

PROGRAM

All dates/times listed are Hawaii Standard Time (HST). Agenda is subject to change. Each day of the plenary conference will open with a livestream of keynote addresses and SSA Policy Forum discussions. Technical presentations will be presented live on-stage, with on-demand viewing of pre-recorded presentations available for virtual attendees upon completion of the in-person sessions. All posters are digital format this year and are accompanied by on-demand presentation videos.

*An asterisk indicates the session will be livestreamed for virtual attendees.

Program at a Glance

SUN Sep 12 –	EMER-GEN® Program (separate registration fee required)
TUE Sep 14	On-site Registration
TUE Sep 14	In-person and Virtual Technical Short Courses (separate registration fee required) Welcome Reception Co-sponsored by Boeing
	On-Demand Launch Poster Presentations
WED Sep 15	Conference Opening & Cultural Invocation* Opening Keynote Address* Major General DeAnna M. Burt SSA Policy Forum* Lessons Learned from Recent Satellite Servicing Missions Invited Talk* Colonel Eric J. Felt & Colonel Joseph J. Roth Technical Session Cislunar SSA. Sponsored by Ball Aerospace. Technical Session Conjunction/Rendezvous and Proximity Operations Technical Session Astrodynamics Featured Presentation Semi-Empirical Metrics to Measure the Effects of Satellite Mega-Constellations on Astronomy Technical Session Dynamic Tasking Poster Reception Co-sponsored by SAIC
	On-Demand Launch Cislunar SSA, Conjunction/RPO, Astrodynamics, and Dynamic Tasking Technical Presentations
THU Sep 16	Keynote Address* SSA Policy Forum* Large Constellations and Right-of-Way in Space Featured Presentation EMER-GEN™ Briefing Featured Presentation 2021 AMOS Student Award Winner's Technical Presentation Technical Session Optical Systems & Instrumentation Featured Presentation The National Science Foundation's Daniel K. Inouye Solar Telescope Technical Session Atmospheric/Space Weather Technical Session Non-Resolved Object Characterization Poster Reception Co-sponsored by SpaceNav
	On-Demand Launch Optical Systems & Instrumentation, Atmospheric/Space Weather, Non-Resolved Object Characterization Technical Presentations

PROGRAM

FRI Sep 17

Keynote Address*

SSA Policy Forum* | *Results of the Recent UN Resolution on Norms of Behavior in Space*

Invited Talk* | *Dr. Kelly D. Hammett*

Technical Session | *Space Situational/Domain Awareness. Sponsored by LeoLabs.*

Featured Panel* | *Space Research Opportunities with the U.S.*

Technical Session | *Machine Learning for SSA Applications. Sponsored by Lockheed Martin*

Conference Closing & Awards Ceremony

Pau Hana Reception | *Co-sponsored by L3 Harris*

On-Demand Launch | SSA/SDA and Machine Learning Technical Presentations

Sunday 12 September - Tuesday 14 September



EMER-GEN®

The 4th 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
PM HST

05:00
PM HST

ON-SITE REGISTRATION | *Aulani Ballroom Foyer*

Tuesday 14 September

ON-DEMAND LAUNCH: View the Poster Presentations on the Virtual Platform and leave comments and questions. Please view a submission's designated Office Hours to video chat with the poster presenter during select times.

07:00
AM HST

05:00
PM HST

ON-SITE REGISTRATION | *Aulani Ballroom Foyer*

TECHNICAL SHORT COURSES: Separate registration fee required for each course. In-person and Virtual short courses are offered this year. In-person short courses will not be livestreamed for virtual attendance. Virtual short courses are "live" with the ability to interact with the instructor and attendees in real-time. [Learn more.](#)

07:00
AM HST

11:00
AM HST

VIRTUAL SHORT COURSE A | *Imaging of Space-Based Objects through Atmospheric Turbulence*

VIRTUAL SHORT COURSE B | *Introduction to ESA's Space Debris Software tools (DRAMA, MASTER, DISCOS, PROOF)*

