

PROGRAM

The AMOS Conference is an in-person event with virtual attendance options and kicks off with a number of virtual and in-person Technical Short Courses in various Space Situational/Domain Awareness-related disciplines. The three plenary program days open with Keynote Addresses and SSA Policy Forum discussions followed by Technical Presentations covering a range of broad topical areas relating to SSA/SDA, all streamed live to the virtual conference platform. Posters are available in digital format this year and are accompanied by on-demand presentation videos. A select number of posters are invited for in-person presentation during the evening poster sessions.

Please note all dates/times listed are Hawaii Standard Time (HST). Agenda is subject to change.

Program at a Glance

FRI Sep 23	Virtual Platform Open to Registered Attendees On-Demand Launch Digital Poster Presentations
SUN Sep 25 - TUE Sep 27	EMER-GEN® Program (separate registration fee required) On-site Registration
MON Sep 26	Virtual Technical Short Courses (separate registration fee required)
TUE Sep 27	Exhibitor Load-in In-person Technical Short Courses (separate registration fee required) Welcome Reception Co-sponsored by Boeing
WED Sep 28	Conference Opening & Cultural Invocation Opening Keynote Address Lieutenant General Michael A. Guetlein SSA Policy Forum Using SSA to Verify Future Space Security Agreements Technical Session Machine Learning for SSA Applications Sponsored by CACI Invited Talk Col Marc Brock Technical Session Space Situational/Domain Awareness Sponsored by Peraton Technical Session Space Debris Sponsored by Northstar Poster Session Co-sponsored by SAIC Women & Allies in SDA Presented by Ansys, COMSPOC, and Lockheed Martin
THU Sep 29	Keynote Address Ezinne Uzo-Okoro SSA Policy Forum Is Orbital Carrying Capacity a Useful Metric? Invited Talk Diane Howard Technical Session Space-Based Assets Featured Presentation EMER-GEN® Briefing Featured Presentation 2022 AMOS Student Award Winner's Technical Presentation Technical Session Optical Systems & Instrumentation Technical Session Astrodynamics Poster Session Co-sponsored by Northrop Grumman Corporation
FRI Sep 30	Keynote Address Richard DalBello

PROGRAM

SSA Policy Forum | *The European Perspective on Space Traffic Management*
Student Space Exploration Day
Technical Session | *Conjunction/Rendezvous Proximity Operations* |
Sponsored by LeoLabs
Technical Session | *Atmospherics/Space Weather*
Technical Session | *Non-Resolved Object Characterization*
Invited Talk | *Col Raley & David Ehrlich*
Technical Session | *Cislunar SSA* | *Sponsored by Lockheed Martin*
Conference Closing & Awards Ceremony
Pau Hana Reception | *Co-sponsored by L3 Harris*

Sunday 25 September - Tuesday 27 September



EMER-GEN®

The 5th annual EMER-GEN® is a joint initiative of the AMOS Conference and SGAC. The program is designed especially for young professionals and students enthusiastic about careers in space. Separate registration required. Visit www.emer-gen.com to learn more.

02:00 **05:00** **ON-SITE REGISTRATION** | *Aulani Ballroom Foyer*
 PM HST PM HST

Monday 26 September

02:00 **05:00** **ON-SITE REGISTRATION** | *Aulani Ballroom Foyer*
 PM HST PM HST

VIRTUAL TECHNICAL SHORT COURSES: *In-person and virtual short courses are offered this year. Separate registration fee required for each half-day course. Virtual short courses are "live" with the ability to interact with the instructor and attendees in real-time. Virtual courses will not be recorded. Access links will be provided to registrants closer to the course date.*

08:00 **12:00** **VIRTUAL COURSE A** | *Space Domain Awareness (SDA) Workshop*
 AM HST PM HST

VIRTUAL COURSE B | *Space Weather Impacts on Orbital Operations*

VIRTUAL COURSE C | *Telescopes and Optics for Ground-Based Optical SSA*

12:00 **01:00** **BREAK** | *Explore the AMOS Virtual Venue and Digital Poster Hall*

01:00 **05:00** **VIRTUAL COURSE D** | *LeoLabs Cloud-based SDA Platform*

VIRTUAL COURSE E | *The International Framework for Space Behavior: Present Foundations and Future Prospects*

VIRTUAL COURSE F | *In-orbit Data Processing - Writing SpaceCloud Applications*

PROGRAM

Tuesday 27 September

07:00 **05:00** **ON-SITE REGISTRATION** | *Aulani Ballroom Foyer*
 AM HST PM HST

IN-PERSON TECHNICAL SHORT COURSES: *In-person and virtual short courses are offered this year. Separate registration fee required for each half-day course. In-person short courses will not be livestreamed for virtual attendance, nor will they be recorded.*

08:00 **12:00** **IN-PERSON COURSE 01** | **Conjunction Assessment (CA) Risk**
 AM HST PM HST **Assessment** | *Vanda*

IN-PERSON COURSE 02 | **The Dynamic Co-Evolution of Space Policy and Technology: Historical Overview and Lessons for Assessing Future Trends** | *Lokelani III*

IN-PERSON COURSE 03 | **Deep Learning Methods for Space Domain Awareness** | *Lokelani II*

IN-PERSON COURSE 04 | **Optical Modeling and Simulation for SSA/SDA** | *Ilima*

IN-PERSON COURSE 05 | **Navigating the Sea of Space Law** | *Mauna Loa*

12:00 **01:00** **BREAK** | *Explore the AMOS Virtual Venue and Digital Poster Hall. Pick up lunch at one of the many locations on-site or next door at the Shops at Wailea.*

01:00 **05:00** **IN-PERSON COURSE 06** | **Demystifying Machine and Deep Learning**
 | *Vanda*

IN-PERSON COURSE 07 | **Observing and Characterizing Space Debris**
 | *Lokelani II*

IN-PERSON COURSE 08 | **An Introduction to Event-Based Sensors for SDA: A Hands-On Tutorial** | *Mauna Loa*

IN-PERSON COURSE 09 | **Space Law & The Space Law Games: Legal Liability and Mapping the Future in LEO Operations** | *Ilima*

IN-PERSON COURSE 10 | **Astrodynamics for xGEO Space Domain Awareness** | *Lokelani III*

06:00 **07:30** **WELCOME RECEPTION** | *Luau Gardens*
 Join us for an oceanfront reception at sunset as we welcome the AMOS ‘ohana back to the island.

