AMOS Advanced Maui Optical and Space Surveillance Technologies Conference September 10-13 2013
A program of Maui Economic Development Board, Inc.

Wailea Marriott, Maui, Hawaii
Draft Agenda (as of 5/31/2013)

Monday 9 September

2:00-6:00 PM **EARLY REGISTRATION** | Aulani Foyer

3:00-8:00 PM **EXHIBITOR MOVE-IN** | Jade-Plumeria Ballroom

Tuesday 10 September

8:00-3:30 PM **SSA POLICY FORUM** | Aulani Ballroom
Presented in partnership with Space Foundation
(separate registration required)

10:00-8:00 PM **EXHIBITOR MOVE-IN** | Jade-Plumeria Ballroom

2:00-6:00 PM **EARLY REGISTRATION** | Aulani Foyer

6:00-7:30 PM **WELCOME RECEPTION** | Luau Gardens
Co-sponsored by The Boeing Company

Wednesday 11 September

6:00-7:15 AM **BREAKFAST AT LEISURE** | Luau Gardens

9:00-6:00 PM **EXHIBIT HOURS** | Jade-Plumeria Ballroom

7:30 **CONFERENCE OPENING** | Aulani Ballroom
Jeanne Unemori Skog, President & CEO, Maui Economic Development Board

INVOCATION
Reverend Kealahou Alika, Keawala'i Congregational Church

8:00-9:00 **OPENING SESSION (TBA)**

9:00 **BREAK (20 MINUTES)**

9:20 **FAINT OBJECT DETECTION SESSION** | Chair: Paul Kervin, Air Force Research Laboratory

Image Stacking Method Application for Low Earth Orbit Faint Objects
Makoto Tagawa, Kyushu University

A Probabilistic Approach of Space Objects Detection from Non-resolved Optical Observation
Xian Bian, North Carolina State University

Blind Search of Faint Moving Objects in 3D Data Sets
Phan Dao, Air Force Research Laboratory

10:20 **ORBITAL DEBRIS SESSION** | Chair: Thomas Schildknecht, Astronomical Institute University of Bern

What Happened to BLITS? An Analysis of the 2013 Jan 22 Event
T.S. Kelso, Center for Space Standards & Innovation

Observations of Titan 3C-4 Transtage fragmentation debris
Heather Cowardin, ESCG Jacobs

11:00 **LUNCHEON (60 MINUTES)** | Lokelani Ballroom
Co-sponsored by BAE Systems

12:00 PM **ORBITAL DEBRIS SESSION** (continued)

Orbit Prediction of LEO Debris Objects from Sparse Tracking Data
James Bennett, RMIT University

Changes of Space Debris Orbits after LDR Operation
Edwin Wnuk, Adam Mickiewicz University, Astronomical Observatory

The Classical Laplace Plane and its use as a Stable Disposal Orbit for GEO
Aaron Rosengren, University of Colorado

Commercial Space Situational Awareness: An investigation of Ground-based SSA Concepts to Support Commercial GEO Satellite Operators
Mark Skinner, The Boeing Company

Towards an Artificial Space Object Taxonomy
Matthew Wilkins, Applied Defense Solutions

Initial Taxonomy and Classification Scheme for Artificial Space Objects based on Ancestral Relation and Clustering
Carolin Fruh, Air Force Research Laboratory and University of New Mexico

2:00 **BREAK (20 MINUTES)**

2:20 **ASTRODYNAMICS SESSION** | Chair: Moriba Jah, Air Force Research Laboratory

What is the “Right” Answer?
David Finkleman, Center for Space Standards and Innovation

Defunct Satellites, Rotation Rates and the YORP Effect
Antonella Albuja, University of Colorado, Boulder

Results and Analyses of Debris Tracking from Mt Stromlo
Ian Ritchie, EOS Space Systems

Multiple Hypothesis Tracking (MHT) for Space Surveillance: New Capabilities in GEO
Navraj Singh, Numerica Corporation

