner (University of California - Berkeley), Sandra Olson (NASA Glenn Research Center) and Paul Ferkul (NASA Glenn Research Center)*	**The neutron component of the lunar radiation environment** **ICES-2022-244** *Lawrence Heilbronn (University of Tennessee)*	**Thermal Design Approach for Efficient Development of CubeSats with a Common Bus System** **ICES-2022-164** *Toshihiro Shibukawa, Shingo Nishimoto, Shuhei Matsushita, Shinichi Yokobori, Kazuki Takashim, Akihiro Ishikawa, Ryu Funase and Shinichi Nakasuka (The University of Tokyo)*	
11:00	**Flame Retardant Polyamide Fibers for Space Crew Clothing** **ICES-2022-4** *Krishnaswamy Rangan (Materials Modification Inc) and Tirumalai Sudarshan (Materials Modification Inc)*	**Impact of Solar Cycle Duration on Astronaut Radiation Exposure during a Human Mars Mission** **ICES-2022-19** *Ronald Turner (Analytic Services Incorporated)*	**Development of a miniature heat exchanger for mechanically pumped loop systems for active thermal control of CubeSats** **ICES-2022-182** *Thomas Ganzeboom (Royal Netherlands Aerospace Centre (NLR)), Johannes van Es (NLR) and Ludovica Formisani (Delft University of Technology)*	
11:30	**Competition Between Pyrolysis Kinetics and Surface Radiation in Opposed-Flow Flame Spread in a Microgravity Environment** **ICES-2022-128** *Subrata Bhattacharjee (San Diego State University) and Michael Delichatsios (Northeastern University, Boston, MA, 02115)*	**CREW HaT: A Magnetic Shielding System for Space Habitats** **ICES-2022-80** *Paolo Desiati (University of Wisconsin - Madison) and Elena D'Onghia (University of Wisconsin - Madison)*	**Thermal Vacuum Testing of Advanced Thermal Control Devices for Flight Demonstration** **ICES-2022-187** *Satoshi Kajiyama, Takuji Mizutani, Takuya Ishizaki, Kota Tomioka (Nagoya Univ.), Hiroto Tanaka, Hiroki Nagai (Tohoku Univ.), Kan Matsumoto (WEL RESEARCH), Kenichiro Sawada (JAXA), Yoshihiro Machida (SHINKO ELECTRIC), Kazuaki Matsumoto (KANEKA) and Hosei Nagano (Nagoya Univ.)*	
12:00	**Opposed-flow spreading flames: Effect of sub-atmospheric pressure on spread and burning rates** **ICES-2022-219** *Luca Carmignani (UC Berkeley), Priya Garg (UC Berkeley), Maria Thomsen (Universidad Adolfo Ibanez), Michael Gollner (University of California, Berkeley), Carlos Fernandez-Pello (University of California, Berkeley), David Urban (NASA) and Gary Ruff (NASA)*	**Spacecraft Scale Magnetospheric Protection from Galactic Cosmic Radiation** **ICES-2022-15** *John Slough (MSNW LLC)*	**Feasibility Study on Thermal Design for Synthetic Aperture Telescope Using Formation Flying Micro-satellites** **ICES-2022-139** *Shinichi Yokobori (The University of Tokyo), Ryo Suzumoto (The University of Tokyo), Norihide Miyamura (Meisei University), Satoshi Ikari (The University of Tokyo) and Shinichi Nakasuka (The University of Tokyo)*	

TECHNICAL SESSIONS
MONDAY / 11 JULY *Early Afternoon*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES500-B: AIAA LS&S/AIChE	**ICES303-B: AIChE/IIC**	**ICES302-B: AIChE/ASME/IIC**	**ICES400-B: ASME**
	Life Science/Life Support Research Technologies	**Physio-Chemical Life Support - Water Recovery & Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: Space Suits**
	14:30-16:30	**14:30-16:30**	**14:30-16:30**	**14:30-16:30**
	Organizers: ***Bob Morrow, Sierra Nevada Corporation*** ***John Wetzel, Sierra Nevada Corporation*** ***Jean Hunter, Cornell University*** ***John Hogan, NASA Ames Research Center*** *(Session 2/3 - see previous/following pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Mike Flynn, NASA Ames Research Center* *Andrew Jackson, Texas Tech University* *Cesare Lobascio, Thales Alenia Space* *Petr Andreychuk, RSC Energia* *(Session 2/6 - see previous/following pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 2/7 - see previous/following pages for more)*	*Organizers:* ***Jinny Ferl, ILC Dover*** *Kristine Davis, NASA Johnson Space Center* *(Session 2/6 - see previous/following pages for more)*
14:30	**Design and operation of Photomembrane Bioreactor (PMBR) to balance nitrogen in high-ammonia wastewater treatment effluents** **ICES-2022-202**	**Ionic Silver and Iodine Biocide Losses from Potable Water in ISS-Material Tubes under Stagnant Conditions** **ICES-2022-389**	**Development of an Inertial and Cold Trap Filter For Carbon Fines Management** **ICES-2022-375**	**NASA Advanced Space Suit xEMU Development Report – Hard Upper Torso Assembly** **ICES-2022-258**
	Daniella Saetta (University of South Florida/NASA), Jason Fischer (Amentum), Joshua Finn (The Bionetics Corporation), Talon Bullard (University of South Florida), Alexandra Smith (University of South Florida), Lawrence Koss (Amentum), Daniel Yeh (University of South Florida), Oscar Monje (Amentum) and Luke Roberson (NASA)	*Dean Muirhead (Barrios Technology), Niklas Adam (NASA) and Michael Callahan (NASA)*	*Juan Agui (NASA), Robert D. Green (NASA) and Gordon Berger (USRA)*	*Ian Meginnis (NASA), Richard Rhodes (NASA) and Daniel Kim (NASA)*
15:00	**The Plant Water Management Experiments on ISS: Soil** **ICES-2022-13**	**Mitigation of Silver Ion Loss from Solution by Polymer Coating of Metal Surfaces, Part IV** **ICES-2022-7**	**Chemical Vapor Deposition Methane Pyrolysis Enables Closed-loop Oxygen Recovery: Path to Flight** **ICES-2022-390**	**NASA Advanced Space Suit xEMU Development Report – Helmet and Extra-Vehicular Visor Assembly** **ICES-2022-260**
	Marc Wasserman (Portland State University), Mark Weislogel (IRPI LLC), Rihana Mungin (Portland State University), Tyler Hatch (NASA Glenn Research Center) and John McQuillen (NASA Glenn Research Center)	*John Vance (NASA AMES RESEARCH CENTER / KBRwyle) and Lance Delzeit (NASA)*	*Amanda Childers (Honeywell International Inc.), Stephen Yates (Honeywell International Inc.), Abigail Parsons (Honeywell International Inc.), Jeff Spencer (Honeywell International Inc.), Jason Smoke (Honeywell International Inc.) and Mehrad Mehr (Honeywell International Inc.)*	*Kristine Davis (NASA) and Tymon Kukla (NASA)*
15:30	**Sustainable Life Support enabled by microalgae: focus on biomass harvesting and culture medium recycling** **ICES-2022-197**	**Engineering Polymers as Structural Materials in Spacecraft Water Systems** **ICES-2022-10**	**A Two-Stage Regenerable Filter for Collection and Disposal of Carbon Fines** **ICES-2022-401**	**Electrochromic Visors for Advanced Spacesuit Helmets** **ICES-2022-347**
	Marie Vandermies (QinetiQ), Dries Demey (QinetiQ), Estelle Couallier (University of Nantes) and Jordan Tallec (AlgoSolis)	*John Vance (NASA AMES RESEARCH CENTER / KBRwyle), Alexander Shaw (NASA AMES RESEARCH CENTER / UNIVERSITIES SPACE RESEARCH ASSOCIATION) and Lance Delzeit (NASA)*	*Gordon Berger (USRA), Juan Agui (NASA), Cara Black (NASA), Jeff Mehan (Jacobs), John Holtsnider (Umpqua Research Company) and Bryan McCurry (Umpqua Research Company)*	*Avni Argun (Giner, Inc.), Andrew Weber (Giner, Inc.), David Markham (Giner, Inc.), Kristine Davis (NASA Johnson Space Center) and Tymon Kukla (NASA Johnson Space Center)*
16:00		**Feasibility Testing of Silver Electrolysis for Disinfection of Spacecraft Potable Water Systems** **ICES-2022-20**	**Development of a Microlith® Catalytic Oxidizer for Exploration Trace Contaminant Control** **ICES-2022-1**	**Advanced Nanocomposites for Exploration Extravehicular Mobility Unit (xEMU) Suits using STF-Armor™ for Lunar Regolith Dust Mitigation** **ICES-2022-212**
		Phillip Hicks (Jacobs Technology) and Niklas Adam (NASA)	*Matthew Kayatin (NASA MSFC), Jay Perry (NASA MSFC), Saurabh Vilekar (Precision Combustion, Inc.) and Curtis Morgan (Precision Combustion, Inc.)*	*Richard Dombrowski (STF Technologies LLC), Erik Hobbs (STF Technologies LLC), Shane Jacobs (David Clark Company), Norman Wagner (University of Delaware), Maria Katzarova (University of Delaware) and Richard Rhodes (NASA Johnson Space Center)*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES509-B: AIAA LS&S	**ICES504-A: AIAA LS&S**		**ICES202-A: IIC**
	Fire Safety in Spacecraft and Enclosed Habitats	**Management of Air Quality in Sealed Environments**		**Satellite, Payload, and Instrument Thermal Control**
	14:30-16:30	**14:30-16:30**		**14:30-16:30**
	Organizers: ***Grunde Jomaas, University of Edinburgh*** ***Gary A. Ruff, NASA Glenn Research Center*** ***David Urban, NASA Glenn Research Center*** ***Stephen Peralta, NASA White Sands*** ***Michael Johnston, NASA, Glenn Research Center*** *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Tina Goodall, UK Ministry of Defence*** ***William Wallace, KBR*** *(Session 1/2 - see following pages for more)*		*Organizers:* ***Johannes van Es, NLR*** *Romain Peyrou-Lauga, European Space Agency* *David Valentini, Thales Alenia Space* *Hiroyuki Ogawa, Japan Institute of Space and Astronautical Science* *Alberto Corbelli, Sitael* *(Session 1/2 - see following pages for more)*
14:30	**Fire Characterization and Gas Analysis of Lithium-Ion Batteries During Thermal Runaway** **ICES-2022-192** *Byoungchul Kwon, Wohan Cui, Pushkal Kannan, Cole Compton, Ya-Ting Liao, Fumiaki Takahashi (Case Western Reserve University)* *Judy Jeevarajan, Daniel Juarez-Robles and Mohammad Parhizi (Underwriters Laboratories Inc)*	**Effects of Ambient Alcohol Levels on the Real-time Monitoring of the Atmosphere of the International Space Station** **ICES-2022-57** *William Wallace (KBR), Thomas Limero (KBR), Kenneth Clark (JES Tech), Daniel Gazda (NASA) and Edgar Hudson (JES Tech)*		**James Webb Space Telescope Initial On-Orbit Thermal Performance** **ICES-2022-416** *Wes Ousley (Lentech, Inc), Keith Parrish (NASA/GSFC), Shaun Thomson (NASA/GSFC) and Kan Yang (NASA/GSFC)*
15:00	**Model Development of Large-Scale Spacecraft Fires during the Saffire-IV Experiments** **ICES-2022-278** *John Brooker (NASA) and Justin Niehaus (NASA)*	**Quantitation of Trace Water in ISS Atmosphere Samples Recovered from CO2-Removal Systems** **ICES-2022-58** *Steven Beck (KBR), William King (KBR), Cristina Muko (KBR) and Daniel Gazda (NASA)*		**SVOM MXT Instrument: Thermal Control System Design and Verification** **ICES-2022-147** *Narjiss Boufracha, Albert Gomes, Karine Mercier, François Gonzalez (CNES), Thierry Tourrette (CEA IRFU), Alexander Lodge, James F. Pearson (University of Leicester), Adrien Jeanmougin (Epsilon Alcen), Alexandre Van Haute (Euro Heat Pipes), Alexandre Guevezov (Airbus Defense and space), Diego GÖtz and Aline Meuris (CEA IRFU)*
15:30	**A Numerical Study of Liquid Fuel Wick Flames in Artificial Partial Gravity in a Centrifuge Facility** **ICES-2022-224** *Arland Zatania Lojo (Case Western Reserve University), Ankit Sharma (Case Western Reserve University), Ya-Ting Liao (Case Western Reserve University), Michael Johnston (USRA/NASA GRC) and Paul Ferkul (USRA/NASA GRC)*	**Evaluation of monoethanolamine and ammonia adsorbents for atmosphere control** **ICES-2022-14** *Charles Cummings (QinetiQ) and Edward Harris (QinetiQ)*		**Development and qualification of ECLAIRs Instrument Thermal Control System using Variable Conductance Heat Pipes** **ICES-2022-86** *Yann Cervantes (CNES), François Gonzalez (CNES), Philippe Guillemot (CNES), Helene Pasquier (CNES), Victor Cleren (ESA), Adrien Frezouls (EPSILON), Adrien Jeanmougin (EPSILON), Mikael Mohaupt (EHP), Alexandre Van Haute (EHP) and Alexandre Guevezov (Airbus Defence and Space)*
16:00		**Preparations for 2nd US Navy Submarine Sea Trial Utilizing NASA and US Navy Analyzers** **ICES-2022-230** *Joshua Manney (Naval Surface Warfare Center Philadelphia Division), Jay Smith (Naval Surface Warfare Center Philadelphia Division), Paul Mudgett (NASA Johnson Space Flight Center), Jeffrey Pilgrim (Vista Photonics, Inc) and Joshua Bowman (Naval Sea Systems Command)*		**Deployable Passive Radiator Development** **ICES-2022-89** *Fabian Preller (INVENT GmbH), Reinhard Schlitt (Engineering Services), Frank Bodendieck (OHB System AG), Ondrej Krepl (OHB Czechspace s.r.o.) and Felix Beck (ESA)*