VIRTUAL SHORT COURSE C | *Observing and Characterizing Space Debris*

PROGRAM

08:00	12:00	IN-PERSON SHORT COURSE 1 Conjunction Assessment (CA) Risk Assessment <i>Vanda</i> IN-PERSON SHORT COURSE 2 Deep Learning Methods for Space Domain Awareness <i>Ilima</i> IN-PERSON SHORT COURSE 3 SSA Optical Systems Modeling and Simulation <i>Lokelani II</i> IN-PERSON SHORT COURSE 4 Statistical Orbit Determination for Space Surveillance and Tracking <i>Mauna Loa</i> IN-PERSON SHORT COURSE 5 Supervised Learning: Review and Applications with Real Space Domain Awareness (SDA) Data <i>Lokelani III</i>
11:00 AM HST	12:00 PM HST	VIRTUAL SHORT COURSE BREAK <i>Explore the AMOS Virtual Venue, visit the Exhibit Hall, and view the Digital Poster Presentations.</i>
12:00	01:00	IN-PERSON SHORT COURSE BREAK <i>Explore the AMOS Virtual Venue or pick up lunch at one of the many locations on-site or next door at the Shops at Wailea.</i>
12:00	04:00	VIRTUAL SHORT COURSE D Polarimetry VIRTUAL SHORT COURSE E Telescopes and Optics for Ground-Based Optical SSA
01:00	05:00	IN-PERSON SHORT COURSE 6 Demystifying Machine and Deep Learning <i>Ilima</i> IN-PERSON SHORT COURSE 7 How to Kill Your Own Satellite <i>Vanda</i> IN-PERSON SHORT COURSE 8 Next Generation Data Management for Space Data <i>Lokelani II</i> IN-PERSON SHORT COURSE 9 Space Weather Impacts on Near-Earth Space Operations <i>Mauna Loa</i> IN-PERSON SHORT COURSE 10 The Dynamic Co-Evolution of Space Policy and Technology: Historical Overview and Lessons for Assessing Future Trends <i>Lokelani III</i>
06:00	07:30	WELCOME RECEPTION <i>Luau Gardens</i> Join us for an oceanfront reception at sunset as we welcome the AMOS ‘ohana back to the island after a long pandemic year. Co-sponsored by 

PROGRAM

Wednesday 15 September

ON-DEMAND LAUNCH: Presentations from the Cislunar SSA, Conjunction/RPO, Astrodynamics, and Dynamic Tasking technical sessions will be available upon completion of the in-person session.

**Session will be streamed to virtual platform*

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*

WELCOME & INTRODUCTIONS*

07:45 08:15 **OPENING KEYNOTE ADDRESS***



Major General DeAnna M. Burt

Commander, Combined Force Space Component Command,
United States Space Command

Deputy Commander, Space Operations Command,
United States Space Force

08:15 08:30 **KEYNOTE Q&A***

08:30 09:30 **SSA POLICY FORUM* | Lessons Learned from Recent Satellite Servicing Missions**

In April 2020, the first commercial satellite servicing mission successfully docked with a satellite above GEO, followed by the second docking in GEO in March 2021; as well, there is a planned orbital debris removal demonstration in LEO in mid-2021. This panel will discuss how existing SSA capabilities were able to monitor and support these recent and planned satellite servicing missions and the lessons learned for conducting future servicing missions and future SSA requirements.

09:30 10:00 VIRTUAL EXHIBITS AND NETWORKING BREAK | *Conference Platform*
Explore the Exhibit Hall and interact with our conference partners. Schedule 1:1 virtual meetings, view demos, resources, and more.

10:00 10:30 **INVITED TALK* | The Space S&T Challenges from LEO to Cislunar** | *Aulani Ballroom*

Col Eric Felt, Director, Space Vehicles Directorate, Air Force Research Laboratory
Col Joseph Roth, Director, Innovation & Prototyping, Air Force Space & Missile Systems Center

PROGRAM

10:30 11:45

CISLUNAR SSA | Sponsored by 

Co-chaired by **James Frith**, Air Force Research Laboratory and **Jesse Greaves**, University of Colorado Boulder

Tracking Objects in Cis-Lunar Space: The Chang'e 5 Case

Roberto Furfaro, University of Arizona

Hiding in Plain Sight: Observing Objects in Low Lunar Orbit and the L2 Dark Cone from a Lunar Surface Observatory

Jeffrey Van Cleve, Ball Aerospace

Risk Maps for Conjunction Potential Throughout the Cislunar Domain

Alexander Koenig, Massachusetts Institute of Technology

Cislunar Multiscale Dynamics and Implications for SSA

Aaron J. Rosengren, University of California San Diego

Robust Cislunar Initial Orbit Determination

Sam Wishnek, CU Boulder

11:45
AM HST

12:45
PM HST

LUNCH | Lunch venue sponsored by 

12:45

02:30

CONJUNCTION/ RENDEZVOUS AND PROXIMITY OPERATIONS | Aulani Ballroom

Co-chaired by **James Blake**, University of Warwick and **Darren McKnight**, LeoLabs

Overcoming the Operational Challenges Encountered during a Decade of Conjunctions

Mark Vincent, Raytheon

Direct Optimization Framework for Collision Avoidance Operations of Low Thrust Satellites in Low Earth Orbit

Axel Garcia Burgos, Massachusetts Institute of Technology

Space Situational Awareness (SSA) Activities Explored through the ELSA-d Mission

Toby Harris, Astroscale

An Investigation into Potential Collision Maneuver Guidelines for Future Space Traffic Management