Co-sponsored by 

PROGRAM

Wednesday 28 September

The three-day plenary program will be livestreamed in its entirety to the virtual conference platform, with on-demand playback available in 24-48 hours. All registered attendees are encouraged to visit the virtual Exhibit Hall and Digital Poster Hall to review materials and interact with sponsors and poster presenters.

06:00 **07:15** **BREAKFAST AT LEISURE** | *Luau Gardens*
AM HST AM HST

07:30 **07:45** **CONFERENCE OPENING** | *Aulani Ballroom*
Leslie Wilkins, President & CEO, Maui Economic Development Board, Inc.

CULTURAL INVOCATION
Kahu Kealahou Alika

WELCOME & INTRODUCTIONS

07:45 **08:15** **OPENING KEYNOTE ADDRESS**
*Introduction by **Victoria Samson**, Washington Office Director, Secure World Foundation*



Lieutenant General Michael A. Guetlein
Commander, Space Systems Command
United States Space Force

08:15 **09:15** **SSA POLICY FORUM | Using SSA to Verify Future Space Security Agreements**
As the international community strives to negotiate space security agreements, the question arises about how to verify actions on orbit and whether the agreed-to behavior is being followed. SSA can provide a technical foundation for verification; by understanding what SSA can do, states are better placed to negotiate behaviors that can be confirmed by outside observers. This panel will discuss the technical ranges of SSA programs and how they can be applied to verify future space security agreements.

Moderated by:
Victoria Samson, Washington Office Director, Secure World Foundation

Panelists:
Almudena Azcarate Ortega, Associate Researcher, Space Security and Weapons of Mass Destruction Programmes, United Nations Institute for Disarmament Research
Daniel Ceperley, Founder & CEO, LeoLabs

PROGRAM

Michael Gleason, Senior Project Engineering, Center for Space Policy and Strategy, The Aerospace Corporation
Douglas Hendrix, CEO, ExoAnalytic Solutions
Benjamin Silverstein, Research Analyst, Carnegie Endowment for International Peace (CEIP)

09:15 10:00

EXHIBITION AND NETWORKING BREAK | *Sponsored by*
 | *Exhibit Hall + Conference Platform*

Explore the Exhibit Hall on-site and online. Interact with our conference partners, view demos, access resources, schedule meetings, and more.



09:15
AM HST

07:15
PM HST

EXHIBITION HOURS FOR THE DAY

10:00
AM HST

11:45
AM HST

MACHINE LEARNING FOR SSA APPLICATIONS | *Sponsored by*
 | *Aulani Ballroom*

Co-chaired by **Islam Hussein**, Trusted Space and
Charlotte Shabarekh, MIT Lincoln Laboratory



Adaptive Stress Testing Applied To Space Domain Awareness Systems
Jackson Wagner, University of Colorado Boulder

Development of a Versatile LiDAR Point Cloud Simulation Testbed for Advanced RSO Algorithms
Lane Fuller, Advanced Scientific Concepts

General-sum Game Modeling of Generative Adversarial Networks for Satellite Maneuver Detection
Dan Shen, Intelligent Fusion Technology, Inc

Applications of Artificial Intelligence Methods for Satellite Maneuver Detection and Maneuver Time Estimation
Nicholas Perovich, MIT Lincoln Laboratory

Light Curve Completion and Forecasting using Fast and Scalable Gaussian Processes (MuyGPs)
Imene Goumiri, Lawrence Livermore National Laboratory

Recurrent Neural Network Autoencoders for Spin Stability Classification of Irregularly Sampled Light Curves
Gregory Badura, Georgia Tech Research Institute

Space Data Model Modernization for Proactive, Machine-Assisted Analytics
Alexandra Wright, Massachusetts Institute of Technology

11:45
AM HST

12:45
PM HST

LUNCH | *Lokelani Ballroom*

12:45

1:05

INVITED TALK | Space Delta 2: Mission Federation and Realignment for a Contested and Congested Domain | *Aulani Ballroom*

Colonel Marc A. Brock, Commander, Space Delta 2, US Space Force

PROGRAM

03:05 **SPACE SITUATIONAL/DOMAIN AWARENESS** | Sponsored by **Peraton**
Co-chaired by **Moriba Jah**, University of Texas at Austin and Privateer, and **Danielle Wood**, Space Enabled Research Group, MIT Media Lab

System Approach to Analyse the Performance of Current and Future EU Space Surveillance and Tracking System at Service Provision level
Igone Urdampilleta, CDTI

ExoALERT: 1 Year of AI-Enabled Space Traffic Management Services at GEO
Doug Hendrix, ExoAnalytic Solutions

Increasing Capabilities in a Growing Radar Network
Owen Marshall, LeoLabs

European Expert Centre providing Services and Support for Space Surveillance and Traffic Management
Thomas Schildknecht, Astronomisches Institut Universität Bern

Target Behaviour Analysis based on Bistatic Radar Systems
Simão da Graça Marto, University of Strathclyde

Advanced Space Surveillance with the Imaging Radar IoSiS
Simon Anger, German Aerospace Center (DLR)

Improving the Resolution of Low Earth Orbit Objects by Multi-Exposure Imaging and Deconvolution
Andrew Lambert, UNSW Canberra

A Sensor Network for Integrated Space Traffic Management for Australia
Edwin Peters, University of New South Wales

03:05 03:25 **EXHIBITION AND NETWORKING BREAK** | *Exhibit Hall + Conference Platform*

Relax and recharge at the Recharging Station, brought to you by **PRIVATEER**

03:25 04:25 **SPACE SITUATIONAL/DOMAIN AWARENESS (cont.)** | Sponsored by **Peraton**
| *Aulani Ballroom*

Co-chaired by **Moriba Jah**, University of Texas at Austin and Privateer, and **Danielle Wood**, Space Enabled Research Group, MIT Media Lab

SSA/SDA Technology Policy Panel

Progress in building effective global cooperation in SSA/SDA will require contributions from engineering, policy, law, and cultural perspectives. This interactive panel discussion brings together thought leaders highlighting creative strategies for SSA & SDA. The ideas they share include ways to build international cooperation and learn from history.