TECHNICAL SESSIONS
MONDAY / 11 JULY *Late Afternoon*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES500-C: AIAA LS&S/AIChE	**ICES303-C: AIChE/IIC**	**ICES302-C: AIChE/ASME/IIC**	**ICES400-C: ASME**
	Life Science/Life Support Research Technologies	**Physio-Chemical Life Support - Water Recovery & Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: Space Suits**
	17:00-18:00	**17:00-18:00**	**17:00-18:00**	**17:00-18:00**
	Organizers: ***Bob Morrow, Sierra Nevada Corporation*** ***John Wetzel, Sierra Nevada Corporation*** ***Jean Hunter, Cornell University*** ***John Hogan, NASA Ames Research Center*** *(Session 3/3 - see previous pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Mike Flynn, NASA Ames Research Center* *Andrew Jackson, Texas Tech University* *Cesare Lobascio, Thales Alenia Space* *Petr Andreychuk, RSC Energia* *(Session 3/6 - see previous/following pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 3/7 - see previous/following pages for more)*	*Organizers:* ***Jinny Ferl, ILC Dover*** *Kristine Davis, NASA Johnson Space Center* *(Session 3/6 - see previous/following pages for more)*
17:00	**Design and Build of HelmHoltz Coils to Generate Hypomagnetic Field for Low Cost Space Biology Experiments** **ICES-2022-339**	**Hybrid Life Support System Full Scale Testing: Integrated bioreactor-desalination for an early planetary base** **ICES-2022-112**	**Evaluation of Heritage Hardware for Use in Cabin Environments with Reduced Pressure and Increased Oxygen Concentration** **ICES-2022-45**	**NASA Advanced Space Suit xEMU Development Report – Wired Heart Rate Monitor** **ICES-2022-429**
	Terry Trevino (American Military University), Terry Rector (University of North Dakota), Nicholas Vasquez (Washington University), Kolemann Lutz (Magneto Space) and Herve Cadiou (Institut des Neurosciences Cellulaires et Intégratives)	*W. Andrew Jackson (Texas Tech University), Ghaem Hooshyari (Texas Tech University), Evan Gray (Texas Tech University), Michael Callahan (Texas Tech University) and Maryam Salehi Pour Bavarsad (Texas Tech University)*	*Morgan Abney (NASA), Robert Bagdigian (ESSCA), Chase Hopkins (NASA Intern), Michael Pedley (NASA), Ariel Macatangay (NASA), Holly Cagle (NASA) and James Knox (ESSCA)*	*Ian Meginnis (NASA), Christopher Woodbury (NASA/Jacobs Technology, Inc), Jorge Rivera (NASA/Jacobs Technology, Inc), Michael Jennings (NASA/Jacobs Technology, Inc) and Sree Sreedhar (NASA/Jacobs Technology, Inc)*
17:30	**Design of a Jettison System For Space Transit Vehicles** **ICES-2022-129**	**Organic Carbon and Nitrogen Removal in a Two-Stage Nitrification- Anammox (MABR-PAX) System Treating High Strength Nitrogen Wastewater** **ICES-2022-198**	**ECLSS Air Revitalization Technology Review 2022: Review of Current Published Units and their Fault Modes** **ICES-2022-167**	**NASA Advanced Space Suit xEMU Development Report – Integrated Communication System** **ICES-2022-264**
	Steve Sepka (NASA), Michael Ewert (NASA), Jeff Lee (NASA), Thomas Chen (NASA - Jacobs Technology, Inc.) and Chandrakanth Venigalla (University of Colorado)	*Behnaz Jalili Jalalieh (Texas Tech University), Maryam Salehi Pourbavarsad (Texas Tech University), Ophelie Messan (Texas Tech University), W. Andrew Jackson (Texas Tech university) and Bill Cumbie (Pancopia Inc.)*	*Daniela Ivey, Monica Torralba (Master's Student, Mechanical and Aerospace Engineering Department, University of California) and Stephen Robinson (Professor and Director – Center for Spaceflight Research, University of California Davis)*	*Ian Meginnis (NASA) and William Foster (NASA/ERC Inc.)*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES406: ASME/AIChE	**ICES504-B: AIAA LS&S**	**ICES206: IIC/TECS**	**ICES202-B: IIC**
	Spacecraft Water/Air Quality: Maintenance and Monitoring	**Management of Air Quality in Sealed Environments**	**Crewed Orbiting Infrastructures, Habitats, Space Station and Payload Thermal Control**	**Satellite, Payload, and Instrument Thermal Control**
	17:00-18:00	**17:00-18:00**	**17:00-18:00**	**17:00-18:00**
	Organizers: ***David Zuniga, Axiom Space*** *Darrel Jan, NASA Ames Research Center*	*Organizers:* ***Tina Goodall, UK Ministry of Defence*** ***William Wallace, KBR*** *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Patrick Oger, Airbus*** *Zoltan Szigetvari, Airbus* *Matteo Lamantea, Thales Alenia Space* *Diego Mugurusa, Collins Aerospace* *Dale Winton, Honeywell International*	*Organizers:* ***Johannes van Es, NLR*** *Romain Peyrou-Lauga, European Space Agency* *David Valentini, Thales Alenia Space* *Hiroyuki Ogawa, Japan Institute of Space and Astronautical Science* *Alberto Corbelli, Sitael* *(Session 2/2 - see previous pages for more)*
17:00	**Optimization of a Deionization Bed for an Oxygen Generator Assembly for Exploration Missions** **ICES-2022-60**	**Culture-Independent Microbial Air Profiling using a Spaceflight-Compatible Nanopore Sequencing Method** **ICES-2022-113**	**Gas Trap Plug Design, Function and Performance** **ICES-2022-75**	**Thermal Control System Design, Analysis and Testing for a Supercritical Xenon HET S/S for Micro and Mini satellite** **ICES-2022-99**
	Katherine Westhoff Larner (MEI Technologies Inc), Christopher McPhail (KBR Inc) and Cody Romero (KBR Inc)	*Brandon Dunbar (GeoControl Systems Inc.), Hang Nguyen (JES Tech), Sarah Stahl-Rommel (JES Tech), G. Marie Sharp (KBR), Christian Castro (JES Tech) and Sarah Castro-Wallace (NASA)*	*Grant Bue (NASA), James Phillion (NASA) and Amanda Rivas (The Boeing Company)*	*Marco Sanitate (Sitael SpA) and Andrea Lucchi (Sitael SpA)*
17:30	**Controlled release silver coatings for antibacterial and anti-biofouling stainless steel surfaces** **ICES-2022-229**	**History of NASA's Odor Assessment (Test 6)** **ICES-2022-2**	**Coolant Leak from ISS External Active Thermal Control System (EATCS) – An Examination of Most Probable** **ICES-2022-145**	**Vapor-Venting Thermal Management System for Sample Return Missions** **ICES-2022-34**
	Ali Ansari (Arizona State University), Rafiqul Islam (Cactus Materials), Francois Perreault (Arizona State University), Yuqiang Bi (Cactus Materials), Kiarash Ranjbari (Cactus Materials, Inc.), Afsana Munni (Arizona State University) and Fariya Sharif (Cactus Materials, Inc.)	*Benjamin Greene (Sierra Lobo, Inc.), Vanessa Buchanan (Sierra Lobo, Inc.) and Susana Tapia Harper (NASA)*	*Darnell Cowan (NASA) and Timothy Bond (NASA)*	*Jeff Diebold (Advanced Cooling Technologies) and Calin Tarau (Advanced Cooling Technologies)*

STUDENT POSTER RECEPTION

Monday, 11 July 18:00-19:30 hrs - Great River Ballroom

SPONOSRED BY: AXIOM SPACE

Effective Emissivity of Nonisothermal Isogrid for Spacecraft Radiator Applications

Seth Abramczyk
University of Maryland, Baltimore
NASA GSFC

Functional Prioritization Strategy for Self-Reliant Deep Space Habitat Tradespace

Annika Rollock
University of Colorado Boulder

Pore Wetting Behavior of Ionic Liquids in Polymeric Membranes

Bharath Tata
University of Colorado Boulder

Developing a Sensor Suite Scoring Function for an Environmental Control and Life Support System that Utilizes Machine Learning for Anomaly Detection and Diagnostics

Samuel Eshima
University of Colorado Boulder

Evaluation of Infrared Thermography for Measuring Leg Skin Temperature Changes in a Microgravity and Partial Gravity Analog

Maddie Haas
Texas A&M University

The Design of a Glovebox to Test EVA Suit Gloves, Accommodating Astronaut Heights and Shoulder Widths from 1st to 99th Percentiles

Lewis Simms
Texas A&M University

Design of a Parabolic Flight Experiment to Measure the Volume of Gas Bubbles in Liquid at Separation from a Solid Surface as a Function of Solid Surface Energy and Gravitational Acceleration

Jadon Kaercher
Texas A&M University

H0TP0T – bubble nucleation and fluid management in a novel cooking device for microgravity

Larissa Zhou
Harvard University

Incorporating smart-technology enabled systems for anomaly response in deep-space habitats

Patrick Pischulti
University of Colorado Boulder

Materials Selection and Features of a Gravity Loading Countermeasure Skinsuit for Parabolic Flight Experimentation

Rachel Bellisle
Massachusetts Institute of Technology

Multi-Wavelength Multi-Angle Technique: An approach for particle characterization

Shruti Choudhary
University of Miami

Assessing Crewmember Operational State and Task Performance Effectiveness to Guide Space Habitat Design and Mission Operations

Michael Zero
University of Colorado Boulder

Pressurized Lunar Rover Design and Human Factors Evaluations of Rover Cockpit Mockup

Samuel Kurtin
University of Colorado Boulder

Autonomous System Capabilities and Attributes to Support Function Allocation of Nominal Operations in a 'Smart' Deep Space Habitat

Sophia Zaccarine
University of Colorado at Boulder

Leveraging π-Backbonding Interactions in Robust Metal–Organic Frameworks for Selective CO Separations in a Series-Bosch Reactor

Rachel Rohde
University of California, Berkeley

A Cheminformatics Pipeline for Screening of Candidate Molecules Producible from Resources on Mars

Hikaru Furukawa
Arizona State University

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TECHNICAL SESSIONS
TUESDAY / 12 JULY *Early Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES506-A: AIAA LS&S	**ICES303-D: AIChE/IIC**	**ICES302-D: AIChE/ASME/IIC**	**ICES400-D: ASME**
	Human Exploration Beyond Low Earth Orbit: Missions and Technologies	**Physio-Chemical Life Support - Water Recovery & Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: Space Suits**
	8:00-10:00	**8:00-10:00**	**8:00-10:00**	**8:00-10:00**
	Organizers: ***Dan Barta, NASA Johnson Space Center*** ***James Chartres, Millennium Engineering & Integration (MEI)*** *(Session 1/3 - see following pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Mike Flynn, NASA Ames Research Center* *Andrew Jackson, Texas Tech University* *Cesare Lobascio, Thales Alenia Space* *Petr Andreychuk, RSC Energia* *(Session 4/6 - see previous/following pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 4/7 - see previous/following pages for more)*	*Organizers:* ***Jinny Ferl, ILC Dover*** *Kristine Davis, NASA Johnson Space Center* *(Session 4/6 - see previous/following pages for more)*
8:00	**NASA Environmental Control and Life Support Technology Development for Exploration: 2021 to 2022 Overview** **ICES-2022-281**	**Silver Foam: A Novel Approach for Long-Term Passive Dosing of Biocide in Spacecraft Potable Water Systems – Update 2022** **ICES-2022-97**	**Supported Ionic Liquid Membranes for Carbon Dioxide Capture in Spacecraft Cabin Atmospheres** **ICES-2022-42**	**NASA Advanced Space Suit xEMU Development Report – Ancillary Hardware** **ICES-2022-261**
	James Broyan (NASA-HQ), Melissa McKinley (NASA-JSC), Imelda Stambaugh (NASA-JSC), Gary Ruff (NASA-GRC) and Andrew Owens (NASA-LaRC)	*Tesia Irwin (The Bionetics Corporation), Wenyan Li (Amentum), Angie Diaz (Amentum), Luz Calle (NASA) and Michael Callahan (NASA)*	*Bharath Tata (University of Colorado Boulder), Pawel Sawicki (University of Colorado Boulder) and James Nabity (University of Colorado Boulder)*	*Tymon Kukla (NASA)*
8:30	**International Space Station as a Testbed for Exploration Environmental Control and Life Support Systems – 2022 Status** **ICES-2022-310**	**Double ChemFET for the In-Line Monitoring of Silver Dosing in Potable Water Systems** **ICES-2022-64**	**Preliminary Investigation of Microgravity Vortex Phase Separator for Liquid Amine CO2 Removal System** **ICES-2022-148**	**Development of a Mechanical-Loading Countermeasure Skinsuit to Mitigate Post-Spaceflight Sensorimotor Dysfunction** **ICES-2022-82**
	Alesha Ridley, Laura Beachy, Christopher Brown (National Aeronautics and Space Administration), Paul Caradec (Leidos Innovations Corporation), John Garr, Lynda Gavin, David Hornyak, Christopher Matty, Laura Shaw and Katherine Toon (National Aeronautics and Space Administration)	*John Abdou (KBR), Lance Delzeit (NASA), Jing Li (NASA) and Ami Hannon (KBR)*	*Alexander Sarvadi (University of North Texas), Huseyin Bostanci (University of North Texas), Cable Kurwitz (Texas A&M University), Grace Belancik (NASA Ames Research Center) and Darrell Jan (NASA Ames Research Center)*	*Braid MacRae (RMIT University), Ruth Bunford (RMIT University), James Waldie (Human Aerospace), Gordon Cable (Human Aerospace), Rajiv Padhye (RMIT University) and Abby Rudakov (RMIT University)*
9:00	**NASA Crew Health & Performance Capability Development for Exploration: 2021 to 2022 Overview** **ICES-2022-299**	**Considerations on Electrolytic Conductivity Measurement for Monitoring of Ionic Silver Biocide Dosing** **ICES-2022-8**	**Preliminary Tests with Variable Conductance Radiator for CO2 Deposition in Deep Space Transit** **ICES-2022-292**	**NASA Advanced Space Suit xEMU Development Report – Shoulder Assembly** **ICES-2022-431**
	Andrew Abercromby (NASA), Grace Douglas (NASA), Kent Kalogera (NASA), Jeffrey Somers (NASA), Rahul Suresh (NASA), Moriah Thompson (NASA), Scott Wood (NASA), Emma Hwang (KBR Wyle Services), Kyle Parton (KBR Wyle Services) and James Broyan (NASA)	*John Vance (NASA AMES RESEARCH CENTER / KBRwyle), Lance Delzeit (NASA) and John Abdou (NASA AMES RESEARCH CENTER / KBRWyle)*	*Balmore Giron-Olivares (University of North Texas), Huseyin Bostanci (University of North Texas), Cable Kurwitz (Texas A&M University), Grace Belancik (NASA Ames Research Center) and Darrell Jan (NASA Ames Research Center)*	*Ian Meginnis (NASA), Shane McFarland (NASA/Aegis Aerospace), Richard Rhodes (NASA), Jeff Watters (NASA) and David Cox (NASA/Aegis Aerospace)*
9:30	**A Review of Baseline Assumptions and Ersatz Waste Streams for Partial Gravity Habitats and Orbiting Microgravity Habitats** **ICES-2022-388**	**DirectINJECT: Dosing Systems for Concentrated Liquid Biocides** **ICES-2022-9**	**Electrochemically-driven CO2 Removal using Anion Exchange Membranes for Spacecraft Cabin Air Revitalization** **ICES-2022-387**	**Utilizing Finite Element Analysis (FEA) to Predict Fit and Performance of an EVA Lower Arm Assembly Pressure Garment** **ICES-2022-316**
	Dean Muirhead (Barrios Technology, Jacobs JETS Contract), Stacey Moller (Aerodyne Industries, Jacobs JETS Contract), Niklas Adam (NASA) and Michael Callahan (NASA)	*John Vance (NASA AMES RESEARCH CENTER / KBRwyle) and Lance Delzeit (NASA)*	*Stephanie Matz (University of Delaware), Brian Setzler (University of Delaware) and Yushan Yan (University of Delaware)*	*Dillon Hall (Texas A&M University), Bonnie J. Dunbar (Texas A&M University) and Darren J. Hartl (Texas A&M University)*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	GREAT RIVER I
	ICES207-A: IIC/TECS	**ICES104-A: TECS/IIC**	**ICES510-A: AIAA LS&S**	**ICES502-A: AIAA LS&S**
	Thermal and Environmental Control Engineering Analysis and Software	**Advances in Thermal Control Technology**	**Planetary and Spacecraft Dust Properties and Mitigation Technologies**	**Space Architecture**
	8:00-10:00	**8:00-10:00**	**8:00-10:00**	**8:00-10:00**
	Organizers: ***Henri Brouquet, ITP Aero*** *Brian Briggs, NASA Jet Propulsion Laboratory* *Matthew Vaughan, European Space Agency* *Hume Peabody, NASA Goddard Space Flight Center* *(Session 1/3 - see following pages for more)*	*Organizers:* ***Jeff Farmer, NASA Marshall Space Flight Center*** *Philipp B. Hager, European Space Agency* *Yann Cervantes, CNES* *Angel Alvarez-Hernandez, NASA Johnson Space Center* *Chris Massina, NASA Johnson Space Center* *Romain Poudevigne, ArianeGroup* *(Session 1/2 - see following pages for more)*	*Organizers:* ***Marie-Christine Desjean, CNES*** ***Juan H. Agui, NASA Glenn Research Center*** ***Marit Meyer, NASA Glenn Research Center*** *(Session 1/3 - see following pages for more)*	*Organizers:* ***Georgi Petrov, Synthesis Int'l*** ***Sandra Haeuplik-Meusburger, TU Wien*** ***François Lévy, Synthesis Int'l*** ***Mahsa Esfandabadi, University of Houston*** *(Session 1/4 - see following pages for more)*
8:00	**Reduced Geometric Model of Sentinel-3A for Radiative Thermal Simulation** **ICES-2022-93** *Vincent Vadez (Dorea) and François Brunetti (Dorea)*	**Demonstration of 3D printed Phase Change Material Heat Capacitors for Space Application** **ICES-2022-138** *Lukas Schulz (Airbus Defence and Space), Ulrich Rauscher (Airbus Defence and Space), Martin Altenburg (Airbus Defence and Space), Florian Baumann (Airbus Defence and Space) and Erik Hailer (Airbus Defence and Space)*	**Assessing Dust Migration Though Pressurized Habitable Volumes** **ICES-2022-328** *Elizabeth Marandola (Sierra Space) and William O'Hara (Sierra Space)*	**Habitability and the Golden Rule of Space Architecture** **ICES-2022-22** *Sheryl Bishop (University of Texas Medical Branch), Sandra Haeuplik-Meusburger (TU Wien space-craft Architektur) and James A. Wise (Neutra Institute for Survival Through Design)*
8:30	**Reduced-order modeling for spacecraft thermal-structural applications** **ICES-2022-110** *Derek Hengeveld (Redwire), Jacob Moulton (Redwire), David Tobin (Redwire), Ryan Vasas (Redwire), Emmett Nelson (Redwire), Alice Liu and Hume Peabody (NASA Goddard Space Flight Center)*	**Direct printing of heating elements for thermal control systems of spacecraft** **ICES-2022-92** *Michael Aldorf, André Holz (Airbus Defence and Space GmbH), Moritz Greifzu, Jonas Vom Weg, Lukas Stepien (Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS), Marten Berlin (Technische Universität Braunschweig), and Jaschar Salmanow (Technische Universität Dresden, Institute of Materials Science)*	**in-Situ Individual Particle Sizer (iSIPS) apparatus** **ICES-2022-420** *Daniel Cantin (INO), Ovidiu Pancrati (INO), Denis Panneton (INO), Jean-Francois Cormier (INO), Sebastien Roy (INO), Simon Turbide (INO), Nafiseh Sang-Nourpour (University Alberta/INO) and Jason Olfert (Aerosol Science and Technology, Department of Mechanical Engineering, University of Alberta)*	**Bringing it Home: Finding Synergies Between Earth and Space Construction and Design** **ICES-2022-336** *Christina Ciardullo (SEArch+ LLC), Rebeccah Pailes-Friedman (SEArch+ LLC), Michael Morris (SEArch+ LLC), Raymond Clinton (NASA Marshall Space Flight Center), Jennifer Edmunson (NASA Marshall Space Flight Center) and Michael Fiske (Jacobs Space Exploration Group)*
9:00	**Spacecraft Harness Evaluator (SHARE) a New Software Tool for Thermal Analysis of Spacecraft Harnesses** **ICES-2022-70** *Edwin Bloem, Roel van Benthem, Johannes van Es (Royal Netherlands Aerospace Centre NLR) and Robert Kroll (European Space Agency)*	**Integrated Hot Reservoir Variable Conductance Heat Pipe with Improved Reliability** **ICES-2022-132** *Kuan-Lin Lee, Calin Tarau, William Anderson (Advanced Cooling Technologies,Inc.), Cho-Ning Huang, Chirag Kharangate and Yasuhiro Kamotani (Case Western Reserve University)*	**Electrostatic charging of the lunar surface** **ICES-2022-214** *James R. Phillips III (NASA Kennedy Space Center), Adrienne R. Dove (University of Central Florida), Charles R. Buhler (NASA Kennedy Space Center), Michael R. Johansen (NASA Kennedy Space Center) and Carlos I. Calle (NASA Kennedy Space Center)*	**Design Strategies of Greenhouse and Food Production/ Preparation Module for Long-Duration Human Exploration Missions** **ICES-2022-150** *Mahsa Esfandabadi (University of Houston) and Olga Bannova (University of Houston)*
9:30	**Linear Control Analysis & Review for Systema – Utilization of Complex Thermo-Elastic Transfer Functions** **ICES-2022-141** *Erik Hailer (Airbus Defence and Space), Johannes Burkhardt (Airbus Defence and Space) and Martin Altenburg (Airbus Defence and Space)*	**Planetary and Lunar Environment Thermal Toolbox Elements (PALETTE) Project Year Two Results** **ICES-2022-423** *David Bugby (Jet Propulsion Laboratory, California Institute of Technology), Jose Rivera (Jet Propulsion Laboratory, California Institute of Technology) and Shawn Britton (NASA Langley Research Center)*	**HEPA Filter Performance for Lunar Dust Removal in Extreme Conditions** **ICES-2022-254** *Andrew Walcker (Paragon Space Development Corp), Ryan Kobrick (Paragon Space Development Corporation) and Juan Agui (NASA GRC)*	**Architectural Design of a Human-Centered Lunar Geology Lab** **ICES-2022-338** *Adam Oswald (University of Colorado Boulder)*