Assessment of Simultaneous Estimation Performance for Multiple Low Earth Orbit (LEO) Debris Objects
Tom Kelecy, Boeing LTS

Improved Estimation of Orbits and Physical Properties of Objects in GEO
Ben Bradley, University of Colorado, Boulder

Parallel Track Initiation for Optical Space Surveillance Using Range and Range Rate Bounds
Paul Schumacher, Air Force Research Laboratory

4:40-6:00 **EXHIBIT AND POSTER SESSION** | Jade-Plumeria Ballroom

5:30-6:30 **NEW GENERATION "PAU HANA" NETWORKING RECEPTION**
Co-hosted by the Space Foundation and Maui Economic Development Board *(by invitation only)*

Thursday 12 September

6:00-7:15 AM **BREAKFAST AT LEISURE** | Luau Gardens

8:00-12:00 PM **SPACE IN THE CLASSROOM**
Co-sponsored by Space Foundation
(300 middle school students and teachers to participate in Audience with an Astronaut and hands-on STEM activities)

9:00-5:00 PM **EXHIBIT HOURS** | Jade-Plumeria Ballroom

7:30-8:20 **INVITED KEYNOTE** | Aulani Ballroom

8:20 **SPECIAL TOPICS**

Image Analysis of the 2012 Pluto (Near) Occultation
Keith Knox, Air Force Research Laboratory

Asteroid Detection with the Space Surveillance Telescope
Deborah Woods, MIT Lincoln Laboratory

9:00 **BREAK (20 MINUTES)**

9:20 **ASTRODYNAMICS SESSION** (continued)

Astrometric and Photometric Data Fusion for Mass and Surface Material Estimation using Refined Bidirectional Reflectance Distribution Functions-Solar Radiation Pressure Model
Richard Linares, Los Alamos National Laboratory

Force Modeling and State Propagation for Navigation and Maneuver Planning for the Proximity Operations Nano-Satellite Flight Demonstration Mission
Christopher Roscoe, Applied Defense Solutions

Orbit Determination Using a Decametric Line-of-Sight Radar
Gordon Frazer, Defence Science and Technology Organisation

10:20 **OPTICAL SYSTEMS SESSION** | Chair: Stacie Williams, Air Force Research Laboratory

Affordable Options for Ground-based, Large-aperture Optical Space Surveillance Systems
Mark Ackermann, Sandia National Laboratories

Sizing of a Raven-class Telescope Using Performance Sensitivities
Ryan Coder, Georgia Institute of Technology

11:00 **LUNCHEON (60 MINUTES)** | Lokelani Ballroom
Co-sponsored by Universities Space Research Association

12:00 PM **OPTICAL SYSTEMS SESSION** (continued)

Lens Systems for Sky Surveys and Space Surveillance
Mark Ackermann, Sandia National Laboratories

A Non-linear Curvature Wavefront Sensor to detect GEOs without the use of a Laser Guidestar
Mala Mateen, Air Force Research Laboratory

GPU-accelerated Faint Streak Detection for Uncued Surveillance of LEO
Peter Zimmer, Go Green Termite/University of New Mexico

1:00 **NON-RESOLVED OBJECT CHARACTERIZATION SESSION** | Chair: Doyle Hall, Boeing LTS

Photometric Data from Non-Resolved Objects for Space Object Characterization and Improved Atmospheric Modeling
Richard Linares, Emergent Space Technologies, Inc.

Geostationary Observations with Latitudinal Diversity Simultaneously (GOLDS): Characterizing GEO Spacecraft Pose and Panels Using Photometry
Dan Fulcoly, Air Force Research Laboratory

Analysis of Faint Glints from Stabilized GEO Satellites
Doyle Hall, Boeing LTS

2:00 **BREAK (20 MINUTES)**

2:20 A Point Pairing Method based on the Principle of Material Frame Indifference for the Characterization of Unknown Space Objects using Space-based Non-resolved Photometry Data
Anil Chaudhary, Applied Optimization, Inc.