Mariel Borowitz, Georgia Institute of Technology

In-Space Inspection Maneuver Analysis Using Trajectory Optimization


Ian Connerney, Virginia Polytechnic Institute and State University

PHANTOM ECHOES 2: A Five-Eyes SDA Experiment on GEO Proximity Operations

Simon George, Defence Science and Technology Laboratory

PROGRAM

*SSA Positional and Dimensional Accuracy Requirements for Space Traffic
Coordination and Management*
Salvatore Alfano, COMSPOC Corporation

02:30 02:50 VIRTUAL EXHIBITS AND NETWORKING BREAK | *Conference Platform*
Relax and recharge at the Recharging Station, brought to you by 

02:50 04:05 **ASTRODYNAMICS** | *Aulani Ballroom*
Co-chaired by **Tom Kelecy**, L3Harris and **Sam Wishnek**, University of Colorado
Boulder

RSO Proper Elements for Space Situational and Domain Awareness
Di Wu, University of California San Diego

*Improving Earth-orbiting Object State Prediction by using Big Data Analysis and
Machine Learning Techniques on TLE Data*
Nicholas Miller, University of Michigan

*Improved Orbital Predictions using Pseudo Observations - Maximizing the Utility
of SGP4-XP*
Anthony Holincheck, Sceptre Analytics, Inc.

*A Reformulation of the Probability Hypothesis Density (PHD) Filter For Space
Situational Awareness Optical Detection and Tracking*
Carolyn Frueh, Purdue University

Fragmentation Detection via Track-to-track Association of Optical Observations
Alejandro Pastor, GMV

04:05 04:20 **FEATURED PRESENTATION**
*Semi-Empirical Metrics to Measure the Effects of Satellite Mega-Constellations
on Astronomy*
Doyle Hall, Omitron Inc.

04:20 05:20 **DYNAMIC TASKING**
Co-chaired by **David Brough**, Numerica and **Gabe Egolf**, Parsons

*Expanding the Space Surveillance Network with Space-Based Sensors Using
Metaheuristic Optimization Techniques*
Cameron Harris, Virginia Polytechnic Institute and State University

*A Deep Reinforcement Learning Application to Space-based Sensor Tasking for
Space Situational Awareness*
Peng Mun Siew, Massachusetts Institute of Technology

PROGRAM

SNARE (Sensor Network Autonomous Resilient Extensible): Decentralized Sensor Tasking Improves SDA Tactical Relevance

Harvey Reed, MITRE

Multi-Space-Object Tracking with the Poisson Labeled Multi-Bernoulli (PLMB) Filter & Probabilistic Admissible Region Constraints

Martin Adams, Universidad de Chile

05:30 07:00 **POSTER PRESENTER RECEPTION** | *Pacific Terrace Rooftop*
 Meet the poster presenters while enjoying a cocktail. All posters are digital and can be viewed on the Virtual Conference Platform.

Co-sponsored by  **SAIC**
 Redefining Insenuity

Thursday 16 September

ON-DEMAND LAUNCH: Presentations from the Optical Systems & Instrumentation, Atmospherics/Space Weather, and Non-Resolved Object Characterization technical sessions will be available upon completion of the in-person session.

**Session will be streamed to virtual platform*

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

07:30 08:00 **KEYNOTE ADDRESS*** | *Aulani Ballroom*

08:00 09:00 **SSA POLICY FORUM*** | **Large Constellations and Right-of-Way in Space**
Current practice leaves it up to individual operators to assess the risk threshold for an avoidance maneuver to prevent potential collisions and who will - or should - perform it. But as the deployment of mega-constellations in LEO continues, there will be an increasing number of close approaches between satellites from different constellations or operators with different risk criteria, maneuver protocols, and potentially competing interests. This panel will discuss the right-of-way for satellites and other potential solutions to mitigate this problem and improve the coordination and resolution of close approaches in space.

09:00 09:20 **VIRTUAL EXHIBITS AND NETWORKING BREAK** | *Conference Platform*
 Explore the Exhibit Hall and interact with our conference partners. Schedule 1:1 virtual meetings, view demos, resources, and more.

09:20 09:30 **FEATURED PRESENTATION** | **EMER-GEN® Briefing** | *Aulani Ballroom*