TECHNICAL SESSIONS
TUESDAY / 12 JULY *Late Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES506-B: AIAA LS&S	**ICES303-E: AIChE/IIC**	**ICES302-E: AIChE/ASME/IIC**	**ICES400-E: ASME**
	Human Exploration Beyond Low Earth Orbit: Missions and Technologies	**Physio-Chemical Life Support - Water Recovery & Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: Space Suits**
	10:30-12:30	**10:30-12:30**	**10:30-12:30**	**10:30-12:30**
	Organizers: ***Dan Barta, NASA Johnson Space Center*** ***James Chartres, Millennium Engineering & Integration (MEI)*** *(Session 2/3 - see previous/following pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Mike Flynn, NASA Ames Research Center* *Andrew Jackson, Texas Tech University* *Cesare Lobascio, Thales Alenia Space* *Petr Andreychuk, RSC Energia* *(Session 5/6 - see previous/following pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 5/7 - see previous/following pages for more)*	*Organizers:* ***Jinny Ferl, ILC Dover*** *Kristine Davis, NASA Johnson Space Center* *(Session 5/6 - see previous/following pages for more)*
10:30	**Functionally Aligning Emergent Technologies for Self-Sufficient Deep Space Smart Habitats** **ICES-2022-120** *David Klaus (University of Colorado Boulder), Sophia Zaccarine (University of Colorado Boulder), Patrick Pischulti (University of Colorado Boulder) and Annika Rollock (University of Colorado Boulder)*	**Investigation into Simulated Microgravity Techniques Used to Study Biofilm Growth** **ICES-2022-215** *Angie Diaz (Amentum), Wenyan Li (Amentum), Tesia Irwin (The Bionetics Corporation), Aubrie O'Rourke (NASA), Luz Calle (NASA), Mary Hummerick (Amentum), Christina Khodadad (Amentum), Jonathan Gleeson (The Bionetics Corporation) and Michael Callahan (NASA)*	**Performance of the Four Bed Carbon Dioxide Scrubber ISS Technology Demonstration** **ICES-2022-78** *James Knox (Dynetics Technical Solutions), Gregory Cmarik (Jacobs Space Exploration Group, NASA/MSFC/ES62) and John Garr (NASA Johnson Space Center)*	**Machine-learning Solution for Automatic Spacesuit Motion Recognition and Measurement from Conventional Video** **ICES-2022-111** *Linh Vu (Aegis Aerospace (NASA Anthropometry & Biomechanics Facility)), Han Kim (Leidos (NASA Anthropometry & Biomechanics Facility)), Alex Gordon (KBR (NASA Anthropometry & Biomechanics Facility)) and Sudhakar Rajulu (NASA)*
11:00	**Influence of ECLSS Performance on Spacecraft Habitability** **ICES-2022-59** *James Nabity (University of Colorado Boulder), Kathleen Laughton (University of Colorado Boulder) and Christine Escobar (Space Lab Technologies)*	**Bubble Effects on Electrolysis for Water Purification in Microgravity** **ICES-2022-134** *Satoshi Matsumoto (Japan Aerospace Exploration Agency), Nasa Yoshioka (Japan Aerospace Exploration Agency), Hideki Saruwatari (Japan Aerospace Exploration Agency), Yukitaka Matsumoto (Kurita Water Industries Ltd.) and Kazuya Ishiwata (Kurita Water Industries Ltd.)*	**Thermal Amine Scrubber – Operational Status, Optimization & Improvements** **ICES-2022-355** *Holden Ranz (Collins Aerospace), Steven Dionne (Collins Aerospace), William Papale (Collins Aerospace) and John Garr (NASA Johnson Space Center)*	**IVA Space Suit Flight Qualification** **ICES-2022-122** *Theodore Southern (Final Frontier Design) and Nikolay Moiseev (Final Frontier Design)*
11:30	**ECLSS Architecture and Breakeven Analysis for Mission-Flexible LIFE™ Habitat** **ICES-2022-332** *Elizabeth Marandola (Sierra Space), Sam Moffatt (Sierra Space) and Laura Kelsey (Sierra Space)*	**Demonstration of a Full Size Integrated Greywater Recycling System Combining Biological Pretreatment with Reverse Osmosis** **ICES-2022-279** *Ghaem Hooshyari (Texas Tech University), W. Andrew Jackson (Texas Tech University), Evan Gray (Texas Tech University), Lianfa Song (Texas Tech University), Arpita Bose (Texas Tech University) and Micheal Callahan (Texas Tech University)*	**Carbon Dioxide Removal by Ionic Liquid System (CDRILS): Impacts of Trace Contaminants and Ground Prototype Testing** **ICES-2022-289** *Rebecca Kamire, Phoebe Henson, Stephen F. Yates, Emir Rahislic, Mark Triezenberg, Breydan Dotson, Sean Skomurski, Jack Ford, Eric Pope and Kristen Pedersen (Honeywell International Inc.)*	**NASA Advanced Space Suit xEMU Development Report – Waist Brief Hip** **ICES-2022-262** *Kristine Davis (NASA), Jaren Grimes (NASA) and Chanel Stephens (NASA)*
12:00	**Inflatable Habitat Structural Health Monitoring via Embedded Fiber Optic Sensors** **ICES-2022-398** *Osgar John Ohanian III (Luna Innovations Incorporated), Susan M. Pope (Luna Innovations Incorporated), Bret Heaslet (Sierra Space Corporation), Grant Woods (Sierra Space Corporation), Matthew Morgan (ILC Dover), James Kirwan (ILC Dover), Joseph Welch (ILC Dover), Thomas Camo Jones (NASA Langley Research Center) and Douglas A. Litteken (NASA Johnson Space Center)*	**Overview of Potential Candidates for Partial Gravity Water Recovery Systems** **ICES-2022-91** *Ingrid Pinel (Lenntech), Niels van Linden (Lenntech) and David van Lennep (Lenntech)*	**JAXA CO2 removal system ISS demonstration (DRCS) development status** **ICES-2022-171** *Kentaro Hirai, Yoko Sakai, Chiaki Yamazaki, Shotaro Futamura, Hironori Yada, Satoshi Matsumoto and Hideki Saruwatari (Japan Aerospace Exploration Agency (JAXA))*	**NASA Advanced Space Suit xEMU Development Report – Environmental Protection Garment** **ICES-2022-265** *Maria Flores-Daley (NASA) and Bobby Jones (NASA)*

Late Morning

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	GREAT RIVER I
	ICES207-B: IIC/TECS	**ICES104-B: TECS/IIC**	**ICES510-B: AIAA LS&S**	**ICES502-B: AIAA LS&S**
	Thermal and Environmental Control Engineering Analysis and Software	**Advances in Thermal Control Technology**	**Planetary and Spacecraft Dust Properties and Mitigation Technologies**	**Space Architecture**
	10:30-12:30	**10:30-12:30**	**10:30-12:30**	**10:30-12:30**
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10:30	**Digitalization of Space Thermal Engineering** **ICES-2022-194** *Alexandre Darrau (ESA), James Etchells (ESA) and Matthew Vaughan (ESA)*	**Optimization and Thermal Vacuum Testing of Variable Emissivity Coatings for Radiators** **ICES-2022-135** *Jean-Paul Dudon (Thales Alenia Space), Laurent Dubost (HEF-IREIS), Philipp Hager (European Space Agency), Stephanie Remaury (CNES), Frederic Vidal (Université de Cergy-Pontoise), Alice Ravaux (HEF-IREIS), Bérangère Doll (Thales Alenia Space), Bruno Bras (ESA-ESTEC) and Sophie Cantin (LPPI)*	**Proposed protocols for defining requirements and sizing of media-based filters for spacecraft and planetary lander applications** **ICES-2022-307** *Robert Green (NASA), Rajagopal Vijayakumar (AERFIL), Juan Agui (NASA), Gordon Berger (USRA) and Matthew Johnson (Jacobs Technology Inc.)*	**Implementation of In-situ Resource Utilization for the Development of a Moon Village** **ICES-2022-220** *Marlies Arnhof (European Space Agency), Belinda Rich (European Space Agency), Hanna Lakk (European Space Agency), Advenit Makaya (European Space Agency), Aidan Cowley (European Space Agency), Georgi I. Petrov (Skimore, Owings & Merrill), Daniel Inocente (Skimore, Owings & Merrill) and Colin Koop (SOM)*
11:00	**Development of Improved Thermal Analysis Capabilities at the NASA Goddard Space Flight Center** **ICES-2022-396** *Hume Peabody (NASA-GSFC) and Eric Yee (NASA-GSFC)*	**Development and Testing of a Lightweight Thermal Louver with Single Crystal Shape Memory Alloy** **ICES-2022-421** *Yuki Akizuki (Japan Aerospace Exploration Agency), Kenichiro Sawada (Japan Aerospace Exploration Agency), Hirobumi Tobe (Japan Aerospace Exploration Agency) and Hiroyuki Ogawa (Japan Aerospace Exploration Agency)*	**Lessons Learned from the Airborne Particulate Monitor ISS Payload** **ICES-2022-311** *Marit Meyer (NASA) and Bettylynn Ulrich (Jacobs Technology, Inc., Houston, Texas 77058)*	**Lunar Surface Cargo Offloading Concepts** **ICES-2022-38** *Tracy Gill (NASA), Jaime De Jesus Gomez Jr. (NASA), Don Pittman (NASA), Mark Lewis (NASA), Kara Beaton (The Aerospace Corporation), Steven Chappell (The Aerospace Corporation) and Paul Kessler (NASA)*
11:30	**Real-time Thermal Co-simulation With A Simplified Fluid Loop Modelling Algorithm** **ICES-2022-95** *Adrien Boudin (Dorea), François Brunetti (Dorea) and Patrick Connil (Thales Alenia Space)*	**Development of an Engineering Model of the Re-Deployable Radiator for Deep Space Explorer** **ICES-2022-422** *Kenichiro Sawada, Yuki Akizuki, Tomihiro Kinjo, Hiroyuki Ogawa, Takeshi Miyabara, Takakazu Okahashi, Hiroyuki Toyota, Kazutaka Nishiyama, Hiroshi Imamura, Takeshi Takashima, Toshiaki Okudaira (Japan Aerospace Exploration Agency), Keiji Miyamoto, Kan Matsumoto, Kazuki Watanabe (WEL Research), and Hosei Nagano (Nagoya University)*	**Demonstration of the International Space Station Particle Database Website** **ICES-2022-160** *Nathalie Tuya (Columbia University), Wenyan Li (NASA Kennedy Space Center), Luz Calle (NASA Kennedy Space Center), Marit Meyer (NASA Glenn Research Center), Meytar Sorek-Hamer (NASA Ames Research Center) and Irina Hallinan (Universities Space Research Association)*	**Surface Systems and Interface Standardization** **ICES-2022-43** *Jaime Gomez (NASA KSC), Don Pittman (NASA KSC), Gabor Tamasy (NASA KSC), Chad Caron (NASA KSC), Michael Dupuis (NASA KSC) and Mark Lewis (NASA KSC)*
12:00			**Presence of Metal Aerosols on the International Space Station** **ICES-2022-288** *Amanda Rodell (Missouri S&T), Wenyan Li (URS Federal Services), Luz Calle (NASA) and Marit Meyer (NASA)*	**Human outpost creation using multiple data sets and computational design** **ICES-2022-181** *Thomas Lagarde (Space Architecture Technical Committee) and Matko Brandic Lipinski (University of Zagreb/Sveuciliste u Zagrebu)*