PROGRAM

Employing a Shared Space Information Sharing Ecosystem as a Mechanism for Promoting Constructive U.S. China Space Relations
Nathaniel Dailey, MITRE & Space Force Association

Partnering not Bossing: Better Leveraging of International Capabilities for Space Domain Awareness
Lauren Hale, The Aerospace Corporation

A Survey of International Telecommunication Union (ITU) Space Station License Applications in the Geosynchronous Orbital Regime (GEO)
Thomas G. Roberts, Massachusetts Institute of Technology

Unnecessary Risks Created By Uncontrolled Rocket Reentries
Ewan Wright, The University of British Columbia

04:25

05:40

SPACE DEBRIS | Sponsored by 
Co-chaired by **Heather Cowardin, NASA** and **Carolyn Frueh, Purdue University**, and **Thomas Schildknecht, Astronomical Institute, University of Bern**

Stability of the LEO Environment as a Dynamical System
Daniel Jang, Massachusetts Institute of Technology

Report on 2021 COSMOS 1408 Event and Impact to Space Domain Awareness Mission
Deshaun Hutchinson, 18th Space Control Squadron

LEO Capacity Modeling for Sustainable Design
Mark Sturza, 3C Systems Company

Long-Term Evolution of Debris Clouds in Low Lunar Orbit
Nathan Boone, Air Force Institute of Technology


A Statistical Approach to Identify Fragmentation Epoch from a Single Fragment Surveillance Radar Observation
Marco Felice Montaruli, Politecnico di Milano

05:45

07:15

EXHIBITION AND POSTER SESSION | *Exhibit Hall*
Posters co-chaired by **Darren McKnight, LeoLabs** and **Matthew Stevenson, LeoLabs**

Meet select poster presenters while enjoying a cocktail and interacting with exhibitors and fellow attendees.

Co-sponsored by 

PROGRAM

08:00 10:00 **WOMEN & ALLIES IN SPACE DOMAIN AWARENESS** | *Pacific Terrace Rooftop*
 Desserts, dancing, and networking under the stars, with featured speaker **Ezinne Uzo-Okoro**, Assistant Director for Space Policy, White House Office of Science and Technology.

Limited to first 300 guests. Separate registration required. Registration information is forthcoming.

Presented by    

Thursday 29 September

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06:00 07:15 **BREAKFAST AT LEISURE** | *Luuu Gardens*
AM HST AM HST

07:30 08:00 **KEYNOTE ADDRESS** | *Aulani Ballroom*
 Introduction by **Ian Christensen**, Director of Private Sector Programs, Secure World Foundation



Ezinne Uzo-Okoro
 Assistant Director for Space Policy
 White House Office of Science and Technology Policy

08:00 09:00 **SSA POLICY FORUM | Is Orbital Carrying Capacity a Useful Metric?**
With the increasing deployment of very large satellite constellations, we are seeing a fundamental change in the way we use the space environment - calling into question our understanding of the carrying capacity of specific orbital regimes or regions. There are research efforts underway to define and apply approaches to assessing orbital capacity. This panel will discuss those approaches, and the work needed to understand how orbital capacity can be applied in behavioral and operationally relevant ways to improve the safe and sustainable use of LEO for all operators.

Moderated by:
Ian Christensen, Director of Private Sector Programs, Secure World Foundation

Panelists:
John Janka, Chief Officer, Global Government Affairs & Regulatory,

PROGRAM

Viasat Inc.
Francesca Letizia, Space Debris Engineer, European Space Agency
Hugh Lewis, Professor, Engineering and Physical Sciences, University of Southampton
Richard Linares, Associate Professor of Aeronautics and Astronautics, Massachusetts Institute of Technology
Akhil Rao, Assistant Professor of Economics, Middlebury College

09:00	09:40	EXHIBITION AND NETWORKING BREAK <i>Sponsored by PRIVATEER</i> <i>Exhibit Hall + Conference Platform</i> Explore the Exhibit Hall on-site and online. Interact with our conference partners, view demos, access resources, schedule meetings, and more.
09:00 AM HST	07:00 PM HST	EXHIBITION HOURS FOR THE DAY
09:40 AM HST	10:05 AM HST	INVITED TALK National Space Council Policy Update 2022: Embracing Opportunity <i>Aulani Ballroom</i> Diane Howard , Director of Commercial Space Policy, National Space Council
10:05	11:20	SPACE-BASED ASSETS Co-chaired by John Ianni , Air Force Research Laboratory and Pat Patterson , Space Dynamics Laboratory <i>Pole-Sitter Based Space Domain Awareness for Cislunar Regions</i> Roberta Ewart , SSC/ST <i>Formation Flying and Change Detection for the UNSW Canberra Space 'M2' Low Earth Orbit Formation Flying CubeSat Mission</i> Melrose Brown , UNSW Canberra Space <i>On Orbit Sensing of Objects Beyond GEO</i> Rachel Derbis , Air Force Institute of Technology <i>Sensor Management for Space-based Sensing Constellations</i> Joshua Davis , Defence Science and Technology Laboratory <i>Hyperspectral Thermal Imaging CubeSat for SSA Applications</i> Miguel Nunes , Hawaii Space Flight Laboratory
11:20	11:30	FEATURED PRESENTATION EMER-GEN® Briefing
11:30	11:45	2022 AMOS STUDENT AWARD WINNER <i>Optimal Cislunar Architecture Design Using Monte Carlo Tree Search Methods</i> Michael Klonowski , University of Colorado at Boulder
11:45 AM HST	12:45 PM HST	LUNCH <i>Lokelani Ballroom</i>

