Tuesday, 19 October 2021

**AP1: Plenary Session – Live Stream**

**Conference Introduction:**
Paul Wilde  
IAASS President

**Keynote Speakers:**
Don Kessler  
IAASS (ret. NASA Space Debris scientist)

Kathy Lueders  
NASA Associate Administrator for the Space Operations Mission Directorate

Izumi Tatsushi  
JAXA Associate Director General, Senior Chief Officer Safety & Mission Assurance

USAF Chief of Safety, Commander Air Force Safety Center

W. Russ DeLoach  
NASA Chief of Safety and Mission Assurance

**Coffee Break**

**AS-01: Space Traffic Control**

**Space Traffic Management in the 21st Century**
Dharshun Sridharan  
Piston Labs

**Space Traffic Management as a National Priority in the United States**
Robert William Shields  
*International Technology and Trade Associates, Inc., United States of America*

**Preliminary Results of the International Astronautical Federation Space Traffic Management Technical Committee #26 Working Group on Terminology**
Oltrogge, Dan; Strah, Maruska; Skinner, Mark; Rovetto, Robert J.; Laurent, Francillout; Lacroix, Andre; Kumar, Anil; Grattan, Kyran; Alonso, Ines Skinner, Dr. Mark A.

**Treatment of Uncertainty in Flight Safety Analysis**
Erik W. F. Larson¹, Paul D. Wilde²  
¹Marigold RISE LLC, California, USA; ²Federal Aviation Administration, Washington, DC, USA

**Space Environment Impact on Perusat-1’s Orbital Parameters When Executing Maneuvers in LEO**
Francisco Javier Ildefonso Linares¹, Fredy Arturo Calle Bustinza², Lizeth Tello Tarrillo³  
¹CONIDA Peruvian Space Agency, Perú; ²CONIDA Peruvian Space Agency, Perú; ³CONIDA Peruvian Space Agency, Perú

**A Framework for Minimum Maneuverability Requirements for Low Earth Orbit Conjunction Assessment, Using Historical Conjunction Data Messages**
Daniel Moomey  
United States Space Force
11:30am – 01:30pm AS-02: Human Performance for Safety & Organizational Culture

**Is Space-Flight Resource Management Skillset Effective for Remote Workers on the Ground?**
Nobuaki Minato¹, Ryo Sakurai¹, Kazuya Kito¹, Kenji Yamagata²
¹Ritsumeikan University, Japan; ²Japan Aerospace Exploration Agency

**S&MA in Asia Pacific Space Activities: Challenges and Opportunities for the Space Ecosystem from Legal and Policy Perspectives**
David LX Ho¹, Naoko Sugiya², Yu Takeuchi²
¹Malaysia Space Initiative (MiSI); ²Japan Aerospace Exploration Agency (JAXA)

**Why The Petroleum Industry Doesn't Learn From The Human Error Causes Of Their Incidents – Are You Making The Same Mistakes?**
Monica Philippart
Ergonomic Human Factors Solutions, United States of America

**Human Error Analysis for Human-Rated Space Systems**
Alan Hobbs¹, John O’Hara², Cynthia Null³, Charlie Dischinger⁴
¹San Jose State University/NASA Ames, United States of America; ²Brookhaven National Laboratory; ³National Aeronautics and Space Administration

**Benefits Beyond: Managing Risk Through Mindful Missions**
Amanda Rose Winters
Infinite Outcomes Inc., United States of America

**Growing the NASA Safety and Mission Assurance (SMA) Workforce of Tomorrow**
Koons, Diane Sarah
NASA, United States of America

11:30am – 01:30pm AS-03: Nuclear Space Safety

Elaine T. Marshall¹, Amber R. Chang-Armstrong², Luis A. Estrada²
¹AFSEC/SES (Dawson), United States of America; ²USSF SPOC 45 SW/SELR, United States of America