09:30 09:45 **2021 AMOS STUDENT AWARD WINNER**

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09:45	11:15	OPTICAL SYSTEMS & INSTRUMENTATION Co-chaired by Matthew Bold , Lockheed Martin and Stacie Williams , Air Force Office of Scientific Research <i>Reducing Weight of Imaging Systems with Flat Lenses</i> Rajesh Menon , Oblate Optics <i>Operations Update for the Deformable Mirror Demonstration Mission (DeMi) CubeSat</i> Rachel Morgan , MIT <i>Simulation Analysis of Wavefront Sensing Techniques for Extended Scene Imaging</i> Justin Knight , University of Arizona <i>Transformation of SST into a Dedicated Sensor in the Space Surveillance Network</i> Jonathan Hutfilz , Space and Missile Systems Center <i>Design and Predicted Performance of 4-m Baseline Habitable-zone Exoplanet Observatory Telescope</i> Stahl H Philip , NASA <i>Characterization of The Eugene Stansbery-Meter Class Autonomous Telescope on Ascension Island</i> Corbin Cruz , Jacobs
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11:15 AM HST	12:15 PM HST	LUNCH
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12:15	01:30	OPTICAL SYSTEMS & INSTRUMENTATION (cont.) <i>Aulani Ballroom</i> Co-chaired by Matthew Bold , Lockheed Martin and Stacie Williams , Air Force Office of Scientific Research <i>Traceable to Ground-Based Imaging of GEO Satellites</i> Richard Paxman , Maxar <i>Polarimetric 3D imaging in degraded environments</i> Kashif Usmani , University of Connecticut <i>Optomechanical Design and Fabrication of a Wide Field of View 250-mm-aperture Freeform Imaging System</i> Matthew A. Davies , The University of North Carolina at Charlotte <i>Event-based Sensor Model for Space Domain Awareness</i> Rachel Oliver , U.S. Air Force <i>Synthetic-Aperture Silhouette Imaging (SASI): Laboratory Demonstration</i>
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PROGRAM

Compact Extremely Accurate Star Tracker

Greg Finney, IERUS Technologies

01:30 01:45

FEATURED PRESENTATION

The National Science Foundation's Daniel K. Inouye Solar Telescope

Thomas Rimmele, National Solar Observatory

01:45 02:45

ATMOSPHERICS/SPACE WEATHER

Co-chaired by **Randall Alliss**, Northrop Grumman Corporation and **Michael Roggemann**, Michigan Technical University

Decorrelating Density and Drag-coefficient Through Attitude Variations

Vishal Ray, CU Boulder

Physics-based Approach to Density Estimation and Prediction using CubeSat GPS Data

Shaylah Mutschler, University of Colorado Boulder

Accelerated AI Powered Atmospheric Predictions for Space Domain Awareness Applications

Danny Felton, Northrop Grumman Corporation

The Solar Particle Access Model (SPAM): A New Tool for Monitoring Solar Energetic Particle Impacts to Satellite Operations

Janet Green, Space Hazards Applications, LLC

02:45 03:05

VIRTUAL EXHIBITS AND NETWORKING BREAK | *Conference Platform*

03:05 05:20

NON-RESOLVED OBJECT CHARACTERIZATION | *Aulani Ballroom*

Co-chaired by **Heather Cowardin**, NASA Johnson Space Center and **Weston Faber**, L3 Harris

Inversion of the Shape and Other Characteristics of Space Debris from Non-resolved Optical Measurements

David Vallverdu Cabrera, Airbus Defence and Space GmbH

Spectral Characterization of 2020 SO

Vishnu Reddy, University of Arizona

Space Object Identification, Discrimination, and Tracking

Kameron Simon, Kratos

Automated Multi-Sensor Data Fusion Using the Unified Data Library

Kristen Haynes, Applied Optimization Inc.

PROGRAM

Comparing Photometric Behavior of LEO Constellations to SpaceX Starlink using a Space-based Optical Sensor

Chance Johnson, USAF/CAF

Studying the Potential of Hyperspectral Unmixing for Extracting Composition of Non-resolved Objects using Simulation Models

Miguel Velez-Reyes, The University of Texas at El Paso

Extending Laboratory BRDF Measurements towards Radiometric Modeling of Resident Space Object Spectral Signature Mixing

Gregory Badura, Georgia Tech Research Institute

Using Light Curves for GEO Object Characterisation

Emma Kerr, Deimos Space UK Ltd.

Rapid Discrimination of Resident Space Objects Using Near-Infrared Photometry

Eric Pearce, University of Arizona Steward Observatory

05:30 07:00

POSTER PRESENTER RECEPTION | *Pacific Terrace Rooftop*

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Co-sponsored by



Friday 17 September

ON-DEMAND LAUNCH: Presentations from the SSA/SDA and Machine Learning Applications for SSA technical sessions will be available upon completion of the in-person session.

**Session will be streamed to virtual platform*

06:00 07:15
AM HST AM HST

BREAKFAST AT LEISURE | *Luau Gardens*

07:30 08:00

KEYNOTE ADDRESS* | *Aulani Ballroom*

08:00 09:00

SSA POLICY FORUM* | **Results of the Recent UN Resolution on Norms of Behavior in Space**

In December 2020, the United Nations General Assembly adopted a resolution proposed by the United Kingdom that called on member states to provide their thoughts on threats to space security and proposals for dealing with those threats, including developing norms of behavior for space. This panel will discuss the inputs received from governments and civil society and what it means for future multilateral discussions on space security, and how SSA can help reduce

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misperceptions and misunderstandings and increase the transparency of space activities.