PROGRAM

12:45	03:15	OPTICAL SYSTEMS & INSTRUMENTATION <i>Aulani Ballroom</i> Co-chaired by Jeff Sherk , Aerospace Corporation and Stacie Williams , Air Force Office of Scientific Research <i>Adaptive Optics for Meter-Class Telescopes</i> Michael Hart , HartSCI LLC <i>Operational Acceptance and Employment of the Space Surveillance Telescope in 2022</i> Jonathan Hutfilz , Space Systems Command <i>Augmentation of a Southern Hemisphere Deep Space Bistatic Radar with Small Optical Systems to Detect Near Earth and other Space Objects</i> Ed Kruzins , UNSW Canberra Space <i>Ground-based Planetary Radars: Current and Future Prospects in the Cislunar Arena</i> Joseph Lazio , Jet Propulsion Laboratory, California Institute of Technology <i>Magdalena Ridge Observatory Interferometer: An Overview of an Astrophysics Facility for Supporting SDA Efforts</i> Van Romero , New Mexico Tech <i>LARADO: A Sensor for On-orbit Optical Detection of Lethal Non-Trackable Debris</i> Andrew Nicholas , Naval Research Laboratory <i>All-Sky Electro-Optical Tracking of Mega-Constellations in Low Earth Orbit</i> Cameron Key , Slingshot Aerospace <i>Event-Based Sensor Multiple Hypothesis Tracker For Space Domain Awareness</i> Rachel Oliver , Cornell University <i>Ultrafast Image Retrieval from a Holographic Memory Disc for High-Speed Operation of a Shift, Scale, and Rotation Invariant Target Recognition System</i> Julian Gamboa , Northwestern University <i>Automatic Detection and Characterization of Closely-Spaced Objects</i> Brandoch Calef , The Boeing Company <i>Upcoming Satellite Detection and Tracking Capabilities of the Australian National University</i> Doris Grosse , Australian National University
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03:30	03:50	EXHIBITION AND NETWORKING BREAK <i>Sponsored by PRIVATEER</i> <i>Exhibit Hall + Conference Platform</i>
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PROGRAM

- 03:50 05:35 **ASTRODYNAMICS**
Co-chaired by **John Gaebler**, KBR, and **Tom Kelecyc**, The Stratagem Group
- AURORAS: The Next Evolution of Orbit Determination Using Passive Optical Observations*
Jeffrey Bloch, Applied Research Associates
- Generalized Labeled Multi-Bernoulli Filter with Kernel-based Ensemble Gaussian Mixture Filtering for Orbit Determination with Sparse Data*
Benjamin Reifler, The University of Texas at Austin
- Geometric Solution to Probabilistic Admissible Region (G-PAR)*
Utkarsh Mishra, Texas A&M University
- Rapidly and Automatically Estimating Reachability of Electric Propulsion Spacecraft*
Prashant Patel, Institute for Defense Analyses
- Maneuver Estimation from Optical Observations of a Spiraling Trajectory: The Case of MEV-2*
Laura Pirovano, University of Auckland, Te Pūnaha Ātea - Space Institute
- Catalogue-based Atmosphere Uncertainty Quantification*
Alejandro Cano Sanchez, Universidad Carlos III de Madrid / GMV
- Improvements to the SGP4 Propagator (SGP4-XP)*
Timothy Payne, USSF/SPOC/DCG-T/S9I

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- 05:45 07:15 **EXHIBITION AND POSTER SESSION** | *Exhibit Hall*
Posters co-chaired by **Darren McKnight**, LeoLabs and **Matthew Stevenson**, LeoLabs

Meet select poster presenters while enjoying a cocktail and interacting with exhibitors and fellow attendees.

Co-sponsored by The Northrop Grumman logo consists of the words "NORTHROP" and "GRUMMAN" stacked vertically in a bold, black, sans-serif font, enclosed within a black rectangular border.

PROGRAM

Friday 30 September

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06:00 **07:15** **BREAKFAST AT LEISURE** | *Luau Gardens*
AM HST AM HST

07:30 **08:00** **KEYNOTE ADDRESS** | *Aulani Ballroom*
*Introduction by **Brian Weeden**, Director of Program Planning, Secure World Foundation*



Richard DalBello
 Director, Office of Space Commerce
 National Oceanic and Atmospheric Administration
 U.S. Department of Commerce


08:00 **09:00** **SSA POLICY FORUM | The European Perspective on Space Traffic Management**
While space traffic management has been a hot policy topic for the last several years, the conversation has largely been driven by the perspective from the United States. The European Union recently announced their strategy on STM, which is billed as a different approach than that from the United States. This panel will discuss the current EU thinking on STM, how it is similar or different from that of the United States or other countries, and what the prospects are for cooperation or competition going forward to develop an international STM regime.