**Expanding the Risk-Informed Safety Analysis of Space Nuclear Systems to IncludeReactors**
Elaine T. Marshall¹, Greg Wyss², Gary F. Polansky²
¹AFSEC/SES (Dawson), United States of America; ²Sandia National Laboratories, United States of America

**Evolution of NASA’s Nuclear Flight Safety Program to Meet Changing Needs**
Matthew J. Forsbacka, Donald McLean Helton
National Aeronautics and Space Administration, United States of America

11:30am – 1:30pm AS-04: Space Debris

**Efforts to Improve Spacecraft Reliability Prediction Method to Evaluate the Probability of Successful Disposal in ISO 24113:2019**
Kenichi Sato, Takashi Yamane, Toru Yoshihara
Japan Aerospace Exploration Agency, Japan

**The Economics of Orbital Debris Mitigation and Remediation**
Martin Zhu
FAA, United States of America

**Consequences of LEO Satellite Collisions – The Fragments**
Mark Alan Sturza¹, Gemma Saura Carretero²
¹3C Systems Company, United States of America; ²Viasat, Inc., United States of America
### Space Debris and Meteoroid Impact Risk Assessment with Debris Protection Design
**Standard at JAXA**
Kumi Nitta
Japan Aerospace Exploration Agency, Japan

### Ion Drag Utilization with Charged Membrane for Space Debris Removal in Low Earth Orbit
**Takanobu Muranaka**, Teppei Okumura, Kazuma Ueno, Yasushi Ohkawa
1Chukyo University, Japan; 2Japan Aerospace Exploration Agency

### Using OOS Systems to Give Broken Or Retired Spacecraft New Life
Isabella Rose Hatty
University of South Australia, Australia

## Wednesday, 20 October 2021

**09:00am – 11:00am**

### AS-05: Regulations & Standards

- **Possible Approach to Establish International Rules of Emerging Space Activities – Risk-based Approach and Adaptive Governance**
  Koichi Kikuchi
  Japan Aerospace Exploration Agency, The University of Tokyo Institute for Future Initiatives, Japan

- **Emerging Aerospace Transportation Systems and Regulatory Challenges**
  Ermanno Napolitano, Kuan Wei Chen
  McGill University, Canada

- **Space laws and regulations in the future**
  Kasumi Kanetaka
  Human/Robotics/Vehicle Integration and Performance Lab, United States of America

- **Norms of Behavior for Safe Operations in Space: The Importance of Civil Society in Compliance Verification**
  Michael P. Gleason
  The Aerospace Corp, United States of America

### AS-06: Launch Safety

- **Reusable Launch Vehicle Failure Modeling Techniques**
  Brian D. Dreyer
  45th Space Wing, USSF

- **Launch Operations Safety Analysis based on Systemic Methods**
  Antonio Vinicius Diniz Merlade, Rodrigo De Melo Silveira, Carlos Henrique Netto Lahoz, Sergio Fugivara
  1Brazilian Air Force, Brazil; 2Industrial Fostering and Coordination Institute (IFI) from the Department of Aerospace Science and Technology (DCTA); 3Aeronautics Institute of Technology (ITA); 4Institute of Aeronautics and Space (IAE) from the Department of Aerospace Science and Technology (DCTA)

- **A General Approach to Developing Debris Penetration Equations**
  Wije Wathugala
  ARCTOS, United States of America

- **The Medina Event: A Benchmark for Distant Focusing Overpressure Safety Analyses**
  Paul David Wilde, Simon Titulaer
  1Federal Aviation Administration, United States of America; 2Space Exploration Technologies Corp., United States of America