09:00	09:20	VIRTUAL EXHIBITS AND NETWORKING BREAK <i>Conference Platform</i> Explore the Exhibit Hall and interact with our conference partners. Schedule 1:1 virtual meetings, view demos, resources, and more.
09:20	09:40	INVITED TALK* AFRL Support to Space S&T <i>Aulani Ballroom</i> Dr. Kelly Hammett , Director, Directed Energy Directorate; Deputy Technology Executive Officer (TEO) for Space Science and Technology, Air Force Research Laboratory
09:40	11:25	SPACE SITUATIONAL/DOMAIN AWARENESS <i>Sponsored by</i> LEO LABS Co-chaired by Moriba Jah , University of Texas at Austin and Danielle Wood , Space Enabled Research Group, MIT Media Lab <i>Safety Norms for Space Security: How the Development of STM Norms Can Strengthen Security in Space</i> Daniel Porras , Secure World Foundation <i>Test on the New SSA System of JASDF</i> Ryotaro Sakamoto , Japan Air Self Defense Force <i>Swedish National Interests in Space Situational Awareness</i> Torbjörn Sundberg , Swedish Defence Research Agency <i>The Australian Space Agency's Inaugural SSA Technology Roadmap: Context, Methodology and Learnings</i> Aude Vignelles , Australian Space Agency <i>Report on 2020 Megaconstellation Deployments and Impacts to Space Domain Awareness</i> Diana McKissock , U.S. Air Force <i>Doppler and Angle of Arrival estimation from Digitally Modulated Satellite Signals in Passive RF Space Domain Awareness.</i> Mohd Noor Islam , Clearbox Systems <i>Proliferation of Daytime Optical Systems for LEO Space Domain Awareness</i> Jeff Aristoff , Numerica Corporation
11:25 AM HST	12:25 PM HST	LUNCH
12:25	01:25	SPACE SITUATIONAL/DOMAIN AWARENESS (cont.) <i>Sponsored by</i> LEO LABS Co-chaired by Moriba Jah , University of Texas at Austin and Danielle Wood , Space Enabled Research Group, MIT Media Lab

PROGRAM

Geosynchronous Satellite Maneuver Identification and Characterization using Passive RF Passive Ranging

Austin Beer, Kratos

System Approach to Analyse the Performance of the EU Space Surveillance and Tracking system

Jose Maria Hermoso, CDTI

Adapting New Processes to Support Improved Space Based Surveillance Ground Operations

Shawn Abernethy, Stratagem Group

European Expert Centre Providing Services and Support for Space Surveillance and Traffic Management

Thomas Schildknecht, Astronomisches Institut Universität Bern

01:25 02:25

PANEL* | Space Research Opportunities with the U.S.

This panel will discuss the many opportunities that exist for the space domain awareness to engage with the US Government. This is a chance to hear leading representatives from the major military and civilian research groups present their approaches to these activities. Of particular interest to many is how the newly formed Space Force efforts are being coordinated with the traditional Air Force research organizations. Discussions will also include opportunities for international outreach and collaborative efforts.

Moderated by:

Geoff Andersen, Technical Director, Southern Office of Aerospace Research and Development, Air Force Office of Scientific Research

Panelists:

Thomas W. Cooley, Chief Scientist, Space Vehicles Directorate, Air Force Research Laboratory

Joel B. Mozer, Chief Scientist, United States Space Force

James L. Reuter, Associate Administrator, Space Technology Mission Directorate, NASA

William P. Roach, Chief Scientist, Air Force Office of Scientific Research

Donald A. Shiffler, Jr., Chief Scientist, Directed Energy Directorate, Air Force Research Laboratory

02:25 02:45 VIRTUAL EXHIBITS AND NETWORKING BREAK | *Conference Platform*

02:45 04:45 **MACHINE LEARNING FOR SSA APPLICATIONS** | Sponsored by  **LOCKHEED MARTIN**
Co-chaired by **Islam Hussein**, Thorton Tomasetti and **Charlotte Shabarekh**, Aptima, Inc.

PROGRAM

Toward Real-time, Learned Deep Space Object Detection in Stacked Persistent Wide Field of View Camera Arrays

Garrett Fitzgerald, United States Space Force/ AFRL/RDSM/ University of Dayton

Geosynchronous Satellite Maneuver Classification via Supervised Machine Learning

Thomas G. Roberts, Massachusetts Institute of Technology

Toward using Artificial Intelligence/Machine Learning (AI/ML) Models for Data Association and Maneuver Classification of Resident Space Objects (ROS) for Space Domain Awareness

Triet Tran, Cornerstone Consulting LLC

Towards Sim2Real Data Augmentation for Deep Space Object Detection

Matthew Phelps, Program Support to SMC/SPG

Satellite Classification Using Statistical Inference Models and Neural Networks: A Survey of Methods and Findings

Richard Kim, Aerospace Technical Services

Pixelwise Image Segmentation for RSO Detection of GEO Spacecraft

Douglas Woodward, The Aerospace Corporation

Incremental Learning of Novel Resident Space Object Spectral Fingerprints

Zach Gazak, AFRL

SpeckleNet: Learned Speckle Interferometry Exploitation

Ian Cunnyngham, United States Space Force

04:45 05:05

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 fourth annual AMOS Conference Best Paper and Student Awards.