TECHNICAL SESSIONS
TUESDAY / 12 JULY *Early Afternoon*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES506-C: AIAA LS&S	**ICES303-F: AIChE/IIC**	**ICES302-F: AIChE/ASME/IIC**	**ICES400-F: ASME**
	Human Exploration Beyond Low Earth Orbit: Missions and Technologies	**Physio-Chemical Life Support - Water Recovery & Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: Space Suits**
	14:30-16:30	**14:30-16:30**	**14:30-16:30**	**14:30-16:30**
	Organizers: ***Dan Barta, NASA Johnson Space Center*** ***James Chartres, Millennium Engineering & Integration (MEI)*** *(Session 3/3 - see previous pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Mike Flynn, NASA Ames Research Center* *Andrew Jackson, Texas Tech University* *Cesare Lobascio, Thales Alenia Space* *Petr Andreychuk, RSC Energia* *(Session 6/6 - see previous pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 6/7 - see previous/following pages for more)*	*Organizers:* ***Jinny Ferl, ILC Dover*** *Kristine Davis, NASA Johnson Space Center* *(Session 6/6 - see previous pages for more)*
14:30	**The COSPAR Planetary Protection Knowledge Gaps Workshop Series – An Agency Perspective** **ICES-2022-274** *J Andy Spry (SETI Institute), Bette Siegel (National Aeronautics and Space Administration), Elaine Seasly (National Aeronautics and Space Administration) and J Nick Benardini (National Aeronautics and Space Administration)*	**Supercritical Water Oxidation: A Promising Wastewater Treatment Technology** **ICES-2022-294** *Adrialis Figueroa (University of Puerto Rico), Michael Flynn (NASA Ames research Center), Rosa Padilla, Daniel Gotti (University Space Research Association (USRA)), Uday Hegde, Jun Kojima (Case Western Reserve University (CWRU)) and Michael Hicks (NASA Glenn Research Center)*	**Progress of Four Bed Carbon Dioxide Scrubber** **ICES-2022-28** *Gregory Cmarik (Jacobs Space Exploration Group, NASA/MSFC/ES62), James Knox (Dynetics Technical Solutions) and John Garr (NASA Johnson Space Center)*	**Shear Thickening Fluid Treated Space Suit Layups: MISSE-13 Low-Earth Orbit Studies** **ICES-2022-213** *Erik Hobbs (STF Technologies LLC), Richard Dombrowski (STF Technologies LLC), Norman Wagner (University of Delaware, Department of Chemical Engineering), Maria Katzarova (University of Delaware, Department of Chemical Engineering) and Miria Finckenor (NASA Marshall Space Flight Center)*
15:00	**Roadmap of a Lunar Base Using the Lunar Lava Tubes and Their Vertical Skylights** **ICES-2022-156** *Masato Sakurai (JAXA), Asuka Shima (JAXA), Isao Kawano (JAXA), Yasufumi Wakabayashi (JAXA), Junichi Haruyama (JAXA), Takuya Goto (Doshisya University), Mitsuhiko Ohta (Nippon Steel), Ken Shoji (Taisei Advanced Center of Technology) and Hiroyuki Miyajima (International University of Health and Welfare)*	**Supercritical Water Oxidation: Testing of Ersatz Wastewater** **ICES-2022-331** *Michael C. Hicks (NASA - Glenn Research Center), Uday G. Hegde (Case Western University), Rosa E. Padilla (University Space Research Associates), Daniel J. Gotti (University Space Research Associates), Jun J. Kojima (Case Western University) and Michael T. Flynn (NASA - Ames Research Center)*	**Water-resistant CO2-selective Absorbents** **ICES-2022-155** *Fuyuhiko Inagaki (Kobe Gakuin University), Ryo Murakami (Kobe Gakuin University), Hikari Kawamitsu (Kobe Gakuin University) and Hiroto Tanishima (Kobe Gakuin University)*	**Improved Shear Thickening Fluid Treated Space Suit Layups: Terrestrial and ISS MISSE-10 Low-Earth Orbit Studies** **ICES-2022-236** *Erin Hogan, Maria Katzarova, Elaine Stewart, Jacob Hewes, Norman Wagner (Department of Chemical and Biomolecular Engineering, University of Delaware); Richard Dombrowski, Erik Hobbs (STF Technologies LLC) and Miria Finckenor (Space Environmental Effects Team, Marshall Space Flight Center)*
15:30	**DIANA - Dedicated Infrastructure and Architecture for Near-Earth Astronautics** **ICES-2022-188** *Denis Acker, Elizabeth Gutierrez, Adrian Pippert, Nadine Barth, Julienne Böttger, Prishit Modi, Vincent Krein, Sajeel Ahmad Khan, Dominik Gentner (University of Stuttgart), Madison Diamond (University of North Dakota), Alma Kugic (Vienna University of Technology), Javier Palacios Calatayud (University of Cadiz), , Hubert Gross (Rzeszow University of Technology), Tim Lukas Kirsch (Technical University of Berlin), Olaf Drozdowski (Gdansk University of Technology), Filip Szyga (Warsaw University of Technology), Stefania-Denisa Bocu (University POLITECHNICA of Bucharest) and Elena Lopez-Contreras Gonzales*		**Multifunctional Sorbent (MultiSORB) Devices for Contaminant Removal** **ICES-2022-259** *Tra-My Justine Richardson, Andrew Lesh, Keith Peterson (National Aeronautics and Space Administration), Tane Boghozian, Gurpreet Klar and Sander Visser (Analytical Mechanics Associates, INC.)*	**NASA Advanced Space Suit xEMU Development Report – Lunar Boots** **ICES-2022-263** *Shane Mcfarland (NASA) and Zachary Fester (NASA)*
16:00			**Effects of Ball Milling on Zeolite powders for use in Additively Manufactured Solid Sorbents** **ICES-2022-348** *Tiago Costa (Analytical Mechanics Associates, INC.), Tra-My Justine Richardson (NASA), Tane Boghozian (Analytical Mechanics Associates, Inc.) and Nichole Carder (Analytical Mechanics Associates, INC.)*	

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	GREAT RIVER I
	ICES207-C: IIC/TECS **ICES203: IIC** **207: Thermal and Environmental Control Engineering Analysis and Software** **203: Thermal Testing**	**ICES201-A: IIC** **Two-Phase Thermal Control Technology**	**ICES510-C: AIAA LS&S** **Planetary and Spacecraft Dust Properties and Mitigation Technologies**	**ICES502-C: AIAA LS&S** **Space Architecture**
	14:30-16:30	**14:30-16:30**	**14:30-16:30**	**14:30-16:30**
	207 Organizers: ***Henri Brouquet,*** *Brian Briggs, Matthew Vaughan, Hume Peabody* *203 Organizers:* ***Gerd Jahn, Airbus*** *Luke Tamkin, Airbus* *Hiroyasu Mizuno, JAXA* *Andrea Ferrero, Thales Alenia Space* *(207 Session 3/3 - see previous pages for more)*	*Organizers:* ***Frank Bodendieck, OHB System AG*** *Stéphane Lapensée, European Space Agency* *Guanghan Wang, Canadian Space Agency* *Alejandro Torres, IberEspacio S.A.* *Alain Chaix, Thales Alenia Space* *(Session 1/4 - see following pages for more)*	*Organizers:* ***Marie-Christine Desjean, CNES*** ***Juan H. Agui, NASA Glenn Research Center*** ***Marit Meyer, NASA Glenn Research Center*** *(Session 3/3 - see previous pages for more)*	*Organizers:* ***Georgi Petrov, Synthesis Int'l*** ***Sandra Haeuplik-Meusburger, TU Wien*** ***François Lévy, Synthesis Int'l*** ***Mahsa Esfandabadi, University of Houston*** *(Session 3/4 - see previous/following pages for more)*
14:30	*ICES 207* **An enhanced Earth InfraRed flux and Albedo model based on real data** **ICES-2022-61** *Romain Peyrou-Lauga (ESA)*	**Advanced Two-Phase Cooling System for Modular Power Electronics** **ICES-2022-131** *Kuan-Lin Lee (Advanced Cooling Technologies,Inc.), Sai Kiran Hota (Advanced Cooling Technologies,Inc.), Andrew Lutz (Advanced Cooling Technologies,Inc.) and Srujan Rokkam (Advanced Cooling Technologies,Inc.)*	**Modal Optimized Vibration dust Eliminator (MOVE): An Active/Passive Dust Mitigation Technology for Spaceflight Exploration** **ICES-2022-41** *Connor Joyce (Paragon Space Development Corporation) and Ryan Kobrick (Paragon Space Development Corporation)*	**Experimental Investigation of Minimum Cabin Sizes at Varying Gravity Levels** **ICES-2022-367** *Zachary Lachance (University of Maryland), David Akin (University of Maryland), Charles Hanner (Space Systems Lab) and Nicolas Bolatto (University of Maryland)*
15:00	*ICES 207* **Evaluation of temperature estimation accuracy using Physics-Informed Neural Network for small satellite model** **ICES-2022-161** *Hiroto Tanaka (Tohoku University), Koji Fujita (Tohoku University) and Hiroki Nagai (Tohoku University)*	**Development of an Innovative Diaphragm Pump and Two-Phase Mechanically Pumped Loop for Active Antennas** **ICES-2022-203** *Charlton Castro (AVS), Christian Ortega (AVS), Kevin Picton (AVS), Monica Iriarte (AVS), Cristina Ortega (AVS), Henk Jan van Gerner (NLR), Ramon van den Berg (NLR) and Johannes van Es (NLR)*	**Feasibility of using Low-Cost COTS Sensors for Particulate Monitoring in Space Missions** **ICES-2022-232** *Marit Meyer (NASA - Glenn Research Center), Nima Afshar-Mohajer (Gradient Co.), Eben Cross (QuantAQ Inc.) and Paul Mudgett (NASA - Johnson Space Center)*	**Human in the Loop Evaluations: Process and Mockup Fidelity** **ICES-2022-133** *Jackelynne Silva-Martinez (NASA), Gordon Vos (NASA), Jennifer Boyer (NASA), Robert Durkin (NASA), William Foley (NASA), Sarah Margerum (KBR), Kritina Holden (Leidos), Victoria Smith (KBR), Leah Beebe (KBR) and Christopher Van Velson (NASA)*
15:30	*ICES 203* **JUICE (JUpiter ICy moons Explorer) Thermal Vacuum Test** **ICES-2022-3** *Romain Peyrou-Lauga (ESA) and Séverine Deschamps (Airbus Defence and Space)*	**Status of Development of a Thermal Probe for Icy Planet Exploration - II** **ICES-2022-24** *Calin Tarau, Kuan-Lin Lee, Brett Leitherer, Krishna Chetty, Andy Lutz and Srujan Rokkam (Advanced Cooling Technologies, Inc.)*	**Providing Experimental Data for Dust Transport Models Using Novel Technology Aboard a Suborbital Lunar-g Test Flight** **ICES-2022-393** *Benjamin Sumlin (Universities Space Research Association) and Marit Meyer (National Aeronautics and Space Administration)*	**Crew-Passenger Ratio Implications on Commercial Spaceflight Design & Survivability: A Discrete Event Simulation Framework** **ICES-2022-300** *Victor Kitmanyen (Florida Institute of Technology), Hisham Ghunaim (Florida Institute of Technology), Kazuhiko Momose (Florida Institute of Technology) and Luis Otero (Florida Institute of Technology)*
16:00	*ICES 203* **Mars 2020 System Thermal Vacuum (STV) Test Implementation and Results** **ICES-2022-53** *Jennifer Miller (NASA), Kaustabh Singh (Jet Propulsion Laboratory), Sean Reilly (none), Keith Novak (Jet Propulsion Laboratory) and Jacqueline Lyra (Jet Propulsion Laboratory)*	**Development of a Gravity-Insensitive Liquid-Vapor Phase Separator for Extreme Environments** **ICES-2022-21** *Thomas Conboy (Creare, LLC), Gregory Daines (Creare, LLC) and Lucas O'Neill (Creare, LLC)*		**Model and Full-Scale Testing of Outfitting Approaches for Inflatable Habitats** **ICES-2022-365** *Nicolas Bolatto (University of Maryland), Colby Merrill (University of Maryland), Ronak Chawla (University of Maryland), Olivia Naylor (University of Maryland), Elizabeth Myers (University of Maryland) and David Akin (University of Maryland)*

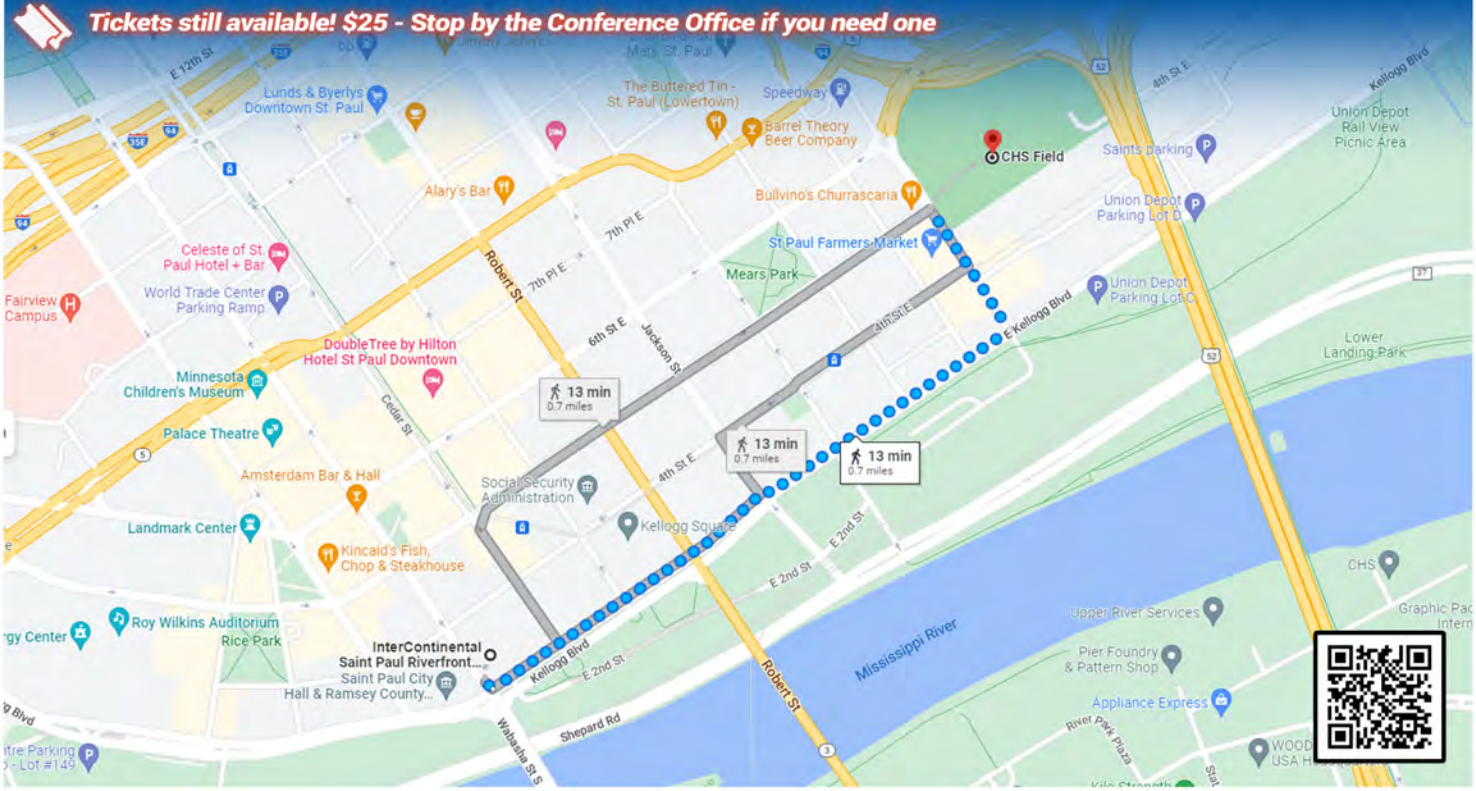
St. Paul Saints Baseball Game

Tuesday, 12 July

17:30 Picnic, 19:05 First Pitch

Join the ICES Community at CHS Field in our reserved seating block to watch the hometown St. Paul Saints take on the Toledo Mud Hens. This minor league team is known for their wacky, crazy, and sometimes outlandish between inning promotions that will provide a game experience like no other! Attendees will enjoy a pre-game picnic served on the Cub-o-Cabana Lawn.