- **Government Personnel Participation in Suborbital Spaceflight**
  Bradley Hill, Robert Seibold, Elizabeth Blome, Ray Jenkins
  1National Aeronautics and Space Administration, United States of America; 2Federal Aviation Administration, United States of America
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<th>Time</th>
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<td>09:00am – 11:00am</td>
<td><strong>AS-07: Designing for Safety</strong></td>
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<td><strong>A Method to Support Test Case Identification for IV&amp;V Using Information Retrieval with Natural Language Processing</strong>&lt;br&gt;Kakimoto, Kazuki¹; Umeda, Hiroki²; Oguchi, Kazuhiro³&lt;br&gt;¹Japan Manned Space Systems Corporation, Japan; ²Japan Aerospace Exploration Agency, Japan</td>
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<td><strong>Using Machine Learning to Prevent Previously Experienced Anomalies for Space Systems</strong>&lt;br&gt;Naoko Okubo&lt;br&gt;Japan Aerospace Exploration Agency, Japan</td>
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<td><strong>Automating the Safety Review of Operations Data Files for ISS Astronauts Utilizing Machine Learning</strong>&lt;br&gt;Shota Iino¹, Satoru Onishi¹, Hideki Nomoto¹, Shimpei Takahashi³&lt;br&gt;¹Japan Manned Space Systems Corporation (JAMSS), Japan; ³Japan Aerospace Exploration Agency (JAXA), Japan</td>
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<td><strong>Safety and Independent V&amp;V on the MSS Application Computer (Mac) for the ISS Robotics</strong>&lt;br&gt;Pat Greene, Jacky Wong, Alesha Hoo&lt;br&gt;MDA, Canada</td>
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<td><strong>Test Case Design Method for Verification of Robustness in Embedded Systems</strong>&lt;br&gt;Hiroki Umeda¹, Kazuhiro Oguchi¹, Shuji Morisaki³&lt;br&gt;¹Japan Aerospace Exploration Agency, Japan; ³Nagoya University</td>
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<td>09:00am – 11:00am</td>
<td><strong>AS-08: Panel Session</strong></td>
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<td><strong>Progress and Perspectives Regarding Space Traffic Coordination (STC), Regulations, and Standards</strong>&lt;br&gt;Chair: Daniel Oltrogge&lt;br&gt;Co-Chair: Mark Skinner</td>
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<td>11:00am – 11:30am</td>
<td><strong>Coffee Break</strong></td>
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<td>11:30am – 01:30pm</td>
<td><strong>AS-09: Launch Safety</strong></td>
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<td><strong>Overview of H-II Transfer Vehicle (HTV) and HTV-X Safety Design</strong>&lt;br&gt;Kyotaro Ida&lt;br&gt;Japan Aerospace Exploration Agency, Japan</td>
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<td><strong>Third Party Liability: Commercial Space Operations</strong>&lt;br&gt;Jerry Haber&lt;br&gt;ARCTOS, United States of America</td>
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<td><strong>When Should an Independent Technical Analysis Be Performed to Ensure Compliance with Quantitative Public Risk Criteria?</strong>&lt;br&gt;Paul David Wilde¹, Erik Larson²&lt;br&gt;¹Federal Aviation Administration, United States of America; ²Marigold RISE LLC, United States of America</td>
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<td><strong>Innovative LCOLA Tool Prioritizing Accuracy, Launch Access and Efficiency</strong>&lt;br&gt;Dan Oltrogge, Salvatore Alfano&lt;br&gt;COMSPOC Corporation, United States of America</td>
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<td>11:30am – 01:30pm</td>
<td><strong>AS-10: Designing for Safety</strong></td>
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<td><strong>System-Level Model-Based Mission Risk Determination for Lunar Mission Design</strong>&lt;br&gt;Matthew Michael Wittal, Shaun Clifton Butts&lt;br&gt;Deep Space Logistics, NASA Kennedy Space Center 32899, USA</td>
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Safety Analysis of Reusable Cislunar Transportation Architecture
Tyler Duncan¹, Nick Christensen¹, Nicholas Gima¹, Michael Kezirian¹, Dallas Bienhoff²
¹University of Southern California; ²Cislunar Space Development Company

Elastomeric Lithium-Ion Battery Pads and Thermal Runaway Safety
Ken Mazich
Rogers Corporation, United States of America