Moderated by:
Brian Weeden, Director of Program Planning, Secure World Foundation

Panelists:
Pascal Faucher, Chair, European Union Space Surveillance and Tracking; Defense & Security, CNES
Sebastien Moranta, Research Manager, European Space Policy Institute
Rodolphe Muñoz, Legal Officer, European Commission, Directorate-General for Defence Industry and Space
Regina Peldszus, Space Policy Officer (Space Security, Space Situational Awareness), European External Action Service

09:00 **09:30** **EXHIBITION AND NETWORKING BREAK** | *Sponsored by* 
| Exhibit Hall + Conference Platform
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09:00 AM HST	03:00 PM HST	EXHIBITION HOURS FOR THE DAY
09:00 AM HST	01:00 PM HST	STUDENT SPACE EXPLORATION DAY <i>South Pacific Ballroom + Exhibit Hall</i> The AMOS Conference welcomes 150 Maui County middle school students and their STEM educators to meet astronaut Scott “Scooter” Altman and visit exhibit booths for hands-on STEM activities.
09:30 AM HST	10:45 AM HST	CONJUNCTION/RPO <i>Sponsored by</i>  LEO LABS <i>Aulani Ballroom</i> Co-chaired by Zach Funke , AFRL Maui and Jim Shell , Novarum Tech LLC <i>Conjunction Assessment: NASA Best Practices and Lessons Learned</i> Lauri Newman , NASA <i>Design And Development of a Decision Support Tool for Risk Assessment & Manoeuvre Planning in Collision Avoidance</i> Alexander Ryan , Industrial Sciences Group <i>Opportunistic Conjunction Screening with Maneuvering Spacecraft</i> Max Geissbuhler , Slingshot Aerospace <i>Predicted Intent Inferred from Real-time Rendezvous and Proximity Behavior</i> Thomas Kelecy , The Stratagem Group <i>Analysis of Orbit Residual Behavior to Determine Contact in Rendezvous and Proximity Operations at Geosynchronous Orbit</i> Jaycie Bishop , ExoAnalytic Solutions
10:45	11:45	ATMOSPHERICS/SPACE WEATHER Co-chaired by Randall Alliss , Northrop Grumman Corporation and Tom Berger , University of Colorado/Space Weather Technology, Research, and Education Center (SWx TREC) <i>The Impact of Space Weather Disturbances on Very Low Earth Orbit (VLEO) Satellites</i> Vishal Ray , University of Colorado Boulder <i>Impact of Space Weather on Space Assets and Satellite Launches</i> Julia Briden , Massachusetts Institute of Technology <i>Validation of Atmospheric Characterization and Prediction over Haleakala during the Laser Communications Relay Demonstration</i> Mary Ellen Craddock , NGC <i>A High Power, Large Aperture Doppler He Lidar for Upper Atmospheric Sensing</i> Peter Dragic , University of Illinois at Urbana-Champaign
11:45 AM HST	12:25 PM HST	LUNCH <i>Lokelani Ballroom</i>

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12:45	02:30	<p>NON-RESOLVED OBJECT CHARACTERIZATION <i>Aulani Ballroom</i> Co-chaired by Zach Gazak, Odyssey and Emily Gerber, Stratagem Group</p> <p><i>Shadow Imaging of Geostationary Satellites: Experimental Demonstration with Accurate Polychromatic Modelling of Diffraction and Atmospheric Disturbances</i> Hanae Labriji, DTIS, ONERA, Université Paris Saclay, F-91123 Palaiseau - France</p> <p><i>Simulation and Analysis of Event Camera Data for Non-Resolved Objects</i> Conor Benson, University of Colorado Boulder</p> <p><i>What is That Object Out There? Automated Satellite Modeling and Alternate Reality (AR)</i> Zachary Bergen, Ball Aerospace</p> <p><i>Spectral Characterization of Modern Spacecraft Materials</i> Heather Cowardin, NASA</p> <p><i>Spectropolarimeter for Satellite Identification</i> Louis Lischwe, Delft University of Technology</p> <p><i>Space Object Identification and Change Detection Methods for the Cislunar Orbit Regime</i> Tamara Payne, Altamira Technologies Corp.</p> <p><i>Remote Sensing of Satellite Activity through Optical and Infrared Temporal Differential Spectrophotometry Informed by Analysis of Noise</i> John Kielkopf, University of Louisville</p>
02:30	02:50	<p>EXHIBITION AND NETWORKING BREAK <i>Exhibit Hall + Conference Platform</i></p>
02:50	3:20	<p>INVITED TALK Challenging Space: Strategic S&T from LEO to Cislunar <i>Aulani Ballroom</i></p> <p>Colonel Jeremy A. Raley, Director, Space Vehicles Directorate, Air Force Research Laboratory</p> <p>David A. Ehrlich, Principal Deputy, Innovation & Prototyping Acquisition Delta, Space Systems Command</p>
03:20	05:05	<p>CISLUNAR SSA <i>Sponsored by</i> </p> <p>Co-chaired by Channing Chow, Cloudstone Innovations LLC and Jaime Stearns, AFRL Space Vehicles Directorate</p> <p><i>An Analytical Approach for Cislunar Information Gain</i> Patrick Miga, University of Colorado</p>

PROGRAM

Probabilistic Initial Orbit Determination and Object Tracking in Cislunar Space Using Optical Sensors

Islam Hussein, Trusted Space, Inc.

Optical Observation Regions in Cislunar Space Using the Bicircular Restricted Four Body Problem Geometry

Carolyn Frueh, Purdue University

Cislunar SDA with Low-Fidelity Sensors and Observer Uncertainty

Joshua Block, Air Force Institute of Technology

Classifying State Uncertainty for Earth-Moon Trajectories

Juan Gutierrez, KBR

Capacity-based Cislunar SDA Architecture Optimization

Josh Wysack, Ball Aerospace

Utilization of Space-Based TDoA and FDoA for Cislunar Orbit Determination

Michael Thompson, Advanced Space

05:05 05:30

CONFERENCE CLOSING & AWARDS CEREMONY

In collaboration with the Space Surveillance Technical Committee of the [American Astronautical Society](#) (AAS), the AMOS Conference recognizes outstanding efforts in the field of Space Situational/Domain Awareness by presenting the fifth annual AMOS Conference Best Paper and Student Awards. Also awarded are Best Presentation for each technical session and a series of Poster Awards.