Tickets still available! $25 - Stop by the Conference Office if you need one



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SIERRA™
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Early Career Workshop

Great River Ballroom

Wednesday
13 July
07:00 hrs

Breakfast will be provided to all participants courtesy of ®

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This casual forum is designed to allow for a unique networking opportunity for students and young professionals to connect with veterans in the field to ask about how to best develop their future careers in the domain of environmental systems.

This is a FREE event and if you have not already RSVP'd to attend, please stop by the ICES Registration & Information desk to let us know you would like to join in!

Get sage advice and learn about the career journeys of industry professionals including...

Morgan Abney
– NASA Engineering and Safety Center
Grace Belancik
– NASA Ames Research Center
Jess Bunchek
– DLR
Yann Cervantès
– CNES
Barry Finger
– Paragon Space Development Corporation
Philipp Hager
– European Space Agency
John Hogan
– NASA Ames Research Center
Stéphane Lapensée
– European Space Agency
Jennifer Miller
– NASA Jet Propulsion Laboratory
Romain Peyrou
– European Space Agency
Cindy Reuland
– NASA
Jose Roman
– NASA Marshall Space Flight Center
Lukas Schulz
– Airbus Defence and Space
Dave Urban
– NASA Glenn Research Center
Matthew Vaughn
– European Space Agency
Saurabh Vilekar
– Precision Combustion, Inc.
Dave Williams
– NASA Johnson Space Center

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TECHNICAL SESSIONS
WEDNESDAY / 13 JULY *Early Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES308-A: AIChE	**ICES304-A: AIChE/IIC**	**ICES302-G: AIChE/ASME/IIC**	**ICES402-A: ASME**
	ICES308: - Advanced Technologies for In-Situ Resource Utilization	**Physio-Chemical Life Support - Waste Management Systems - Technology and Process Development**	**Physio-chemical Life Support - Air Revitalization Systems - Technology and Process Development**	**Extravehicular Activity: PLSS Systems**
	9:00-10:30	**9:00-10:30**	**9:00-10:30**	**9:00-10:30**
	Organizers: ***Christian Junaedi, Precision Combustion, Inc.*** ***Brittany Brown, NASA Marshall Space Flight Center*** ***Jerry Sanders, NASA Johnson Space Center*** *(Session 1/3 - see following pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Steve Sepka, NASA* *Matteo Lamantea, Thales Alenia Space* *Annie Meier, NASA Kennedy Space Center* *(Session 1/3 - see following pages for more)*	*Organizers:* ***Morgan Abney, NASA Engineering and Safety Center*** ***Grace Belanchik, NASA Ames Research Center*** ***Jim Knox, Dynetics Technical Solutions*** ***Patrick Oger, Airbus Defence and Space*** *(Session 7/7 - see previous pages for more)*	*Organizers:* ***Gregory Quinn, Collins Aerospace*** ***Bruce Conger, Jacobs*** ***Greg Guyette, Collins Aerospace*** *(Session 1/3 - see following pages for more)*
9:00	**Solid Oxide Electrolysis Based Lunar PSR Ice Processing System for Propellant Hydrogen and Oxygen Production** **ICES-2022-275** *Michele Hollist, Joseph Hartvigsen, Jessica Elwell, S Elangovan, Abel Gomez, Don Claus, Merrill Wilson (OxEon Energy, LLC), Gregory Jackson, Christopher Dreyer, George Sowers, David Dickson, John Schmit and Nasim Emadi (Colorado School of Mines)*	**NASA Universal Waste Management System and Toilet Integration Hardware Operations on ISS – Issues, Modifications and Accomplishments** **ICES-2022-73** *Melissa McKinley (NASA-JSC), Melissa Borrego (NASA) and James Broyan Jr. (NASA-JSC)*	**Additively-Manufactured, Net-Shape Adsorbent Beds for Carbon Dioxide Removal** **ICES-2022-370** *Jim Steppan (HiFunda LLC), Keng Hsu (PADT Inc.), Byron Millet (HiFunda LLC), Kai Morikawa (PADT Inc.) and Tom Meaders (HiFunda LLC)*	**Analysis on the Effect of Flow Interruption in the Oxygen Ventilation Loop on Inspired Carbon Dioxide** **ICES-2022-386** *Noah Andersen (HX5, LLC)*
9:30	**In situ Manufacturing derived from Bioregenerative Life Support Systems** **ICES-2022-435** *Robert Morrow (Sierra Space), John Wetzel (Sierra Space) and Sam Moffatt (Sierra Space)*	**Optimization of Ultrasonic Drying Rate and Efficiency for Spacecraft Solid Waste Management** **ICES-2022-218** *Jonathan Bigelow (Ultrasonic Technology Solutions), Connor Shelander (Ultrasonic Technology Solutions), Tra-My Justine Richardson (Research Physical Scientist, Ames Research Center) and Ayyoub Momen (Ultrasonic Technology Solutions)*	**Robocast Zeolitic Lattices For Reversible CO2 Sorbent Monoliths** **ICES-2022-381** *Joe Cesarano (Robocasting Enterprises LLC), Michael Niehaus (Robocasting Enterprises LLC), Tra-My Justine Richardson (NASA Ames Research Center) and Eric Coker (Sandia National Laboratories)*	**Ultra-Pure, High Endurance Liquid Bladder with Volume Sensor for Space Applications** **ICES-2022-18** *Marc Ramsey (RAPA Technologies), Cinda Chullen (NASA JSC) and Raymundo Moreno (Jacobs)*
10:00	**ROXY - An economically viable process to produce oxygen and metals from regolith** **ICES-2022-140** *Achim Seidel, Martin Altenburg, Emanuele Monchieri (Airbus Defence and Space), Peter Quadbeck, Christian Redlich (Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM), Uday Pal (Boston University) and Florian Strigl (Airbus Defence and Space)*	**Management of Fecal Waste Utilizing a Hybrid Organic Processor Assembly Unit Designed for Resource Recovery** **ICES-2022-272** *Alexandra Smith, Talon Bullard, Daniella Saetta, Ben Hoque, Celia Devito, Katrina Haarmann, Daniel Yeh, Robert Bair, Paul Long, Mark Fehrenbach (University of South Florida), Jason Fischer (NASA) and Luke Roberson (NASA)*		**The Effect of Trace-Contaminant Sorbent Monolith Geometry on Sorbent Performance** **ICES-2022-322** *Marek A. Wójtowicz (Advanced Fuel Research, Inc.), Joseph E. Cosgrove (Advanced Fuel Research, Inc.), Michael A. Serio (Advanced Fuel Research, Inc.), Andrew E. Carlson (Advanced Fuel Research, Inc.) and Cinda Chullen (NASA)*

Early Morning

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	GREAT RIVER I
	ICES101-A: TECS **Spacecraft and Instrument Thermal Systems**	**ICES201-B: IIC** **Two-Phase Thermal Control Technology**	**ICES305: AIChE/ASME/TECS/AIAA LS&S** **Environmental and Thermal Control of Commercial and Exploration Spacecraft**	**ICES502-D: AIAA LS&S** **Space Architecture**
	9:00-10:30	**9:00-10:30**	**9:00-10:30**	**9:00-10:30**
	Organizers: ***Jose Rodriguez, NASA Jet Propulsion Laboratory*** *Hume Peabody, NASA Goddard Space Flight Center* *Wes Ousley, Lentech, Inc.* *Doug Bolton, NASA Jet Propulsion Laboratory* *(Session 1/3 - see following pages for more)*	*Organizers:* ***Frank Bodendieck, OHB System AG*** *Stéphane Lapensée, European Space Agency* *Guanghan Wang, Canadian Space Agency* *Alejandro Torres, IberEspacio S.A.* *Alain Chaix, Thales Alenia Space* *(Session 2/4 - see previous/following pages for more)*	*Organizers:* ***Jordan Holquist, Paragon Space Development Corporation*** *Barry W. Finger, Paragon Space Development Corporation* *Chang Hyun Son, The Boeing Company* *David Williams, NASA Johnson Space Center* *Tom Leimkuehler, NASA Johnson Space Center*	*Organizers:* ***Georgi Petrov, Synthesis Int'l*** ***Sandra Haeuplik-Meusburger, TU Wien*** ***François Lévy, Synthesis Int'l*** ***Mahsa Esfandabadi, University of Houston*** *(Session 4/4 - see previous pages for more)*
9:00	**Use of diffusion bonded Cu strap and Integrated MLI for thermal control of 100K IR detector on L'Ralph instrument** **ICES-2022-117** *Juan Rodriguez (NASA) and Daniel Bae (NASA)*	**Fabrication and Experimental Testing of Variable-View Factor Two-Phase Radiators** **ICES-2022-37** *Jeff Diebold, Calin Tarau, Andrew Lutz, Srujan Rokkam (Advanced Cooling Technologies, Inc.), Michael Eff and Lindsey Lindamood (EWI)*	**Modeling and Separation Performance of the Condensate Separator for Microgravity Conditions (COSMIC)** **ICES-2022-282** *Robert Jacobi (Paragon Space Development Corporation), Kelly Stukbauer (Paragon Space Development Corporation) and Connor Joyce (Paragon Space Development Corporation)*	**Study for a Rigid/Inflatable Greenhouse Module to Integrate Bio-regenerative Life Support Systems into Orbital Facilities and Deep Space Transfer Vehicles** **ICES-2022-137** *Paolo Caratelli (Abu Dhabi University), Maria Alessandra Misuri (Abu Dhabi University) and Rowdha Begam Mohamed Hanifa (Abu Dhabi University)*
9:30	**Multi-Angle Imager for Aerosols Thermal Control System and Articulating Thermal Strap** **ICES-2022-119** *Douglas Bolton (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California)*	**Working Fluid and Material Selection for Heat Pipes and Vapor Chambers for use in Air-Cooled Temperature Swing Adsorption Compression Systems** **ICES-2022-409** *Quinton Dzurny (Georgia Institute of Technology), Tra-My Justine Richardson (NASA Ames) and G.P. Peterson (Georgia Institute of Technology)*	**Regenerative Life Support Systems for Exploration Habitats: Unique Capabilities and Challenges to Enable Long-Duration-Mission Habitats Beyond Low Earth Orbit** **ICES-2022-196** *David Howard (NASA), G. Richard Schunk (NASA), Christine Stanley (NASA), Paul Kessler (NASA) and Tiffany Nickens (NASA)*	**AMORE - Concept Study for a lunar research village** **ICES-2022-297** *Michail Magkos (KTH), Anne Stadtmüller (ABK Stuttgart), Yassin Amara, Nicolas Heinz, Maximilian Hengstmann, Andrea Hinkel, Abhishek Anil, Merve Karakas (University of Stuttgart), Souktik Bhattacherjee (Jadavpur University), Sisinio Dargent de Vicente (ETH Zürich), Patrick Haffmans (Syddansk Universitet), Apoorva Joshi (JSS Science and Technology University), Aleksandr Kolchin (Bauman Moscow State Technical University), Christian Korn (Institute of Space Systems at the University of Stuttgart), Vipul Mani (TU Berlin), Rafael Rivera (University of Puerto Rico Mayagüez Campus), Ilja Skrypnyk (Technische Universität Berlin) and Dominik Tokarz (Warsaw University of Technology)*
10:00	**Europa Clipper Magboom Deployment Thermal Design and Deployment Sequence** **ICES-2022-204** *Elham Maghsoudi (NASA Jet Propulsion Laboratory), Caroline Racho (NASA Jet Propulsion Laboratory), Jonathan Jones (NASA Jet Propulsion Laboratory) and Scotty Allen (Northrop Grumman Goleta)*	**Temperature Oscillations in Loop Heat Pipe Operations – a Revisit** **ICES-2022-404** *Triem Hoang (TTH Research Inc.)*	**Design of a Life support architecture for a reusable lunar habitat** **ICES-2022-36** *Juliette Mollard (Centre National d'Etudes Spatiales (CNES)), Marie-Christine Desjean (Centre National d'Etudes Spatiales (CNES)), Alexis Paillet (Centre National d'Etudes Spatiales (CNES)) and Gregory Navarro (Centre National d'Etudes Spatiales (CNES))*	**Lunar base design concept of DIANA - Dedicated Infrastructure and Architecture for Near-Earth Astronautics** **ICES-2022-298** *Alma Kugic (Vienna University of Technology), Madison Diamond (University of North Dakota), Elizabeth Gutierrez, Denis Acker, Adrian Pippert, Nadine Barth, Prishit Modi (University of Stuttgart), Javier Palacios Calatayud (University of Cadiz), Hubert Gross (Rzeszow University of Technology) and Vincent Krein (University of Stuttgart)*