05:05 06:00

PAU HANA RECEPTION | *Mei Court*

Commemorate the end of the 22nd AMOS Conference with live music, cocktails, and friends as we say *Aloha* and *A Hui Hou*

Sponsored by  **L3HARRIS**

Digital Poster Presentations

PROGRAM

All posters are in digital format and can be viewed on the Virtual Platform starting Tues Sep 14. Brief video presentations accompany the posters. Please view a poster's designated Office Hours to video chat with the poster presenter during select times.

Light Curve Analysis of Deep Space Objects in Complex Rotation States
Michael Abercrombie, The Boeing Company

Geostationary Satellite Telemetry on a Budget
Abdu Abohalima, ANU

Calibration of the Falcon Telescope Network for Geosynchronous Satellite Photometric and Spectral Signatures
Ethan Albrecht, United States Air Force Academy

SDA Environmental Toolkit for Defense -- Enabling Attribution for Orbital Assets and Electro-magnetic Spectrum Links through Streamlined R2O
Sage Andorka, United States Space Force

On the Impact of Tactical Track Loading on Volume Revisit Performance and the Role of Augmenting Hosted Payloads – A GEO Space Domain Awareness Challenge
Jeff Asher, JHU/APL

A Visible Spectroscopic Atlas of Geostationary Satellites
Adam Battle, University of Arizona

Radar-Derived Spin States of Defunct GEO Satellites and Rocket Bodies
Conor Benson, University of Colorado Boulder

Sat Sentry: On-orbit Detection System for Space Domain Awareness
Nicholas Bertrand, Northrop Grumman Corporation

A Study of Measuring Beam Wander from Stars for Ground-based Laser Illumination
Nazim Bharmal, Durham University

Space-based Observations Of The Cis-lunar Environment
Aaron Boley, The University of British Columbia

Artificial Debris Collision Risk Following a Catastrophic Spacecraft Mishap in Lunar Orbit
Nathan Boone, Air Force Institute of Technology

Bayesian Approach to Light-Curve Inversion of 2020 SO
Tanner Campbell, University of Arizona

Improving Orbital Uncertainty Realism through Covariance Determination in GEO
Alejandro Cano Sanchez, GMV

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Accelerating Space Domain Awareness Using Reinforcement Learning

Matthew Carver, Booz Allen Hamilton

Simplified Conjunction Analysis using a Graph Database for Identifying High Risk Objects

Janet Cathell, Sceptre Analytics

Cislunar Orbit Determination Behavior: Processing Observations of Periodic Orbits with Gaussian Mixture Model Estimation Filters

C. Channing Chow II, Cloudstone Innovations LLC

Utilization Potential for Distinct Orbit Families in the Cislunar Domain

Phillip Cunio, ExoAnalytic Solutions

A Space Operations Domain Architecture Framework (SODAF) for Multinational Constructive Engagement and Future Conflict Uncertainty Mitigation

Nathaniel Dailey, The MITRE Corporation & JHU School of Advanced International Studies

Maximizing the Utility of Non-Traditional Sensor Network Data for SSA/SDA

Neil Dhingra, Orbit Logic Incorporated

Machine Learning for Launch Assessment: The Similarity-Based Launch Classification Tool (SLCT)

Michal Dichter, Applied Technology Associates, a BlueHalo Company

Compact Solutions for Detecting Space and Ground Based Optical Threats to Satellites

Cameron Dickinson, MDA Space Robotics & Operations

Qualifying and Reducing Neutral Density Uncertainty for Precise Orbit Determination using Physics-Based Data Assimilations

Nicholas Dietrich, University of Colorado Boulder

Preliminary Orbit Determination Using the Transit of Satellites in Front of Space-Based Illumination Sources

Daniel Dombrowski, Air Force Institute of Technology

Out of Context Analysis (OCA) a Different Approach to Investigate Data You Have

Richard Domikis, Conerstone Defense

Speckle Interferometry of Binary Stars with a 1m Telescope, Grounded with AO from a 1.5m

Jack Drummond, Leidos

Use of Machine Learning Models for Heterogeneous Spacecraft Constellation Operations and Forecasting

Alexander Dunn, Oakman Aerospace, Inc.

Time Forecasting Satellite Light Curve Patterns using Neural Networks

William Dupree, Aptima, Inc.