05:30 07:00

PAU HANA RECEPTION | *Mei Court*

Commemorate the end of the 23rd AMOS Conference with live music, cocktails, and friends as we say *Aloha* and *A Hui Hou*

Co-sponsored by  **L3HARRIS**[™]
FAST. FORWARD.

PROGRAM

Digital Poster Presentations | Access Starts Sep 21

All posters are available in digital format this year and are accompanied by brief on-demand presentation videos in the virtual conference platform's Poster Hall. Interact with poster presenters on discussion boards and via video chat during optional Office Hours. The online Poster Hall opens Sep 23.

A select number of posters are invited for in-person presentation during the Poster Sessions, as indicated with a () double asterisk.**

Machine Learning for Satellite Characterisation

Alexander Agathangelou, Defence Science and Technology Laboratory**

From Ozone Depletion to Orbital Debris: Applying Lessons Learned from the Montreal Protocol to Orbital Debris

Asha Balakrishnan, Science and Technology Policy Institute

ARES: A Versatile Benchtop Testbed for Evaluating Techniques for Imaging through Atmospheric Turbulence

Fabien Baron, Georgia State University **

Updates on the Visible Spectroscopic Atlas of Geostationary Satellites

Adam Battle, University of Arizona **

Imperfect Information Games and Counterfactual Regret Minimization in Space Domain Awareness

Tyler Becker, University of Colorado Boulder **

Passive Ranging Solution Design to Improve CA Services

Marc Belmonte, GMV

Angular Velocity Vector Determination of Spacecraft in Flat-Spin Attitude States using Inverse Modelling with a Synthetic Light Curve Model

Laurence Blacketer, Northern Space & Security Ltd.

The Global Network On Sustainability In Space (GNOSIS): Activities, Initiatives, and Future Endeavours

James Blake, University of Warwick

Space and Ground-Based SDA Sensor Performance Comparisons

Amelia Bloom, Ball Aerospace **

Lightweight Image Processing Toolpack for Low-power and Low-cost Optical SST Triangulation Stations for Cataloguing in LEO Regime

Konrad Bojar, KB-Innotech

An Autonomous Geographically Distributed Ground Network that Scales

Matthew Britton, Aerospace Corporation **

Analysis of DebrisSat Data Collection and Procedures

Elizabeth Campa, University of Florida

PROGRAM

Stingray: Photometric Survey of the GEO Belt
Tanner Campbell, University of Arizona**

Analysis of Induced Color Index Error Due to Sequential Filter Photometry
Philip Castro, Applied Optimization, Inc.

Optimization and Automation of the Spectroscopy Pipeline of the Falcon Telescope Network
Philip Castro, Applied Optimization, Inc.

Cislunar Orbit Determination: Improvements in Uncertainty Realism and Data Fusion
C. Channing Chow II, Cloudstone Innovations LLC **

Synthetic Dark Current Correction for Space Situational Awareness Sensors
Thomas Chrien, Millennium Space Systems, A Boeing Company**

Assessing Performance Characteristics of the SGP4-XP Propagation Algorithm
Dave Conkey, a.i. solutions, Inc.

Coniometric and Polarized Imaging Spectroscopic Lab Measurements of Spacecraft Materials
Heather Cowardin, NASA **

SDA Environmental Toolkit for Defense -- Enabling Space Environment and Weather Support for SDA Ground-based Optical and Radar Sensors
Jeffery Cox, The Aerospace Corporation

Projected Orbital Demand and LEO Environmental Capacity
Andrea D'Ambrosio, Massachusetts Institute of Technology **

Feasibility of a Virtual Constellation using Small Aperture, Wide Field of View Optical Systems for Space Domain Awareness and Applications
Siddharth Dave, York University**

The Impact of Orbit Accuracy-Based Tasking on Sensor Network Efficiency
Neil Dhingra, Orbit Logic

Novel Algorithms for Novel Data: Machine Learning for Neuromorphic Data from the International Space Station
Stefan Doucette, MITRE Corporation **

Modeling Radar Measurement Uncertainty for Look Angle Optimization
Daniel Dowd, USSF, HQ Space Operations Command (SpOC) **

Survey of Geosynchronous Satellite Polarization Signatures
Blake Eastman, United States Air Force Academy **

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A Systems Theory Approach for Evaluating the Cascading Collision Potential of Orbital Shells

Valentin Eder, Space Analyses GmbH **

Detecting Space Objects in Event Camera Data through 3D Point Cloud Processing

Panna Felsen, The Aerospace Corporation**

Reformulating Compressed Sensing to be used with Semi-Resolved Images and Light Curves for Space Object Imaging: LEO and High Altitude

Carolin Frueh, Purdue University **

A Consolidated Multi-State Orbit Estimation Paradigm for Improved RSO Track Custody

Emily Gerber, Stratagem Group, Inc**

Modeling and Testing of COTS Observation Systems for Night and Daytime Satellite Detection

Ellen Glad, Millennium Space Systems, A Boeing Company

U.S. Commercial Space Regulation: The Rule of Three

John Goehring, National Geospatial-Intelligence Agency

Monitoring and Managing Space Weather Impacts to Satellite Constellations

Janet Green, Space Hazards Applications, LLC **

Fitting Doppler Predictions to Observations for High Precision Orbit Estimation Using Geometrically and Temporally Diverse Observations

Jake Gunther, Utah State University

Polarimetry and Spectroscopy on Geostationary Satellites with the Nordic Optical Telescope

Per Hägg, Swedish Defence Research Agency **

Optimal Sensor Planning for SSA using System Identification Concepts

Per Hägg, Swedish Defence Research Agency

Comparison of Vertical Profile Turbulence Structure Measurements at John Bryan Observatory

Brian Haimbaugh, AFRL**

Advances of ArianeGroup Capabilities for Laser Optical Observation of LEO Objects

Laurent Hennegrave, ArianeGroup

Calculating Optical Observation Residuals from GPS Satellites

Nathan Holzrichter, The MITRE Corporation **

Optimization Framework for Active Debris Removal Missions with Multiple Selected Targets

Joanna Hon, Turion Space Corp.