TECHNICAL SESSIONS
WEDNESDAY / 13 JULY *Late Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES308-B: AIChE	**ICES304-B: AIChE/IIC**	**ICES404: ASME**	**ICES402-B: ASME**
	ICES308: - Advanced Technologies for In-Situ Resource Utilization	**Physio-Chemical Life Support - Waste Management Systems - Technology and Process Development**	**International Space Station ECLS: Systems**	**Extravehicular Activity: PLSS Systems**
	11:00-12:30	**11:00-12:30**	**11:00-12:30**	**11:00-12:30**
	Organizers: ***Christian Junaedi, Precision Combustion, Inc.*** ***Brittany Brown, NASA Marshall Space Flight Center*** ***Jerry Sanders, NASA Johnson Space Center*** *(Session 2/3 - see previous/following pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Steve Sepka, NASA* *Matteo Lamantea, Thales Alenia Space* *Annie Meier, NASA Kennedy Space Center* *(Session 2/3 - see previous/following pages for more)*	*Organizers:* ***Steven Balistreri, The Boeing Company*** ***John Cover, NASA Johnson Space***	*Organizers:* ***Gregory Quinn, Collins Aerospace*** ***Bruce Conger, Jacobs*** ***Greg Guyette, Collins Aerospace*** *(Session 2/3 - see previous/following pages for more)*
11:00	**Overcoming Technical Challenges to Advance the MOXIE Solid Oxide Electrolysis Stack from TRL 3 to 9, Early Challenges to Successful ISRU Oxygen Production on Mars** **ICES-2022-207**	**Trash Compaction and Processing System Development and Testing** **ICES-2022-104**	**Exploring the Benefits of Evolving ISS ECLSS Hardware to 3-D Printed Hardware for Lunar/Mars Surface Habitats: Trace Contaminant Control Subassembly Case Study** **ICES-2022-206**	**SERFE Project Overview** **ICES-2022-295**
	Jessica Elwell (OxEon Energy, LLC), Joseph Hartvigsen (OxEon Energy, LLC), S. Elango Elangovan (OxEon Energy, LLC), Dennis Larsen (OxEon Energy, LLC), Michele Hollist (OxEon Energy, LLC) and Tyler Hafen (OxEon Energy, LLC)	*Joseph Klopotic (Sierra Space) and John Wetzel (Sierra Space)*	*Gregory Gentry (Self)*	*David Westheimer (NASA), Colin Campbell (NASA), Alicia Contreras-Baker (NASA/Jacobs), Benjamin Greene (NASA), Adam Korona (NASA/JETS) and Shonn Everett (Booz Allen Hamilton)*
11:30	**Scale Up and Coupling of the MOXIE Solid Oxide Electrolyzer for Propellant Production on Mars** **ICES-2022-211**	**Microbial Characterization of Heat Melt Compaction for Treatment of Space Generated Solid Wastes** **ICES-2022-293**	**Investigation of the Anomalous Low Voltage Condition of the Oxygen Generation Assembly** **ICES-2022-231**	**SERFE Thermal Performance Results** **ICES-2022-290**
	Joseph Hartvigsen, S. Elango Elangovan, Jessica Elwell, Michele Hollist, Dennis Larsen, Tyler Hafen, Don Claus, Skyler Valdez, Abel Gomez, Piotr Czernichowski, Ainsley Yarosh, Jenna Pike and Nathan Davis (OxEon Energy, LLC)	*Mary Hummerick (Amentum Services), Jason Fisher (Amentum Services), Raymond Wheeler (NASA), Tra-My Justine Richardson (NASA, ARC), Michael Ewert (NASA, ARC), Jeffrey Lee (NASA, ARC) and Lawrence Koss (Amentum Services)*	*Phillip Baker (Collins Aerospace), Robert Roy (Collins Aerospace), Alesha Ridley (NASA) and Steve Van Keuren (S&K Global Solutions, Inc.)*	*David Westheimer (NASA), Colin Campbell (NASA), Alicia Contreras-Baker (NASA/Jacobs), Chane Sladek (NASA/JETS) and Glen Waguespack (NASA/JETS)*
12:00	**Evaluation of Candidate Crop Plant Lactuca Sativa in Biologically Enhanced Martian Regolith** **ICES-2022-65**	**Removal of Urea and Ammonia from Real Human Urine using Bio-electrochemical Reactor system for Closed Loop Environments** **ICES-2022-245**	**ASU SPK-U Toilet System Development and Operation Review and Its Upgrading Plans** **ICES-2022-277**	**SERFE Water Quality Results** **ICES-2022-285**
	Jennifer Russell (Department of Space Studies, University of North Dakota), Gary W. Stutte (SyNRGE LLC) and Pablo De Leon (Department of Space Studies, University of North Dakota)	*Wilfredo J Cardona Vélez (University of Puerto Rico), Carlos R. Cabrera Matinez (University of Texas El Paso), Gary A Toranzos (University of Puerto Rico), Santosh H Vijapur (Faraday Technology Inc), Tim Hall (Faraday Technology Inc.) and E. Jennings Taylor (Faraday Technology Inc.)*	*Petr Andreychuk (RSC Energia), Natalia Shamshina (RSC Energia), Leonid Bobe (NIICHIMMASH) and Alexander Pavlov (NIICHIMMASH)*	*David Westheimer (NASA), Colin Campbell (NASA), Alicia Contreras-Baker (NASA/Jacobs) and John Steele (MRI)*

Late Morning

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES101-B: TECS	**ICES201-C: IIC**	**ICES301: AIChE**	**ICES204-A: IIC/AIAA LS&S**
	Spacecraft and Instrument Thermal Systems	**Two-Phase Thermal Control Technology**	**Advanced Life Support Systems Control**	**Bioregenerative Life Support**
	11:00-12:30	**11:00-12:30**	**11:00-12:30**	**11:00-12:30**
	Organizers: ***Jose Rodriguez, NASA Jet Propulsion Laboratory*** *Hume Peabody, NASA Goddard Space Flight Center* *Wes Ousley, Lentech, Inc.* *Doug Bolton, NASA Jet Propulsion Laboratory* *(Session 2/3 - see previous/following pages for more)*	*Organizers:* ***Frank Bodendieck, OHB System AG*** *Stéphane Lapensée, European Space Agency* *Guanghan Wang, Canadian Space Agency* *Alejandro Torres, IberEspacio S.A.* *Alain Chaix, Thales Alenia Space* *(Session 3/4 - see previous/following pages for more)*	*Organizers:* ***Chang Hyun Son, The Boeing Company*** ***Nikolay Ivanov, Peter the Great Saint Petersburg Polytechnic University, Russia*** ***Cliff Martin, The Boeing Company***	*Organizers:* ***Cesare Lobascio, Thales Alenia Space*** *Masato Sakurai, JAXA* *Miriam Sargusingh, NASA Johnson Space Center* *Paul Zabel, DLR* *(Session 1/4 - see following pages for more)*
11:00	**Two-Phase Thermal Control Hardware Verification and Validation for the Ka-band Radar Interferometer Instrument** **ICES-2022-107** *Ruwan Somawardhana (JPL), Eric Sunada (JPL), Louis Tse (Jet Propulsion Laboratory) and Eugene Ungar (NASA)*	**Operation of an Eight-Loop Heat Pipe Architecture for High Dissipative Applications** **ICES-2022-234** *Paula Prado Montes (Airbus), Georges Lefort (Airbus), José Luis Pastor Fernández (IberEspacio), Felix Beck (ESA) and Sandra Macías Jiménez (Airbus DS)*	**Estimation of System States for Non-Measured Parameters and Integration with a Digital Twin framework to Boost Spacecraft Autonomy and Awareness** **ICES-2022-222** *Monica Torralba, Cory George (Masters Student, Mechanical and Aerospace Engineering Department, University of California Davis, 95616), Stephen Robinson (Professor, Director, University of California Davis Center for Spaceflight Research, 95616), Samuel Eshima (PhD Student, Smead Aerospace Engineering Sciences, University of Colorado Boulder, 80303) and James Nabity (Associate Professor, Smead Aerospace Engineering Sciences, University of Colorado Boulder, 80303)*	**PFPU – Microgravity Precursor Food Production Unit development status** **ICES-2022-88** *Giorgio Boscheri (Thales Alenia Space Italia), Giovanni Marchitelli (Thales Alenia Space Italia), Christel Paille (European Space Agency) and Thomas Fili (Thales Alenia Space Italia)*
11:30	**Thermal Architecture and Design of the Cruise Heat Rejection System of Mars Sample Retrieval Lander** **ICES-2022-319** *Razmig Kandilian, Pradeep Bhandari, Kaustabh Singh, Keith Novak, Brian Carroll, Michael Cox and Jacqueline Lyra (Jet Propulsion Laboratory - California Institute of Technology)*	**Experiments on a Loop Heat Pipe with a 3D Printed Evaporator** **ICES-2022-357** *Rohit Gupta (Advanced Cooling Technologies, Inc.), Chien-Hua Chen (Advanced Cooling Technologies, Inc.) and William Anderson (Advanced Cooling Technologies, Inc.)*	**Generating Anomalous Regenerable CO2 Removal System Data for Environmental Control and Life Support System Self-Awareness** **ICES-2022-284** *Samuel Eshima (University of Colorado Boulder), James Nabity (University of Colorado Boulder), Monica Torralba (University of California Davis), Daniela Ivey (University of California Davis) and Stephen Robinson (University of California Davis)*	**Astro Garden® "Salad Diet" Scale Ground Prototype Assembly and Plant Growth Testing** **ICES-2022-17** *Samuel Moffatt (Sierra Nevada Corporation), Robert Morrow (Sierra Nevada Corporation), John Wetzel (Sierra Nevada Corporation) and Joseph Klopotic (Sierra Nevada Corporation)*
12:00	**Build to Print Cruise Phase Thermal Design and Performance of the Mars 2020 Spacecraft** **ICES-2022-52** *Jennifer Miller (NASA), Keith Novak (Jet Propulsion Laboratory), Jacqueline Lyra (Jet Propulsion Laboratory), Kaustabh Singh (Jet Propulsion Laboratory) and Kurt Gonter (Jet Propulsion Laboratory)*	**Propylene Loop Heat Pipe Design and Thermal Performance** **ICES-2022-410** *John Thayer, Jianbo Jiang, Nelson Gernert (AAVID Thermal Division of Boyd Corp.), Sergey Semenov, Deepak Patel (NASA/GSFC), Christopher Stull (Lentech, Inc), Triem Hoang (ATA Aerospace) and Wes Ousley (Lentech, Inc)*	**Dealing Order Determination for Various Simultaneous Device Failures for Material Circulation Control in ALSS by Hierarchical Approach** **ICES-2022-176** *Masakatsu Nakane (Nihon University) and Hiroyuki Miyajima (International University of Health and Welfare)*	**NUtritional Closed-Loop Eco-Unit System (NUCLEUS) for Food Production in Deep Space** **ICES-2022-350** *Barbara Belvisi (Interstellar Lab), Jim Rhoné (Interstellar Lab), Graham Gordon (Interstellar Lab), Jérémy Jauzion (Interstellar Lab) and Antoine Pineau (Interstellar Lab)*

TECHNICAL SESSIONS
WEDNESDAY / 13 JULY *Early Afternoon*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES308-C: AIChE	**ICES304-C: AIChE/IIC**	**ICES405: ASME** **ICES403: ASME**	**ICES402-C: ASME**
	ICES308: - Advanced Technologies for In-Situ Resource Utilization	**Physio-Chemical Life Support - Waste Management Systems - Technology and Process Development**	**405: Human/Robotics System Integration** **403: Extravehicular Activity: Operations**	**Extravehicular Activity: PLSS Systems**
	14:30-16:30	**14:30-16:30**	**14:30-16:30**	**14:30-16:30**
	Organizers: ***Christian Junaedi, Precision Combustion, Inc.*** ***Brittany Brown, NASA Marshall Space Flight Center*** ***Jerry Sanders, NASA Johnson Space Center*** *(Session 3/3 - see previous pages for more)*	*Organizers:* ***Justine Richardson, NASA Ames Research Center*** *Steve Sepka, NASA* *Matteo Lamantea, Thales Alenia Space* *Annie Meier, NASA Kennedy Space Center* *(Session 3/3 - see previous pages for more)*	*405 Organizers:* ***Amy Ross, NASA Johnson Space Center*** ***Dr. David Akin, University of Maryland*** *403 Organizers:* ***Cinda Chullen, NASA Johnson Space Center*** ***Christie Sauers, NASA Johnson Space Center***	*Organizers:* ***Gregory Quinn, Collins Aerospace*** ***Bruce Conger, Jacobs*** ***Greg Guyette, Collins Aerospace*** *(Session 3/3 - see previous pages for more)*
14:30	**Demonstration of Paragon's Water Purification Assembly for Lunar Water Processing** **ICES-2022-105** *Jordan Holquist, Sean Gellenbeck, Connor Joyce, Robert Rivera, Chad Bower and Philipp Tewes (Paragon Space Development Organization)*	**Suborbital Testing of the OSCAR Trash-to-Gas System** **ICES-2022-5** *Ray Pitts (NASA Kennedy Space Center), Anne Meier (NASA Kennedy Space Center), Joel Olson (NASA Kennedy Space Center), Malay Shah (NASA Kennedy Space Center), David Rinderknecht (NASA Kennedy Space Center) and Jaime Toro Medina (NASA Kennedy Space Center)*	*ICES 405*: **Detection of task type through unobtrusive physiological monitoring** **ICES-2022-153** *Katya Arquilla (Massachusetts Institute of Technology), Michael Zero (University of Colorado Boulder), Kaitlyn Hauber (University of Colorado Boulder), Mark Shelhamer (Johns Hopkins University), David Klaus (University of Colorado Boulder) and Christine Fanchiang (The Space Research Company, LLC)*	**Advanced Technology Infusion into a Spacesuit Portable Life Support System** **ICES-2022-425** *Cinda Chullen (NASA)*
15:00	**In-Situ Electrochemical Generation and Utilization of Hydrogen Peroxide for Disinfection** **ICES-2022-208** *Santosh Vijapur, Timothy Hall, E. Jennings Taylor, Santosh More (Faraday Technology, Inc.), Jeffrey Sweterlitsch, Michael Ewert, Sarah L. Castro-Wallace (NASA Johnson Space Center), Vicky Byrne (KBR), Brandon Dunbar (GeoControl Systems, Inc.), Hang Nguyen (JES Tech) and Melanie Smith (JES Tech)*	**Investigating Waste Preparation Methods for Trash-to-Gas Technologies** **ICES-2022-195** *Malay Shah (NASA Kennedy Space Center), Ray Pitts (NASA Kennedy Space Center), Morgan Benson (NASA Kennedy Space Center) and Jonathan Gleeson (The Bionetics Corporation)*	*ICES 405*: **Situational Cues for Continuous Trust Calibration in Automated Systems** **ICES-2022-239** *Alexandra Forsey-Smerek (Massachusetts Institute of Technology), Katya Arquilla (Massachusetts Institute of Technology) and Julie Shah (Massachusetts Institute of Technology)*	
15:30	**Solid Oxide Electrolysis Cathode for Increased Robustness for ISRU Application** **ICES-2022-280** *Tyler Hafen (OxEon Energy, LLC), Taylor Rane (OxEon Energy, LLC), Dennis Larsen (OxEon Energy, LLC), Jenna Pike (OxEon Energy, LLC), Joseph Hartvigsen (OxEon Energy, LLC), Jessica Elwell (OxEon Energy, LLC) and S Elango Elangovan (OxEon Energy, LLC)*		*ICES 403:* **Assessments of Physiology And Cognition in Hybrid-reality Environments (APACHE) – Physical Workload Approximation** **ICES-2022-209** *Alex Baughman (GeoControl Systems), Kyoung Jae Kim (KBR), Kadambari Suri (KBR) and Andrew Abercromby (NASA Johnson Space Center)*	
16:00			*ICES 403:* **Design of the Portable Offloading for Walking, Exercise, and Running (POWER) Device** **ICES-2022-335** *Logan Kluis (Texas A&M University), Deanna Kennedy (Texas A&M University), James Hubbard (Texas A&M University) and Ana Diaz-Artiles (Texas A&M University)*	