Unmixing Space Object's Moderate Resolution Spectra
Phan Dao, Air Force Research Laboratory

RSO Feature Identification Using Hierarchical Mixtures of Experts
David Gaylor, Emergent Space Technologies, Inc.

3:20-4:00 **AIR FORCE MAUI OPTICAL AND SUPERCOMPUTING (AMOS) SITE CAPABILITIES TUTORIAL**

4:00-5:00 **EXHIBIT AND POSTER SESSION** | Jade-Plumeria Ballroom

5:00 **CONFERENCE ADJOURN**

Friday 13 September

6:00-7:15 AM **BREAKFAST AT LEISURE** | Luau Gardens

8:00-4:30 PM **SPACE IN THE CLASSROOM**
Co-sponsored by Space Foundation
(Teacher workshop)

9:00-2:00 PM **EXHIBIT HOURS** | Jade-Plumeria Ballroom

7:30 **iNVITED KEYNOTE/PANEL** | Aulani Ballroom

9:00 **BREAK (20 MINUTES)**

9:20 **INTERNATIONAL PROGRAMS**

Coordinated Optical GEO Survey for European SSA Precursor Services
Thomas Schildknecht, Astronomical Institute University of Bern

An Overview of Recent Australian Commitments to Space Situational Awareness from a Systems Analysis Perspective
Garry Newsam, Defence Science & Technology Organisation

10:00 **SPACE-BASED ASSETS SESSION** | Chair: Lauchie Scott, Defence R&D Canada, Ottawa

Sapphire: On-Orbit Results for Space Situational Awareness
Alan Scott, COM DEV

Microsatellite Based Space Situational Awareness
Lauchie Scott, Defence R&D Canada, Ottawa

FalconSAT-7: Towards rapidly deployable space-based surveillance
Geoff Andersen, USAF Academy

11:00 **LUNCHEON (60 MINUTES)** | Lokelani Ballroom

12:00 PM **SPACE-BASED ASSETS SESSION** (continued)

SpinSat Mission Overview
Andrew Nicholas, Naval Research Laboratory

GEO-to-GEO Optical Sensors: What do you "See"?
Jim Shell, Novarum Tech LLC

Flat Panel Space Based Space Surveillance Sensor
Richard Kendrick, Lockheed Martin

Ground Testing of Prototype Hardware and Processing Algorithms for a Wide Area Space Surveillance System (WASSS)
Neil Goldstein, Spectral Sciences Inc.

GEO Collision Avoidance using a Service Vehicle
Matthew Duncan, SpaceNav

1:40 **BREAK (20 MINUTES)**

2:00 **ADAPTIVE OPTICS AND IMAGING SESSION** | Chair: Michael Hart, Steward Observatory, University of Arizona

Rise of the Machines: First Year Operations of the Robo-AO Visible-light Laser-adaptive-optics Instrument
Christoph Baranec, Caltech

Integrated line-of-sight modeling of the Airborne Aero-Optics Laboratory
Steven Griffin, Boeing

PSF Rotation with Changing Defocus and Applications to 3D Imaging for Space Situational Awareness
Sudhakar Prasad, University of New Mexico

Myopic Deconvolution from Wave Front Sensing for Images Acquired with Large Spectral and Temporal Bandwidth
Douglas Hope, Hart Scientific Consulting International LLC

High-resolution imaging through Strong Atmospheric Turbulence and Over Wide Fields of View
Stuart Jefferies, Institute for Astronomy, University of Hawaii

Unsupervised Blind Deconvolution
Roberto Baena-Galle, Real Academia de Ciencias y Artes de Barcelona

Iteratively Reweighted Blind Deconvolution
Brandoch Calef, Boeing

Joint Multiframe Blind Deconvolution and Spectral Unmixing of Hyperspectral Images
Qiang 'Peter' Zhang, Wake Forest School of Medicine

Image Reconstruction from Sparse Irregular Intensity Interferometry Measurements of Squared Fourier Magnitude
David Gerwe, Boeing