Cislunar SSA/SDA Data Communication Autonomous Distributed Scheduling

Gregory Howe, Stottler Henke Associates, Inc.

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Risk-Based Decision-Making for Space Traffic Management

Islam Hussein, Trusted Space, Inc.**

Uplooking Local Resolution Due to Atmospheric Turbulence

Amber Iler, KBR **

Identifying Near-Earth Objects on Wide-Field Astronomical Surveys Using a Convolutional Neural Network

Belén Yu Irureta-Goyena, EPFL

High Resolution Imaging of Satellites and Objects in Space with IoSiS

Matthias Jirousek, German Aerospace Center (DLR) **

Buying Space: Trends in U.S. SDA Acquisition

Kaitlyn Johnson, Center for Strategic and International Studies**

Modeling Small Orbital Debris Remediation in Low Earth Orbit

James Jones, Northrop Grumman

Pseudorange Measurement and Sun Phase Angle Estimation using CNN-based Image Processing Algorithm for HERA Mission

Aurelio Kaluthantrige, University of Strathclyde**

SpaceMap: Real-time Web Server for Safer, more Sustainable and Efficient Space

Douglas Deok-Soo Kim, SpaceMap **

Impact of the 2022 Hunga Tonga-Hunga Ha'apai Eruption on Cislunar Space Situational Awareness

Mitchell Kirshner, University of Arizona System and Industrial Engineering

Earth Gravity Assisted Inclination Change to Reduce Lunar Constellation Deployment Delta-V

Darin Koblick, Raytheon

Cislunar Orbit Determination Benefits of Moon-Based Sensors

Darin Koblick, Raytheon **

New Twin-Tubes Telescope for Observation of Near-Earth Space

Oleksandr Kozhukhov, National Space Facilities Control and Test Center of State Space Agency of Ukraine

Characterization of LEO Satellites With All-Sky Photometric Signatures

Harrison Krantz, University of Arizona Steward Observatory

Towards Realistic COOLFluid Global Coronal Model for EUHFORIA 2.0 Space Weather Forecast: Magnetograms Reconstruction and Comparison with Observations.

Blazej Kuzma, Centre for Mathematical Plasma Astrophysics, KU Leuven**

Alternate Ranging Strategy for Space Delta Operations

Leon Lala, The Aerospace Corporation

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Hybrid Sensor for Joint Space Domain Awareness and Lunar Surface Intelligence
Anna Lawitzke, Ball Aerospace **

A Modular Approach for Rendezvous and Proximity Operations Missions: from Simulations to Operations
Thibault Lebeke, Exotrail **

Training Neural Networks to Detect Resident Space Objects using Space Based Optical Payloads and Low-SWAP On Board Processing
Dominique Low, MDA

The Experiment for Space Radiation Analysis (ESRA): Technology Maturation of Next Generation Charged Particle Detectors in GTO
Carlos Maldonado, Los Alamos National Laboratory

Efficient High-fidelity Propagation and Visualization for Large Numbers of RSOs
Bill McClintock, Stratagem Group **

Event-based Detection, Tracking, and Recognition of Unresolved Moving Objects
Scott McCloskey, Kitware

A Map of the Statistical Collision Risk in LEO
Darren McKnight, LeoLabs**

Novel Image Alignment Technique for Extraction of Astrometry and Photometry from Small Field of View Astronomical Sensors
Calum Meredith, Defence Science and Technology Laboratory **

Assessment of Onboard Processing Algorithms for Cislunar Space Domain Awareness
Kyle Merry, Sandia National Labs**

Data-Driven Lifetime Risk Assessment and Mitigation Planning for Large-Scale Satellite Constellations
Pol Messalles Ripoll, SpaceNav

Widely-Spaced Large Reflector Transmit Arraying for Space Surveillance
Kathleen Minear, Specialized Arrays Inc

Trending and Analysis of Payload vs. All Low Earth Conjunction Data Messages below 1,000km, from 2016 through 2021
Daniel Moomey, U.S. Space Force

Bullseye: A Leakproof Search Strategy for Space Domain Awareness
Daniel Mulligan, Science Applications International Corporation (SAIC) **

Observations of Small Debris from the Cosmos 1408 Anti-Satellite Test using the HUSIR and Goldstone Radars
James Murray, Jacobs

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Bi-static Radar Interferometric Localization of MEO and GEO Space Debris using Australia Telescope Compact Array

Hamed Nosrati, CSIRO Space & Astronomy Australia

Multi-Phenomenology Characterization of Space Objects Using Reinforcement Learning

Jorge O'Farrill, MTSI**

A Novel Analytical Method to Determine Future Close Approaches between Satellites

Austin Ogle, Fulbright Grant

Comparison of Predicted and Observed Spacecraft Encounters from Russian ASAT Test

Daniel Oltrogge, COMSPOC**

Anthropogenic Change Detection On and Close to the Moon for Space Domain Awareness

David Osterman, Ball Aerospace

Assessing Passive Radar for LEO SSA

James Palmer, Silentium Defence **

Early Identification and Tracking of Fragments from Break-up Events

Alejandro Pastor, GMV**

DRAGON Army: An Innovation Pipeline for Space Operations

Rishi Patel, United States Air Force **

Peacock: A Persistent Wide-Field-Of-View Simultaneous Multispectral System Based on COTS Hardware

Tamara Payne, Applied Optimization Inc.

Measurements and Interpretation of Near-IR Spectra of Satellites

Eric Pearce, University of Arizona Steward Observatory

Geometry Sensitivity Study of a Recently-Maneuvered Satellite

Dylan Penn, Virginia Tech

A Software Defined Radio Based Method for Accurate Frequency Estimation for Real-time Passive RF Space Domain Awareness.