Early Afternoon

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES101-C: TECS	**ICES201-D: IIC**	**ICES300: AIChE**	**ICES204-B: IIC/AIAA LS&S**
	Spacecraft and Instrument Thermal Systems	**Two-Phase Thermal Control Technology**	**ECLSS Modeling and Test Correlations**	**Bioregenerative Life Support**
	14:30-16:30	**14:30-16:30**	**14:30-16:30**	**14:30-16:30**
	Organizers: ***Jose Rodriguez, NASA Jet Propulsion Laboratory*** *Hume Peabody, NASA Goddard Space Flight Center* *Wes Ousley, Lentech, Inc.* *Doug Bolton, NASA Jet Propulsion Laboratory* *(Session 3/3 - see previous pages for more)*	*Organizers:* ***Frank Bodendieck, OHB System AG*** *Stéphane Lapensée, European Space Agency* *Guanghan Wang, Canadian Space Agency* *Alejandro Torres, IberEspacio S.A.* *Alain Chaix, Thales Alenia Space* *(Session 4/4 - see previous pages for more)*	*Organizers:* ***Chang Hyun Son, The Boeing Company*** ***Cynthia Reuland, Aerodyne*** ***Nikolay Ivanov, Peter the Great Saint Petersburg Polytechnic University, Russia*** ***Kevin Braman, The Boeing Company*** ***Susan Snyder, The Boeing Company***	*Organizers:* ***Cesare Lobascio, Thales Alenia Space*** *Masato Sakurai, JAXA* *Miriam Sargusingh, NASA Johnson Space Center* *Paul Zabel, DLR* *(Session 2/4 - see previous/following pages for more)*
14:30	**Thermal Performance of Parker Solar Probe through Orbit Eleven** **ICES-2022-26** *Carl Ercol (JHUAPL), Elizabeth Congdon (JHUAPL), Krithika Balakrishnan (JHUAPL) and G. Allan Holtzman (JHUAPL).*	**Thermal Ground Testing of Loop Heat Pipes for PACE OCI** **ICES-2022-412** *Sergey Semenov (NASA/GSFC), Deepak Patel (NASA/GSFC), Triem Hoang (TTH Research) and Christopher Stull (Lentech, Inc)*	**Responses to Elevated CO2 on Food Production and Life Support Systems in a Mars Habitat** **ICES-2022-346** *Grant Hawkins (Over the Sun, LLC), Ezio Melotti (Over the Sun, LLC) and Kai Staats (Over the Sun, LLC)*	**Review of Targeted Lighting Approaches for Controlled Environment Agriculture in Space Habitats** **ICES-2022-6** *James Hardy (University of Colorado Boulder), Gioia Massa (NASA Kennedy Space Center), James Nabity (University of Colorado Boulder) and Patrick Kociolek (University of Colorado Boulder)*
15:00	**Designing for Powered Flight on Titan: Preliminary Testing and Analysis of a Thermal Control Design for the Dragonfly Battery Module** **ICES-2022-256** *Krithika Balakrishnan, G. Allan Holtzman, James E. Parkus, Robert F. Coker, Daniel Y. Jeong and Carl J. Ercol (Johns Hopkins Applied Physics Laboratory)*	**Testing and Evaluation of Ultra-Thin Loop Heat Pipe as Lightweight Flexible Thermal Strap for Spacecraft** **ICES-2022-400** *Hosei Nagano (Nagoya University), Takuji Mizutani (Nagoya University), Satoshi Kajiyama (Nagoya University), Yuki Akizuki (Japan Aerospace and Exploration Agency) and Yoshihiro Machida (Shinko Electric Industries Co., LTD)*	**Main focusses on the use of higher plant growth models for life support systems** **ICES-2022-255** *Joanna Kuźma, Jean-Pierre Fontaine, Lucie Poulet and Claude-Gilles Dussap (Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal)*	**Energy and Power Demand of Food Production in Space based on Results of the EDEN ISS Antarctic Greenhouse** **ICES-2022-87** *Paul Zabel (German Aerospace Center (DLR)), Vincent Vrakking (German Aerospace Center), Conrad Zeidler (DLR) and Daniel Schubert (DLR)*
15:30	**Rapid Development of Instrument Thermal Models: Perspectives and Guidelines from NASA Goddard's Instrument Design Laboratory** **ICES-2022-103** *Kan Yang (NASA), Hume Peabody (NASA) and Rachel Rivera (NASA)*	**Supercritical Startup Experiment of Cryogenic Loop Heat Pipe for Deep Space Mission** **ICES-2022-76** *Takeshi Yokouchi, Xinyu Chang, Hiroki Nagai (Institute of Fluid Science,Tohoku University), Kimihide Odagiri, Hiroyuki Ogawa (Japan Aerospace Exploration Agency) and Hosei Nagano (Department of Mechanical System Engineering, Nagoya University)*	**Computational Fluid Dynamics Airflow Modelling of the CASA – Crew Alternative Sleeping Area of the ISS** **ICES-2022-109** *Chang Son (The Boeing Company), Nikolay Ivanov, Evgueni Smirnov (Peter the Great St. Petersburg Polytechnic University) and Denis Telnov (New Technologies and Services)*	**Summary of Research and Outreach Activities during the 2021 Season of the EDEN ISS Antarctic Greenhouse** **ICES-2022-385** *Vincent Vrakking (German Aerospace Center), Paul Zabel (German Aerospace Center (DLR)), Markus Dorn (German Aerospace Center (DLR)), Daniel Schubert (DLR) and Jess Bunchek (SURA/LASSO)*
16:00		**Thermal Vaccuum Testing of a Miniature Propylene Loop Heat Pipe** **ICES-2022-411** *John Thayer, Jianbo Jiang, Nelson Gernert (AAVID Thermal Division of Boyd Corp.), David Bugby (NASA/JPL), Jose Rodriguez (NASA/JPL) and Wes Ousley (Lentech, Inc)*		

Monday, 11 July - 8:30 hrs | *Minnesota Ballroom*

AWARDS BANQUET SPEAKER:

Paul Geithner

Deputy Project Manager (Technical) James Webb Space Telescope

Goddard Space Flight Center

Paul Geithner is the Deputy Project Manager – Technical for the James Webb Space Telescope at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Geithner's career at NASA began in 1991 when he was hired into the Hubble Space Telescope (HST) Flight Systems and Servicing project at Goddard. He worked on HST's replacement gyroscopes and was the Instrument Manager for the Corrective Optics Space Telescope Axial Replacement (COSTAR) optical correction instrument and the Near-Infrared Camera and Multi-Object Spectrometer (NICMOS) scientific instrument.

Geithner's involvement with Webb began in 1997 after the second HST servicing mission when he became the program's Mission Systems Engineer. He later served as the Webb Instrument Systems Manager and in 2002 went to NASA Headquarters in Washington, D.C. as the mission's Program Executive before returning to Goddard in November of 2006 as the Webb Observatory Manager. He became Deputy Project Manager – Technical in 2011.

Geithner's other professional work experience includes military service and private sector employment in consumer credit and in fiber optic communications. He has been keenly interested in science, engineering and space exploration throughout his life and he is an enthusiastic participant in public outreach.

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AIAA JEFFRIES AEROSPACE MEDICINE AND LIFE SCIENCES RESEARCH AWARD

Recognizing the importance to aeronautics of scientific endeavors in the field of medicine, the Jeffries Aerospace Medicine and Life Sciences Research Award was established in 1940 as the John Jeffries Award to honor the memory of the American physician, John Jeffries, whose scientific investigations were published in a "Narrative of Two Aerial Voyages" in 1796.

ICES Awards Banquet
Wednesday, 13 July – 18:30 hrs | Great River Ballroom

2022 Recipient:

Dr. Peter Hancock

Provost Distinguished Research Professor

University of Central Florida

Psychology Department

Award Citation:
"For lifelong contributions to the human factors of aviation and aerospace safety and performance."

Peter A. Hancock, D.Sc., Ph.D. is Provost Distinguished Research Professor in the Department of Psychology and the Institute for Simulation and Training, as well as at the Department of Civil and Environmental Engineering and the Department of Industrial Engineering and Management Systems at the University of Central Florida (UCF). At UCF in 2009 he was also created the 16th ever University Pegasus Professor (the Institution's highest honor and in 2012 was named 6th ever University Trustee Chair. He directs the MIT2 Research Laboratories and Associate Director of the Center for Applied Human Factors in Aviation (CAHFA). Prior to his current position he founded and was the Director of the Human Factors Research Laboratory (HFRL) at the University of Minnesota where he held appointments as Professor in the Departments of Computer Science and Electrical Engineering, Mechanical Engineering, Psychology, and Kinesiology as well as at the Cognitive Science Center and the Center on Aging Research. He continues to hold an appointment as a Clinical Adjunct Professor in the Department of Psychology at Minnesota. He is also an affiliated Scientist of the Humans and Automation Laboratory at MIT, a Research Associate of the University of Michigan Transport Research Institute, and a Senior Research Associate at the Institute for Human and Machine Cognition in Pensacola, Florida.

AWARD PRESENTATIONS

INTERNATIONAL CONFERENCE ON ENVIRONMENTAL SYSTEMS (ICES) AWARD FOR TECHNICAL EXCELLENCE

The International Conference on Environmental Systems (ICES) Award for Technical Excellence recognizes individual technical contributions to Space Environmental Control and Life Support (ECLSS), Thermal Control Systems (TCS), Extravehicular Activity (EVA), Crew Systems, and Habitation. The individual selected is being recognized for accomplishments that advance the state of the art in the environmental control industry, contributions to ICES-related parts of space projects, and/or efforts supporting the organization and conduct of the ICES conference. Candidates for the ICES Award are nominated by peers through the ICES sponsoring committees and selected by the ICES Steering Committee.

2022 Recipient to be announced during the banquet

Past Recipients:

2021 Chang H. Son & Jentung Ku

2019 David Klaus	2010 Burkard Behrens
2018 Andrew Jackson	2009 Barry Finger
2017 Greg Gentry	2008 Bill Atwell
2016 Wolfgang Supper	2007 Michael Rouen
2015 Jeffery T. Farmer	2006 John W. Fisher
2014 Harry W. Jones	2005 Keiji Nitta
2013 Edward Hodgson	2004 Richard L. Olson
2012 Phil Spampinato	2003 Alan Drysdale
2011 Joe Chambliss	2002 John B. Hall Jr.

2001 Richard Reysa

ICES STUDENT POSTER AWARDS

The Student Poster Competition conducted earlier in the week consisted of 16 posters presented by student s from 7 different universities and were judged by professionals in the ICES community on technical content, poster quality, and presentation of the material.

TECHNICAL SESSIONS
THURSDAY / 14 JULY *Early Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
	ICES103: TECS/IIC	**ICES102-A: TECS**	**ICES205-A: IIC/AIChE**	**ICES407-A: ASME**
	Thermal and Environmental Control of Exploration Vehicles and Habitats	**Thermal Control for Planetary and Small Body Surface Missions**	**Advanced Life Support Sensor and Control Technology**	**Extravehicular Activity: Emerging Space Suit Technologies**
	9:00-10:30 (STARTS at 9:00)	**9:00-10:30 (STARTS at 9:00)**	**9:00-10:30 (STARTS at 9:00)**	**8:30-10:30**
	Organizers: ***Jose Roman, NASA Marshall Space Flight Center*** *Sean Tuttle, Nova Systems / Sigma Space Systems* *Andrea Ferrero, Thales Alenia Space* *Tom Leimkuehler, NASA Johnson Space Center*	*Organizers:* ***Eric Sunada, NASA Jet Propulsion Laboratory*** *Jennifer Miller, NASA Jet Propulsion Laboratory* *Gaj Birur, NASA Jet Propulsion Laboratory* *(Session 1/2 - see following pages for more)*	*Organizers:* ***Abhijit V. Shevade, NASA Jet Propulsion Laboratory*** *Darrell L. Jan, NASA Ames Research Center* *Timo Stuffler, OHB System AG* *(Session 1/2 - see following pages for more)*	*Organizers:* ***Brad Holschuh, University of Minnesota*** *Shane Jacobs, David Clark Company Incorporated* *(Session 1/2 - see following pages for more)*
8:30				**Mechanical Counter-Pressure EVA Suits: NASA Outlook and Development Strategy in 2022** **ICES-2022-249** *Shane Mcfarland (NASA)*
9:00	**Shape Memory Alloys for Regulating TCS in Space (SMARTS): Validated Multiphysical Modeling and Design Optimization of Morphing Composite Radiators** **ICES-2022-216** *Sean Nevin (Texas A&M University), Joseph El-Ashkar (Texas A&M University), Collette Gillaspie (Texas A&M University) and Darren Hartl (Texas A&M University)*	**Dragonfly Lander: Terrestrial Thermal Control Techniques on Titan, Saturn's Largest Moon** **ICES-2022-402** *Gary Holtzman, Carl Ercol, Robert Coker, James Parkus and Elisabeth Abel (Johns Hopkins University Applied Physics Laboratory)*	**ANITA2 – the advanced multicomponent air analyser for ISS – Pre-flight calibration and testing of gas measurement performance** **ICES-2022-168** *Atle Honne, Kristin Kaspersen, Kari Bakke, Anders Erik Liverud, Jens Thielemann, Brian Elvesæter (SINTEF), Michael Gisi, Lukas Pfeiffer, Armin Stettner, Roland Seurig, Timo Stuffler (OHB System AG), Johannes Witt, Pierre Rebeyre and Scott Hovland (ESA)*	**Computational Engineering Models for the Design of Mechanical Counterpressure Spacesuits** **ICES-2022-31** *Theodore Macklin (Imperial College London)*
9:30	**Shape Memory Alloys for Regulating TCS in Space (SMARTS): System Design and Thermal Vacuum Demonstration** **ICES-2022-291** *Daniel C. Miller, Connor Joyce (Paragon Space Development Corporation), Darren Hartl, Priscilla Nizio (Texas A&M University), Douglas E. Nicholson, Sean Nevin (Boeing Research and Technology), Othmane Benafan, Glen S. Bigelow and Darrell J. Gaydosh (NASA Glenn Research Center)*	**Waste Heat-Based Thermal Corer for Lunar Ice Extraction** **ICES-2022-130** *Kuan-Lin Lee, Quang Truong, Sai Kiran Hota, Srujan Rokkam (Advanced Cooling Technologies,Inc.) and Kris Zacny (Honeybee Robotics)*	**Status and Results of the Spacecraft Atmosphere Monitor Technology Demonstration Instrument** **ICES-2022-403** *Murray Darrach, Stojan Madzunkov, Byunghoon Bae, Richard Kidd, Frank Maiwald, Charles Malone, Dragan Nikolic, Anton Belousov, Fang Zhong, Jurij Simcic, Margie Homer, Marianne Gonzales, Vachik Garkanian, Valeria Lopez, Cecile Jung-Kubiak, Mina Rais-Zadeh, Hannes Krause and Tina Tillmans (Jet Propulsion Laboratory / California Institute of Technology)*	**Modeling of Fabrics and Pressurization for Actively Tensioned Mechanical Counter Pressure Spacesuit** **ICES-2022-266** *Akshay Kothakonda (Massachusetts Institute of Technology) and Dava Newman (Massachusetts Institute of Technology)*
10:00		**Final Thermal Design of the Mars 2020 Sample Tube** **ICES-2022-50** *Keith Novak (JPL/Caltech), Takuro Daimaru (JPL/Caltech) and Pradeep Bhandari (JPL/Caltech*	**Development of Portable Gas Chromatograph Using Ball Surface Acoustic Wave Sensor for Measurement of Crewed Space Environment** **ICES-2022-172** *Takamitsu Iwaya, Shingo Akao, Kazushi Yamanaka, Tatsuhiro Okano, Nobuo Takeda, Yusuke Tsukahara, Toru Oizumi, Hideyuki Fukushi, Maki Sugawara, Toshihiro Tsuji, Tomoki Tanaka, Akinobu Takeda (Ball Wave Inc.), Asuka Shima, Satoshi Matsumoto, Haruna Sugahara, Takeshi Hoshino and Tetsuya Sakashita (JAXA)*	**High Performance Mechanical Counter Pressure Spacesuit Glove for Martian Surface Exploration** **ICES-2022-191** *Gabriella Schauss (University of Colorado Boulder), Rachel Bellisle (Massachusetts Institute of Technology), Akshay Kothakonda (Massachusetts Institute of Technology), Dava Newman (Massachusetts Institute of Technology) and Allison Anderson (University of Colorado Boulder)*