5:00 PM **CONFERENCE ADJOURN**

5:30-8:30 PM **CLOSING LUAU DINNER & SHOW** | Luau Gardens

Saturday 14 September

7:30 & 9:30 AM **OPTIONAL TECHNICAL TOUR**
Departs from Wailea Marriott

POSTER PRESENTERS

ALTAIR: Calibrated Balloon-Borne Light Sources for High-Precision Photometry
Justin Albert, University of Victoria

Atmospheric Cloud Forecasting in Support of Space Based Applications
Randall Alliss, Northrop Grumman Corporation

Holographic Adaptive Laser Optics System (HALOS): Fast, autonomous aberration correction
Geoff Andersen, HUA Inc.

Structural, Thermal Optical Modeling of CUBESAT LEO Based Orbit Instrumentation Payload
Kevin Anderson, California State Polytechnic University at Pomona

Palomar Ultraviolet Laser for the Study of Exoplanets
Christoph Baranec, Caltech

Hands on Education Through Student-Industry Partnerships
Jessica Brown, Lockheed Martin Space Systems Company

Tracking A Very Near Earth Asteroid
Robert Bruck, BAE Systems

Toward the Automated Control of Disparate Network of Optical Telescopes for SSA, Exoplanet Research, and Near-Earth Object Detection
Mike Butterfield, GEOST, Inc.

AN/FPS-108 COBRA DANE Space Surveillance Mission Evolution
Philip Chorman, Riverside Research

Observations and Modeling of GEO Satellites at Large Phase Angles
Rita Cognion, Oceanit

On the Nature of Debris and Collision Growth Estimates
Robert Combs, 14 AF A5/8 (Booz Allen Hamilton)

New Corrected Calibration Binaries Observed at the SOR
Jack Drummond, Air Force Research Laboratory

Observer Interface Analysis for Standardization to a Cloud Based Real-Time Space Situational Awareness (SSA)
Jan Eilers, German Aerospace Centre (DLR)

The Interface Between Technology and Policy in SSA
David Finkleman, Analytical Graphics Inc.

Improvements to Optical Track Association with the Direct Bayesian Admissible Region Method
Kohei Fujimoto, University of Colorado, Boulder

Optical-Infrared Colors of GEO Satellites
Brooke Gibson, Oceanit

SpaceView (Viral Space Situational Awareness) One Year Update
Anthony Gleckler, GEOST, Inc.

Proximity Operations Nano-Satellite Flight Demonstration (PONSFD) Rendezvous Proximity Operations Design and Trade Studies
Jacob Griesbach, Applied Defense Solutions

Application of Passive Damping to Increase Performance of the Sodium Guidestar on the AEOS 3.6 m Telescope
Steven Griffin, Boeing

Influence of Wind Buffeting on the 3.6 m Telescope
Steven Griffin, Boeing

Taming the 1.2 m Telescope
Steven Griffin, Boeing

Cycle 1 Science Status and How to Propose Time on SOFIA
Helen Hall, Universities Space Research Association

Scintillation of Light from Distant Objects due to Anisotropic and Non-Kolmogorov Turbulence
Richard Holmes, Boeing LTS

Synthesis of Trajectory Analysis and Plume Identification for Characterization of Active Spacecraft
Jennifer Hudson, Western Michigan University

961-element Adaptive Optics Wave-front Controller
Jianlu Jia, Chinese Academy of Sciences

Calibration and Operation of the Sodium Guidestar Adaptive Optics System on the Starfire Optical Range 3.5 meter Telescope
Robert Johnson, Air Force Research Laboratory

Parallel Implementation of a Frozen Flow Based Wavefront Reconstructor
Keith Kelly, Emory University

Collaborative Commercial Space Situational Awareness
T.S. Kelso, Center for Space Standards & Innovation

IMPACT - Integrated Modeling of Perturbations in Atmospheres for Conjunction Tracking
Josef Koller, Los Alamos National Laboratory

Atlas of Light Curves and Photometric Monitoring of the Non-resolved Space Objects
Nikolay Koshkin, Astronomical Observatory of Odessa University, Ukraine