Spacecraft Pressure Vessel Passivation – An Overview of Requirements, Principles, and Practices
Scott Hull¹, William Schonberg²
Organization(s): ¹NASA Goddard Space Flight Center, United States of America; ²Missouri S&T, United States of America

Hyperloop System Phase 0 Safety Review
Michael T. Kezirian, Micah K. Nishimoto
University of Southern California - Department of Astronautical Engineering, United States of America

11:30am – 01:30pm
AS-11: Risk Assessment & Management

Safety Assurance for Artificial Intelligence System
Naoki Ishihama, Masa Katahira
JAXA, Japan

The Challenger Tragedy Was Caused by an Apollo Mistake, Terminating Risk Analysis
Harry Jones
NASA Ames Research Center, United States of America

Managing Spacecraft Risk with Space Environments Testing Via Process Safety Management at the Nasa Neil A. Armstrong Test Facility
Rene Fernandez¹, Jennifer Allred¹, Rebecca Meigs¹, Christine Greenwalt¹, James Hritz², Mark Otterson²
¹NASA Glenn Research Center, United States of America; ²Leidos Inc., United States of America

An Analysis of Space Flight Missions and Mishaps Through the Lens of Weaknesses in the Application of Mission Assurance
Timothy Riley
Sandia National Labs, United States of America, Embry-Riddle Aeronautical University

Probabilistic Risk Management for Space Debris Mitigation on the Mobile Servicing System (MSS) on the ISS
Courtney Mulligan
MDA, Canada

Safety Assessment Overview of Small Satellites to Be Released from the JEMRMS Using the JEM Small Satellite Orbital Deployer (J-SSOD)
Haruka Tamaru, Takayuki Satoh, Tatsuya Shirai
Japan Aerospace Exploration Agency, Japan

11:30am – 01:30pm
AS-12: Panel Session

The Potential Role of a Space Safety Institute
Chair: Dr. Josef Koller
Co-Chair: Dr. George Nield
## Thursday, 21 October 2021

### 09:00am – 11:00am  
**AS-13: Designing for Safety**

**Dynamic Verification of Satellite Systems Using Ilities**  
Mason Brown, Sharmistha Dey, Paulo De Souza, Peter Bernus, Gervase Tuxworth  
Griffith University, Australia

**Human Space Exploration: Mitigating the Non-Ionizing Radiation Risks**  
Ramona Gaza$^{1,3}$, Jeff Reilly$^{2,3}$, Sam Ghalayini$^{1,3}$, Ricardo Sanchez$^3$  
$^1$NASA/Leidos, Exploration & Mission Support, Houston, TX 77058, USA; $^2$University of Houston, Houston, TX 77058, USA; $^3$NASA Johnson Space Center, Houston, TX 77058, USA

**Application of the Qualification Status Review Analytical Technique for the Special Purpose Dexterous Manipulator Electronic Platform Redesign**  
Kyle Lourenssen, Juhaina Khan, Iqbal Kassam  
MDA, Canada

**Prevention of Thermal Runaway Propagation in Lithium-Ion Battery Packs Using Compressible Phase-Change Materials**  
Nathaniel Alexander Sunderlin$^1$, Chuanbo Yang$^2$, Wei Wang$^2$  
$^1$National Renewable Energy Laboratory, United States of America; $^2$Rogers Corporation, United States of America

### 09:00am – 11:00am  
**AS-14 Spaceflight Safety**

**Trend and Analogous Failure Analysis on JEM [KIBO] On-Orbit Anomalies to Derive Useful Lessons Learned**  
Tatsuya Shirai  
Japan Aerospace Exploration Agency (JAXA), Japan

**Assessing Pre-Hospital Emergency Medical Protocols for Commercial Space Flight Application**  
Robert Ocampo$^1$, David Klaus$^2$  
$^1$Self, United States of America; $^2$University of Colorado Boulder