Early Morning

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES401-A: ASME/AIAA LS&S	**ICES501-A: AIAA LS&S**	**ICES513: AIAA LS&S**	**ICES204-C: IIC/AIAA LS&S**
	Extravehicular Activity: Systems	**Life Support Systems Engineering and Analysis**	**Human Health and Performance Analysis**	**Bioregenerative Life Support**
	9:00-10:30 (STARTS at 9:00)	**9:00-10:30 (STARTS at 9:00)**	**9:00-10:30 (STARTS at 9:00)**	**9:00-10:30 (STARTS at 9:00)**
	Organizers: ***Keith Splawn, ILC Dover*** ***Brian Alpert, NASA Johnson Space Center*** ***Robert Trevino, NASA Johnson Space Center*** *(Session 1/2 - see following pages for more)*	*Organizers:* ***Andrew Owens, NASA Langley Research Center*** ***James Nabity, University of Colorado*** ***Chel Stromgren, Binera, Inc.*** *(Session 1/2 - see following pages for more)*	*Organizers:* ***Claas Olthoff, Technical University of Munich*** ***Ana Diaz Artiles, Texas A&M University***	*Organizers:* ***Cesare Lobascio, Thales Alenia Space*** *Masato Sakurai, JAXA* *Miriam Sargusingh, NASA Johnson Space Center* *Paul Zabel, DLR* *(Session 3/4 - see previous/following pages for more)*
8:30				
9:00	**Development and Test of a Spacesuit Informatics System for Moon, Mars, and Further Deep-Space Exploration** **ICES-2022-66** *Jake Rohrig, Ashley Himmelmann, Monica Torralba, and Gregory Quinn (Collins Aerospace); Pascal Lee (Mars Institute), Sawan Dalal (Baylor College of Medicine), Magnus Arveng (Ntention), Moina Tamuly (Ntention) and Jostein Lysberg (Ntention)*	**A Guide for Evaluating Spacecraft Environmental Control & Life Support Systems (ECLSS) Technology Developments** **ICES-2022-71** *Darnell Cowan (NASA), Morgan Abney (NASA), James Broyan (NASA), Jay Perry (National Aeronautics and Space Administration), Lance Delzeit (NASA), Marit Meyer (NASA), Orlando Melendez (NASA) and David Williams (NASA)*	**Validation of a Human Thermal Model for Assessing Crew-Induced Loads in Spacecraft** **ICES-2022-268** *Timofey Golubev (ThermoAnalytics, Inc.), Mark Hepokoski (ThermoAnalytics, Inc.), Mark Klein (ThermoAnalytics, Inc.), Allen Curran (ThermoAnalytics, Inc.) and Hee Jong Song (NASA Johnson Space Center).*	**Holistic Resource Management for Sustainable Life Support beyond Low-Earth Orbit: Focus on Nitrogen** **ICES-2022-165** *Dries Demey (QinetiQ Space nv) and Marie Vandermies (QinetiQ Space nv)*
9:30	**A Cloud Computing Infrastructure to Support xEMUs and Future EVAs** **ICES-2022-79** *John Manlucu (University of Baltimore), Najya Ahsan (University of Baltimore), Ruth Robinson (University of Baltimore), Michael Vandi (University of Baltimore), Kaitlyn Baker (University of Baltimore) and Giovanni Vincenti (University of Baltimore)*	**Integrated Logistics and Supportability Challenges of Sustained Human Lunar Exploration** **ICES-2022-90** *Andrew Owens (NASA), William Cirillo (NASA), Chel Stromgren (Binera, Inc.), Jason Cho (Binera Inc.), Chase Lynch (Binera, Inc.) and Jon Vega (Binera, Inc.)*	**A Rao-Blackwellized Particle Filter for Modeling Neurovestibular Adaptation to Altered Gravity** **ICES-2022-27** *Victoria Kravets (University of Colorado, Boulder), Nisar Ahmed (University of Colorado, Boulder) and Torin Clark (University of Colorado, Boulder)*	**Development of an automated photobioreactor test system** **ICES-2022-68** *Johannes Martin (Institut of Space Systems, University of Stuttgart) and Gisela Detrell (Institute of Space Systems - University of Stuttgart)*
10:00	**An Overview of Augmented Reality Solutions for the Enhancement of Space Exploration and Operations** **ICES-2022-334** *Kaitlyn Baker (University of Baltimore)*	**A Cost Analysis of the use of In Situ Space Resources for Sustainable Habitation on the Moon and Mars** **ICES-2022-170** *Hiroyuki Miyajima (International University of Health and Welfare)*		**Microalgae for Oxygen and food production on the Lunar or Martian surface – Impact of In-Situ Resources Utilization** **ICES-2022-48** *Gisela Detrell (Institute of Space Systems - University of Stuttgart) and Johannes Martin (Institut of Space Systems, University of Stuttgart)*

TECHNICAL SESSIONS
THURSDAY / 14 JULY *Late Morning*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	GOVERNORS I	GOVERNORS II	GOVERNORS III	GOVERNORS IV
		ICES102-B: TECS	**ICES205-B: IIC/AIChE**	**ICES407-B: ASME**
		Thermal Control for Planetary and Small Body Surface Missions	**Advanced Life Support Sensor and Control Technology**	**Extravehicular Activity: Emerging Space Suit Technologies**
		11:00-13:00	**11:00-13:00**	**11:00-13:00**
		Organizers: ***Eric Sunada, NASA Jet Propulsion Laboratory*** *Jennifer Miller, NASA Jet Propulsion Laboratory* *Gaj Birur, NASA Jet Propulsion Laboratory* *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Abhijit V. Shevade, NASA Jet Propulsion Laboratory*** *Darrell L. Jan, NASA Ames Research Center* *Timo Stuffler, OHB System AG* *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Brad Holschuh, University of Minnesota*** *Shane Jacobs, David Clark Company Incorporated* *(Session 2/2 - see previous pages for more)*
11:00		**Thermal performance of Ingenuity the Mars Helicopter** **ICES-2022-116** *Stefano Cappucci (NASA Jet Propulsion Laboratory) and Michael Pauken (NASA Jet Propulsion Laboratory)*	**The Spacecraft Water Impurity Monitor, a Framework for the Next Generation Complete Water Analysis System for Crewed Vehicles Beyond the ISS** **ICES-2022-305** *Richard Kidd, Margie Homer, Aaron Noell, Jurij Simcic, Byunghoon Bae, Marianne Gonzalez, Valeria Lopez, Murray Darrach (Jet Propulsion Laboratory), Stuart Pensinger, Mike Callahan (NASA Johnson Space Center), Evan Neidholdt and Nikki Gilbert (KBRwyle)*	**Variable Stiffness Soft Knee Exoskeleton for Advanced Space Suits and Planetary Exploration: Energetics Evaluation** **ICES-2022-152** *Allison Porter, Katya Arquilla, Nicole McGaa, Alvin Harvey, Rachel Bellisle, and Dava Newman (Massachusetts Institute of Technology); Aleksandra Stankovic (Harvard Medical School/Massachusetts General Hospital)*
11:30		**Non-Integrated Hot Reservoir Variable Conductance Heat Pipes** **ICES-2022-35** *Jeff Diebold, Calin Tarau, Joshua Smay, Timothy Hahn and Ryan Spangler (Advanced Cooling Technologies, Inc.)*	**New-generation spacecraft water monitoring with flight-ready solid state nanopore** **ICES-2022-154** *Zehui Xia (Goeppert LLC) and Brian DiPaolo (Goeppert LLC)*	**Effects of E-Textile Circuit Components on Signal Quality for Wearable Sensing Applications** **ICES-2022-302** *Alireza Golgouneh (University of Minnesota-Twin Cities), Brad Holschuh (University of Minnesota-Twin Cities) and Lucy Dunne (University of Minnesota-Twin Cities)*
12:00		**Overall Thermal Architecture & Design of the Mars Sample Return Lander Mission** **ICES-2022-33** *Pradeep Bhandari, Razmig Kandilian, Keith Novak, Stefano Morellina, Jacqueline Lyra, Ruwan Somawardhana, Kaustabh Singh (Jet Propulsion Laboratory) and Jennifer Miller (NASA)*		**Feasibility of MCP and Hybrid GP/MCP Architectures for Martian EVA: A Trade Study Perspective** **ICES-2022-81** *Abby Rudakov (RMIT University), Jonathan Clarke (Mars Society Australia), Braid MacRae (RMIT University), James Waldie (Human Aerospace) and Rajiv Padhye (RMIT University)*
12:30		**Thermal System Design of the Mars Ascent Vehicle for the Mars Sample Return Mission Surface Phase** **ICES-2022-32** *Stefano Morellina (Jet Propulsion Laboratory), Pradeep Bhandari (JPL), Ruwan Somawardhana (JPL), Carl Guernsey (JPL), Ashley Karp (JPL), Felix Lopez (NASA Marshall Spaceflight Center) and Patrick Junen (NASA MSFC)*		**Photogrammetry for Deformation Mapping: 3D Strain Measurement for the Design of Mechanical Counterpressure Spacesuits** **ICES-2022-29** *Theodore Macklin (Imperial College London)*

TIME	ROOM, SESSION TITLE, AND ORGANIZERS			
	STATE I	STATE II	STATE III	KELLOGG II
	ICES401-B: ASME/AIAA LS&S	**ICES501-B: AIAA LS&S**	**ICES307: AIChE**	**ICES204-D: IIC/AIAA LS&S**
	Extravehicular Activity: Systems	**Life Support Systems Engineering and Analysis**	**Collaboration, Educational Outreach, and Public Engagement**	**Bioregenerative Life Support**
	11:00-13:00	**11:00-13:00**	**11:00-13:00**	**11:00-13:00**
	Organizers: ***Keith Splawn, ILC Dover*** ***Brian Alpert, NASA Johnson Space Center*** ***Robert Trevino, NASA Johnson Space Center*** *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Andrew Owens, NASA Langley Research Center*** ***James Nabity, University of Colorado*** ***Chel Stromgren, Binera, Inc.*** *(Session 2/2 - see previous pages for more)*	*Organizers:* ***Lucie Poulet, NASA Postdoctoral Program, Kennedy Space Center*** ***Dean Muirhead, Barrios Technology*** ***Jochen Keppler, seleon gmbh***	*Organizers:* ***Cesare Lobascio, Thales Alenia Space*** *Masato Sakurai, JAXA* *Miriam Sargusingh, NASA Johnson Space Center* *Paul Zabel, DLR* *(Session 4/4 - see previous pages for more)*
11:00	**Development and Testing of the BioBot EVA Support System** **ICES-2022-358** *Charles Hanner (Space Systems Lab), Nicolas Bolatto (University of Maryland), Joshua Martin (University of Maryland), Daniil Gribok (University of Maryland) and David Akin (University of Maryland)*	**Modeling and Simulation of Component Degradation and Faults in the Carbon Dioxide Removal Assembly** **ICES-2022-221** *Daniel Kaschubek (Technical University of Munich) and James Nabity (University of Colorado Boulder)*	**Designing a hybrid approach for space analog missions in Brazil** **ICES-2022-382** *Davi Souza (Habitat Marte), Julio Rezende (Habitat Marte) and Luisa Santos (Habitat Marte)*	**Lessons Learned from the Integration of Biological Systems in Series for Wastewater Treatment on Early Planetary Bases** **ICES-2022-201** *Jason Fischer (Amentum), Daniella Saetta (University of South Florida/NASA), Joshua Finn (The Bionetics Corporation), Talon Bullard (University of South Florida), Alexandra Smith (University of South Florida), Lawernce Koss (Amentum), Oscar Monje (Amentum), Daniel Yeh (University of South Florida) and Luke Roberson (NASA)*
11:30	**Development of an Autonomous Umbilical Tending System for Rover-Supported Surface EVAs** **ICES-2022-361** *Nicolas Bolatto (University of Maryland), Robert Fink (University of Maryland), Joshua Martin (University of Maryland), Zachary Lachance (University of Maryland), Rahul Vishnoi (University of Maryland) and David Akin (University of Maryland)*	**A Diagnostics Model for Detecting Leak Severity in a Regenerable CO2 Removal System** **ICES-2022-303** *Samuel Eshima (University of Colorado Boulder), James Nabity (University of Colorado Boulder), Ayush Mohany (Georgia Institute of Technology), Heraldo Rozas (Georgia Institute of Technology) and Nagi Gebraeel (Georgia Institute of Technology)*	**U.S. Spacesuit Knowledge Capture – Creation, Curation, and Dissemination** **ICES-2022-39** *Cinda Chullen (S&K Global Solutions), Vladenka Oliva (Jacobs), Gordon Andrews (Jacobs), Sarah Hargrove (Jacobs) and Diana Rodgers (S&K Global Solutions)*	**Integrating Mushrooms into an Agent-based Model of a Physico-chemical and Bioregenerative ECLSS** **ICES-2022-159** *Sean Gellenbeck (University of Arizona), Joel Cuello (University of Arizona), Kai Staats (Over the Sun, LLC), Ezio Melotti (Over the Sun, LLC) and Grant Hawkins (Over the Sun, LLC)*
12:00		**Trade Study Analysis of a Cryogenic Oxygen Architecture for Lunar Outpost Life Support** **ICES-2022-417** *Thomas Chen (ERC, inc) and Jeffrey Sweterlitsch (NASA)*	**Clothes Cleaning Research for Space Exploration** **ICES-2022-391** *Michael Ewert (Johnson Space Center), Evelyne Orndoff (NASA JSC), Mark Sivik (Procter & Gamble Company, Inc.), Kristi Niehaus (Procter & Gamble), William Shearouse (Procter & Gamble), Jessica Zinna (Procter & Gamble Company, Inc.), Steven Patterson (Procter & Gamble), Dean Muirhead (Barrios Technology) and W. Andrew Jackson (Texas Tech University)*	**Biologically Reliable Integration and Design for Growth Environments in Space (BRIDGES)** **ICES-2022-371** *Davi Souza (Federal University of Rio Grande do Norte), Eran Shileikis (Independent) and Sai Tarun Prabhu Bandemegala (University of North Dakota)*
12:30				

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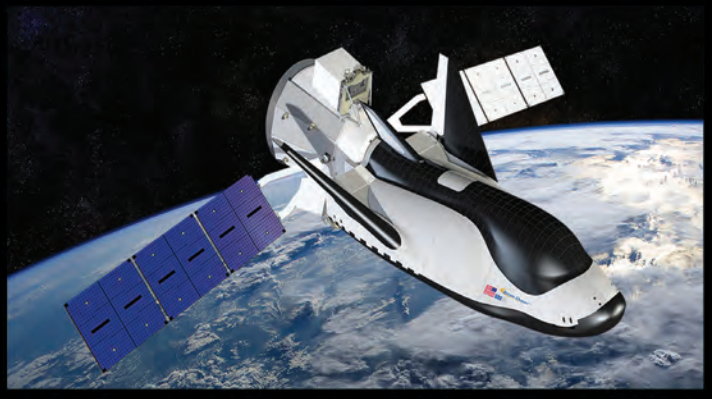

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