Edwin Peters, University of New South Wales **

Extraction of Light Curves from Passive Observations During Survey Campaign in LEO, MEO and GEO Regions

Alexis Petit, Share My Space

Improving Spectral-Based Estimation of Space Object Orientation

Matthew Phelps, USSF SSC/ECZGA**

Prototype Infrastructure for Autonomous On-board Conjunction Assessment and Collision Avoidance

Austin Probe, Emergent Space Technologies**

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Daytime Resolved Imaging of Space Objects from Ground Stations

Marine Pyanet, ArianeGroup

Use of a Commercial GEO Servicing Vehicle for Space Domain Awareness

Data Collection

Matt Pyrak, Northrop Grumman **

Detection Methods for the Statistical Analysis of the Population of Satellites and Space

Debris from Astronomical Images

Elisabeth Rachith, EPFL **

XGEO Collection Methods Using New Satellite Observing Techniques on the James Webb

Space Telescope

Kaitlyn Raub, MITRE **

Reducing Decision Time for On-orbit Operations with Virtualized Ground Stations and

Machine Learning

Carmen Reglero Andres, Amazon Web Services

SSA Technology Development Status for LEO Observations at the German Aerospace

Center (DLR)

Wolfgang Riede, German Aerospace Center (DLR), Institute of Technical Physics **

Automated Satellite Track Detection and On-sky Position Extraction Pipeline for Wide Field

of View Surveys

Willem Rood, Delft University of Technology

xGEO Space Domain Awareness: Parametrization and Characterization of Cislunar Space

Aaron Rosengren, University of California San Diego

Centralized Scheduler Interface for Communication Link Between SpaceLink's Relay

Satellites and LEO Assets

Jim Schwenke, SpaceLink

Cislunar Space Situational Awareness Sensor Tasking using Deep Reinforcement

Learning Agents

Peng Mun Siew, Massachusetts Institute of Technology **

Passive RF in Support of LEO Orbit Determination

Kameron Simon, Kratos **

High-precision Astrometric Measurements of Calibration Satellites

Jovan Skuljan, Defence Technology Agency **

Mirror Recoating of Large Primary Optics

Zachary Stein, The Boeing Company **

Towards Graph-Based Machine Learning For Conjunction Assessment

Emma Stevenson, Universidad Politécnic de Madrid **

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On-board, Autonomous, Hybrid Spacecraft Subsystem Fault and Anomaly Detection, Diagnosis, Root Cause Determination, and Recovery
Richard Stottler, Stottler Henke Associates, Inc. **

Memo on Space Debris Summit and Active Debris Removal
Frederick Tarantino, SAF/SQS

The Next Generation Planetary Radar System on the Green Bank Telescope
Patrick Taylor, National Radio Astronomy Observatory, Green Bank Observatory **

Improvements to HASDM in Support of Space Traffic Management
W. Kent Tobiska, Space Environment Technologies

Ensemble Machine Learning (ML) Models for Data Association and Maneuver Classification of Resident Space Objects (RSO's)
Triet Tran, Cornerstone Consulting, LLC

An Effective Machine Learning Approach To Detect Satellite Signals In Passive RF Space Domain Awareness
Kriti Tripathi, Clearbox Systems**

Sharing Operationally Relevant Space Cyber Information
Nick Tsamis, The MITRE Corporation

Sharing Operational Risk Information in the Space Domain to Facilitate Norms Development and Compliance Monitoring
Nick Tsamis, The MITRE Corporation

A Year in the Life of the Shackleton Space Domain Awareness Station
Jeffrey Van Cleve, Ball Aerospace **

SpeckleNet: Learned Speckle Interferometry Exploitation
Andrew Vanden Berg, AFRL/RDSM **

Understanding Non-Resolved Space Object Signatures for Space Domain Awareness
Miguel Velez-Reyes, The University of Texas at El Paso

Exploring a New Class of Bright, Ultra-fast, Glints from Resident Space Objects
W. Thomas Vestrand, Los Alamos National Laboratory **

Design and Test of Optical Surveillance Strategies for EU-SST Network Performances Studies
Sebastien Vourc'h, ArianeGroup

Cislunar Maneuver Detection and Classification
Charles J. Wetterer, KBR/Pacific Defense Solutions **

Deep-space Object Detection in Persistent Wide Field of View Camera Arrays
Brian Williams, Slingshot Aerospace

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Near-Rectilinear Halo Orbit Surveillance using Cislunar Periodic Orbits
Adam Wilmer, Air Force Institute of Technology

Analysis of Photometric Signatures of DTV-10 Collected 8 Years Apart
Kody Wilson, US Air Force Academy

Cislunar Orbit Optimization for Orbit Repetition and Eclipse Mitigation
Sam Wishnek, University of Colorado at Boulder

Low-Orbit, High Stakes: Winning the LEO Broadband Competition
Makena Young, Center for Strategic and International Studies **

Scattering of High Frequency Waves in the Presence of Whistler Wave Turbulence in the Ionosphere
Nathan Zechar, Riverside Research Institute **

An Automated System to Discover and Track Unknown Geosynchronous Objects using a Ground-based Optical Telescope
Yifan Zhou, University of Liverpool

Let's Find Eagle: Cislunar Space Domain Awareness Meets Archeoastronomy
Peter Zimmer, J.T. McGraw and Associates, LLC (JTMA)

Daylight Optical Measurements of LEO Satellites
Peter Zimmer, J.T. McGraw and Associates, LLC (JTMA)

The Need for Speed - Just in Time Data Relay through Optical Communications Links
Robert Zitz, SpaceLink

Single and Double Pass Optical LEO Survey and Tracking
Michał Żołnowski, Remote Observatories for Asteroids and Debris Searching