**Supporting Crew Medical Decisions on Deep Space Missions: A Real-Time Performance Monitoring Capability**  
Bettina L. Beard$^1$, Brian Russell$^1$, Michael Krihak$^1$, Jeremy Noel$^1$, Dennis Beaugrand$^2$, Barbara Burian$^1$, Tianna Shaw$^1$, David Pletcher$^1$, Kara Martin$^1$  
$^1$NASA, United States of America; $^2$Alidyne, United States of America

**Toward Enabling Safe Earth-Independent Mission Operations**  
Shu-Chieh Wu$^1$, Megan Parisi$^2$, Kaitlin McTigue$^3$, Tina Panontin$^1$, Alonso Vera$^2$  
$^1$San José State University; $^2$NASA Ames Research Center.

**Modelling the Relationship between Risk, Usage, and Time in Space Flight, Transportation, and Adventure Sport Activities**  
Ocampo, Robert  
Self, United States of America

### 09:00am – 11:00am  
**AS-15: Re-entry Safety**

**Investigation of Safety Methods to Prevent Collisions and the Creation of New Debris During the Space Debris Disposal Phase**  
Moe Shimada$^1$, Toshinori Takai$^2$, Naoki Ishihama$^2$, Masafumi Katatahira$^2$  
$^1$NARA INSTITUTE OF SCIENCE AND TECHNOLOGY, Japan; $^2$JAXA, Japan

**Lessons Learned for Safety Through the HTV Missions**  
Yoshinobu Mizutani  
JAXA, Japan
Design for Minimum Casualty Area – The IXPE Case
Chris Ostrom¹, Jeremiah Marichalar², Benton Greene³, William Deininger⁴, Amy Walden⁵, John Bacon⁶, Chris Sanchez⁷
¹HX5 - Jacobs JETS Contract; ²GeoControl Systems - Jacobs JETS Contract; ³Jacobs JETS Contract; ⁴Mission Systems Engineering, Ball Aerospace; ⁵NASA Marshall Space Flight Center; ⁶NASA Johnson Space Center; ⁷ERC - Jacobs JETS Contract

It is Time to Implement Mitigation Strategies to Protect the Airspace from Space Debris
Michael Tevriz Kezirian
University of Southern California, United States of America

Scaling, Inexpensive NEO Survey/Follow-Up Concept
Rene Carlos
C Phlo, United States of America

9:00am – 11:00am
AS-16: Launch Safety

The Laser Ignition System Improves Rocket Safety
Masanori Sakaino¹, Shinichiro Tokudome¹, Toshiaki Takemae¹, Yoshitaka Mochihara¹, Satoshi Arakawa¹, Naoki Morishita¹, Yoshiki Matsuura²
¹JAXA, Japan; ²IHI AEROSPACE Co.,Ltd., Japan

Distant Focusing Overpressure Risk Assessment Methods
Ronald R. Lambert¹, Paul D. Wilde², Jon D. Chrostowski¹, Randolph L. Nyman¹
¹ARCTOS, United States of America; ²Federal Aviation Administration, United States of America

Enhancing Flight Termination Technology for Expansion of Commercial Launch
Triplett, Angela L.
Triplett, Dr. Angela L., The Aerospace Corporation

Effects of Environmental Heterogeneity on DFO Risk Assessments at Coastal Space Ports
William Gregory Blumberg¹, Ahmed Fadi²
¹NASA Postdoctoral Program, GSFC NASA; ²Safety Office, Wallops Flight Facility, GSFC NASA

11:00am – 11:30am
Coffee Break

11:30am – 01:00pm
AP2 Plenary Closing Session – Live Stream

NASA Gateway Program
Dan Hartman, Program Manager
Tremayne Days, Safety & Mission Assurance Manager

Seradata SpaceTrak Launch and Satellite Database
Tim Fuller, Managing Director
David Todd, Head of Space Content

01:00pm – 01:30am
Conference Wrap-Up & Announcements

Announcement Student Competition Winners
Michael Kezirian
ISSF President

Conference Wrap-Up
Paul Wilde
IAASS President