Groebner Basis Solutions to Satellite Trajectory Control by Pole Placement
Zuzana Kukelova, Czech Technical University in Prague

The NASA Meter Class Autonomous Telescope: Ascension Island
Susan Lederer, NASA/JSC

Sensitivity of Attitude Determination on the Model Assumed for ISAR Radar Mappings
Stijn Lemmens, European Space Agency

Conjunctions and Collision Avoidance with Electrodynamic Tethers
Eugene Levin, Electrodynamics Technologies, LLC

Design of a Radar Based Space Situational Awareness System
Toni Liebschwager, German Armed Forces

A Minimum Fuel Based Estimator for Maneuver and Natural Dynamics Reconstruction
Daniel Lube, University of Colorado

Image Enhancement for Astronomical Scenes
Jacob Lucas, The Boeing Company

Modified Chebyshev Picard Iteration for Efficient Numerical Integration of Ordinary Differential Equations
Brent Macomber, Texas A&M University

Physics-Based Predictive Modeling of Atmospheric Optical Turbulence Layers for Laser Propagation
Alex Mahalov, Arizona State University

Thermal Modeling of Space Debris via Finite Element Analysis
Paul McCall, Florida International University

Enhancing Space Missions Using Multicore Space Flight Computers
Kenneth Mighell, National Optical Astronomy Observatory

CubeSat Integration into the Space Situational Awareness Architecture
Keith Morris, Lockheed Martin

Tomographic Reconstruction of Atmospheric Turbulence from Micro-lens Imagery
James Nagy, Emory University

A Derivation of the Analytical Relationship between the Projected Albedo-Area Product of a Space Object and its Aggregate Photometric Measurements
Tamara Payne, Applied Optimization Inc.

Generic Observatory Control System
Matt Pearson, EOS Space Systems

Human Decision Processes: Implications for SSA support tools
Paul Picciano, Aptima

F.I.D.O. Focused Integration for Debris Observation
John Ploschnitznig, Riverside Research

On the Frequency of Observed Peaks in Satellite Conjunctions with Debris Populations
Bruce Rabalais, DigitalGlobe, Inc.

Space Situational Awareness Architecture Vision
David Richmond, Lockheed Martin

EOS Space Systems Wide Field Imager for SSA Applications
Ian Ritchie, EOS Space Systems

Remote Control Southern Hemisphere SSA Observatory
Ian Ritchie, EOS Space Systems

ALTAIR: Calibrated Balloon-Borne Light Sources for High-Precision Photometry
Eileen Ryan, New Mexico Institute for Mining and Technology

A Method Of Determining Debris Ballistic Coefficients Using Two Line Elements
Jizhang Sang, EOS Space Systems

RANSACing Optical Image Sequences for GEO and near-GEO Objects
Radim Sara, Czech Technical University in Prague

Programming Constructs for Exascale Computing in Support of Space Situational Awareness
Mark Schmalz, University of Florida

Determining the Observational Parameters of an Optical Interferometer Designed to Observe Geosat
Henrique Schmitt, Naval Research Laboratory

Large Area Flat Panel Imaging Detectors for Astronomy and Night Time Sensing
Oswald Sigmund, University of California

Efficient Spatiotemporal Clutter Rejection and Nonlinear Filtering-based Dim Object Tracking Algorithms
Alexander Tartkovsky, University of Southern California

Analytic Orbit Trajectory Prediction for J2-J6 Using Recursive Lagrange-Like Invariants
James Turner, Texas A&M University

Telescope Ecosystems and the Power of Persistence for Space Situational Awareness
W. Thomas Vestrand, Los Alamos National Laboratory

Optical Turbulence Characterization by WRF model above Ngari
Hongshuai Wang, National Astronomical Observatories, Chinese Academy of Sciences

Performance of Hybrid Adaptive Optics Systems
Michael Werth, Boeing

Fast Gravitational Field Model Using Adaptive Orthogonal Finite Element Approximation
Ahmad Younes, Texas A&M University