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Amorphous Closed Loop Feedback Control for SDA Payloads

David Ellis, Ball Aerospace

A Regional Greedy Algorithm for Space Domain Awareness Resource Allocation

Naomi Owens Fahrner, Ball Aerospace

Spooky Coordinated Tasking and Estimation on Uninformative Priors

Samuel Fedeler, University of Colorado at Boulder

Nonlinear Filtering with State-dependent Probability of Detection

Gunner Fritsch, Texas A&M University

Detection of Background Stars over an Artificial Satellite Pass using the K-Maximum Algorithm.

Andre Gaudin, University of Canterbury

Characterization of Orbital Debris Attributes Using Functional Data Analysis

Emily Gerber, L3 Harris

Adaptive Optics for Daytime Deep-Space Optical Communications

Szymon Gladysz, Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB

Relative Optical Cislunar Navigation

Jesse Greaves, University of Colorado Boulder

Establishing Consensus Between Implicitly Updated Decentralized Probability Distribution Functions

Juan Gutierrez, Purdue University

Photometric Characterization and Trajectory Accuracy of Starlink Satellites

Grace Halferty, University of Arizona

An Adaptive, Non-singular Measurement Model for Angles-only Orbit Determination and Estimation

James Hippelheuser, University of Central Florida

Dynamic Model Integration and Simulation Engine (DMISE) Assisted Design of Future Sensor Networks in Support of Space Traffic Management

Douglas Hope, Georgia Tech Research Institute

Headline-based Human-Computer Interface to Aggregate Space Indications and Warnings

John Ianni, Air Force Research Laboratory

Asteroid Detection and Risk Prediction for the Earth

Tulika Jain, Shah & Anchor Kutchhi Engineering College

Data Fusion of Historical Space Weather Outliers and Satellite Anomalies

Randy Jensen, Stottler Henke Associates, Inc.

PROGRAM

Characterizing Satellites Using Near-Simultaneous Polarization Measurements

Audra Jensen, USAFA

Application of the AST-UKF to Modern Space Domain Awareness

Jonathan Kadan, Virginia Tech

The Advancement and Importance of Cubesats in Space Sector: A Botswana Perspective in the African Space Agenda

Tumo Fortunate Kedumele, Space Generation Advisory Council In Support of the United Nations Programme on Space Applications

Design and Prototyping of a Low-cost LEO Optical Surveillance Sensor

Emma Kerr, Deimos Space UK Ltd.

Toward Intuitive Understanding of Complex Astrodynamics using Distributed Augmented Reality

Caroline Kingsley, Charles River Analytics

Novel Closed Form Solution for Orbit Segment Altitude Extrema Over Spherical and Oblate Central Bodies

Darin Koblick, Raytheon Intelligence and Space

Designing Space Situational Awareness in Mixed Reality; Lesson's Learned from MDA's Visualization Development as Part of Canadarm Operations, the DREAMR Lab and the Space Common Operating Picture System (S-COPS).

Christos Koulas, MDA

Use of Ground Stations of ERS Data Reception in the Interest of Space Situational Awareness

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

Characterizing the All-Sky Brightness of Satellite Mega-Constellations and the Impact on Astronomy Research

Harrison Krantz, University of Arizona Steward Observatory

Space Command and Control Program - Kobayashi Maru

Jennifer Krolikowski, SMC/ECXC

Space Common Operation Picture System (S-COPS)

Balaji Kumar, MDA Systems Ltd.

Light Scattering Properties of a Solar Panel Including Wavelength and Polarization Dependencies in the Visible Spectrum

Joe Kurtz, University of New South Wales - Canberra

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Improving Orbit Propagation With In-Situ Atmospheric Density Measurements

Andrew Kurzrok, Space Generation Advisory Council

Self-Supervised Learning for Estimating Satellite Orientation

Trent Kyono, The Boeing Company

Small Satellite Tracking Using Passive Radar Retro-reflectors

Daria Lane, PEO C4I and Space Systems/PMW 146

The Efficacy of Limiting Catastrophic Fragmentations in Low Earth Orbit by Regulating Probability of Collision with Large Objects

Mike Lindsay, Astroscale

Providing Cislunar SDA Utilizing an All-GEO/HEO Constellation

Bryan Little, Air Force Institute of Technology

Discovering 3-D Structure of LEO Objects Using Neural Radiance Fields

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Jeremy Ludwig, Stottler Henke Associates, Inc.

Empirical Characterization of Machine Learning Methods for Space Situational Awareness

Mitchell Malone, Tau Technologies

Observations of Space Object 2020 SO Using 8-inch f/2 Schmidt Astrograph

Tim McLaughlin, Pine Park Engineering Corp

Autonomous Collection Target Acquisition for Ground-Based Telescopes using Deep Reinforcement Learning

Ian McQuaid, United States Air Force

Maneuver Planning via Population Monte Carlo

Caleb Miller, CU Boulder, Lawrence Livermore National Laboratory

Earthshine: A Paradigm Shift for Daylight Imaging and Custody of LEO Satellites

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A Subset Simulation Based Technique for Calculating the Probability of Collision

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Enhanced Standard Data Format for Reporting Electro-Optical Data Products for Space

Domain Awareness

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Introduction of New Strategies and State of the Art Investigation on Space Debris Catalogue Creation for Optical Sensor Networks

GUIDO PEDONE, Airbus Defence and Space GmbH

Debris Cloud Structure in Medium Earth Orbit

Marielle Pellegrino, University of Colorado Boulder

Clustering-Based Uncorrelated Track Association

Louis Penafiel, Aptima, Inc.

Detection & Identification of On-Orbit Objects Using Machine Learning

Marcos Perez,

Polarimetric Space Situational Awareness using the Aero-Optical Prediction Tool

Christopher Persons, IERUS Technologies

Share My Space Multi-telescope Stations Performance Assessment

Alexis Petit, Share My Space

Solar Flare Prediction With Recurrent Neural Networks

Jill Platts, AFRL/RISA

Dual Use Star Tracker and Space Domain Awareness Sensor In-Space Test

Elozor Plotke, LinQuest Corporation

Real-Life Performance of RPO Imagers at GEO

Matt Pyrak, Northrop Grumman Space Systems

Orbital Diversity and Inclination Optimization for Large Count LEO Constellations in Non-polar Orbits

Chuck Quintero, JHU-APL

Decentralized Space Information Sharing as a Key Enabler of Trust and the Preservation of Space

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Chris Rodgers, Centauri

Future Space Domain Awareness Hosted Payloads

Anthony Rosati, USSF AFSPC SMC/SPG

A Worldwide Network of Radar for Space Domain Awareness in Low Earth Orbit

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Modeling Energy Dissipation and De-tumbling of a Defunct a Satellite Using a Finite Element Method

Ryotaro Sakamoto, University of Colorado Boulder

Optical Satellite Tracking in Earth's Shadow with Non-traditional Illumination

Kevin Schafer, MITRE

Ablative Collision Avoidance for Space Debris in the Lower Earth Orbit by a Single Multi-kJ Pulse from a Ground-based Laser

Stefan Scharring, German Aerospace Center (DLR)

Space Domain Characterization and Control System (SDCCS) -- A User Workflow Centered Persistent Analytical Framework

Michael Sellick, Centauri, LLC.

Re-entry Event of CZ-3B R/B Observed by All-sky Meteor Cameras AMOS

Jiri Silha, Comenius University, Faculty of Mathematics, Physics and Informatics

Systems and Methods for Hybrid Lunar Surface and Space Domain Situational Awareness

Elvis Silva, Ball Aerospace

A Three-dimensional Photometric Model of a Satellite in Geostationary Orbit

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Identifying the Statistically-Most-Concerning Conjunctions in LEO

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PolNet: A Deep Convolutional Neural Network for Satellite Positive ID from Imaging Polarimetry

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Investigating the Risks of Debris-generating ASAT Tests in the Presence of Megaconstellations

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Cislunar Orbit Determination and Tracking via Simulated Space-Based Measurements

Michael Thompson, Advanced Space

Legal Considerations for Exploiting Cislunar and Lunar Resources

Darren Thornton, Air Force Institute of Technology

The Machine Learning Enabled Thermosphere Advanced by HASDM (META-HASDM) System in Development That Will Support Space Traffic Management and Conjunction Assessment

W. Kent Tobiska, Space Environment Technologies

Agile Space Object Custody for Electro-Optical Sensors

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Daytime Sky Brightness Measurements and Comparison to Analytical Models

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Designing a Compressive All-Sky Tracking Camera for Space Situational Awareness

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Establishment of a Space Operations Squadron at the Japan Air Self-Defense Force in 2020: Current Status and Future Prospects

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An Artificial Intelligence enabled Dynamic Coalition Architecture for Space Domain Awareness

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Faint Satellite Detection from Radon Transformations using Machine Learning Techniques

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Semantic Segmentation of Low Earth Objects using Convolutional Neural Networks

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The Future of Global Space Situational Awareness

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Establishing a Chain of Digital Forensics for Space Object Behavior Using Distributed Ledger Technology

Waqar Zaidi, L3Harris

A Complete SSA Scheme for a Sustainable Low Earth Orbit: Space Data Aggregation and IA Combined with In-orbit Inspection

Selma Zamoum, Spaceable

AGO70: Passive Optical System to Support SLR Tracking of Space Debris on LEO

Matej Zigo, Comenius University in Bratislava

Cislunar SSA/SDA from the Lunar Surface

Peter Zimmer, J.T. McGraw and Associates, LLC (JTMA)

Overcoming the Challenges of Daylight Optical Tracking of LEOs

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