




2018 CODER
ORBITAL DEBRIS
WORKSHOP



November 13-15, 2018
The Hotel at UMD
College Park, Maryland

*Collaboration, research, and education
to address critical issues in orbital debris
policy, mitigation, and remediation.*

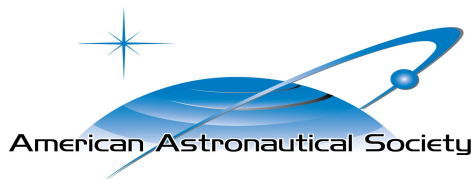


SPONSORS

This year, we would like to thank the following sponsors for their generous support for the 2018 CODER Workshop.



A. JAMES CLARK
SCHOOL OF ENGINEERING



WELCOME

Welcome to the University of Maryland Center for Orbital Debris Education and Research 2018 Workshop to address critical issues in orbital debris policy, mitigation, and remediation.

We hope this year's expanded workshop will connect individuals and research from across academe, industry, and government to foster collaboration and promote the long-term goal of developing policies, laws, and systems that will lead to the effective remediation and control of orbital debris.

Our goal is to promote an open exchange among the science, technology, economic, policy, and law communities, raise awareness, and inform decision makers on state of the art technologies that are currently available to address this growing issue.



CODER
CENTER FOR ORBITAL DEBRIS
EDUCATION AND RESEARCH

PROGRAM

TUESDAY, NOVEMBER 13, 2018

7:30 a.m. - 8:20 a.m.	Workshop Registration & Check in & Continental Breakfast	
8:20 a.m.	Welcome & Announcements	Ray Sedwick, Director, CODER, University of Maryland
8:30 a.m.	Keynote: An entrepreneur's perspective on the evolving role of industry in the space community	Ryan Frederic Managing Partner Humble Rogue Ventures
9:00 a.m.	Session 1: Space Situational Awareness, Commercial Enterprise	MODERATOR: Ryan Frederic Managing Partner, Humble Rogue Ventures
10:30 a.m.	Break	
11:00 a.m.	Session 2: SSA: Tracking and Identification	MODERATOR: Ray Sedwick, Director, CODER, University of Maryland
12:15 - 1:45 p.m.	Lunch	
1:45 p.m.	Keynote: A handbook for post-mission disposal of micro satellites and smaller	Prof. David Spencer Penn State University
2:15 p.m.	Session 3: Space Traffic Management	MODERATOR: Prof. David Spencer Penn State University
3:30 p.m.	Break	
4:00 p.m.	Session 4: Atmospheric Modeling and Re-entry	MODERATOR: Marshall Kaplan, Assoc. Director, CODER, University of Maryland
5:15 p.m.	Adjourn	
5:15 p.m. - 7:15 p.m.	Opening Reception	



Stay connected & share ideas throughout the workshop by tweeting @UMD_CODER or using hashtag #coder18

PROGRAM

WEDNESDAY, NOVEMBER 14, 2018

7:30 a.m. - 8:20 a.m.	Workshop Registration & Check in & Continental Breakfast	
8:20 a.m.	Welcome & Announcements	Theresa Hitchens, Senior Research Associate, CISSM
8:30 a.m.	Keynote: Disrupting Space Debris: Harnessing Innovations in SSA/STM	Kevin O'Connell, Director, Office of Space Commerce, U.S. Dept. of Commerce
9:20 a.m.	Keynote: Advancing SSA & STM: improved capability through expanded cooperation	Robert Rego, Strategic Missions Advisor to Commander, U.S. Strategic Command
10:10 a.m.	Break	
10:40 a.m.	Keynote: Preserving the space environment through international cooperation	Kenneth Hodgkins, Director, Space and Advanced Technology, U.S. Department of State
11:30 a.m.	Keynote: Role of UN COPUOS in dev. int'l consensus guidelines	Peter Martinez, Director, Secure World Foundation
12:20 - 1:45 p.m.	Lunch	
1:50 p.m.	Keynote: Will the commercial sector overtake the government's lead in mitigation and remediation policy?	Stephen Garber, Historian, NASA History Division
2:40 p.m.	Keynote: An overview of Space Data Association and its services	Jean-Luc Froelinger, VP for Satellite Ops & Engineering, Intelsat
3:30 p.m.	Break	
4:00 p.m.	Session 5: Roundtable: moving forward on debris mitigation and SSA/STM	MODERATOR: Theresa Hitchens, Senior Research Associate, CISSM
5:45 p.m.	Adjourn	
5:45 p.m. - 7:45 p.m.	Reception	

PROGRAM

THURSDAY, NOVEMBER 15, 2018

7:30 a.m. - 8:20 a.m.	Workshop Registration & Check in & Continental Breakfast	
8:20 a.m.	Welcome & Announcements	Ray Sedwick, University of Maryland
8:30 a.m.	Keynote: Highlights of Recent Research Activities at the NASA Orbital Debris Program Office	Matthew Forsbacka NASA MMOD Program Executive
9:00 a.m.	Session 6: Orbital Debris Remediation Component Technologies	MODERATOR: Roger Thompson, Senior Eng. Specialist, Aerospace Corp.
10:30 a.m.	Break	
11:00 a.m.	Keynote: Consortium for Execution of Rendezvous and Servicing Operations (CONFERS)	David Barnhart, Director, ISI Space Tech. & Systems Group
11:30 a.m.	Session 7: Orbital Debris Remediation Systems and Concepts	MODERATOR: David Barnhart Director, ISI Space Tech. & Systems Group
12:45 p.m.	Closing Remarks	Marshall Kaplan, Associate Director, CODER, University of Maryland
1:00 p.m.	Adjourn	



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KEYNOTES

➤ TUESDAY, NOVEMBER 13

SPACE SITUATIONAL AWARENESS



RYAN FREDERIC

**Managing Partner
Humble Rogue Ventures**

Mr. Frederic is the former President and Co-Founder of Applied Defense Solutions, Inc (ADS). A small engineering services firm focused on Space in the aerospace, defense and intelligence communities. Under Ryan's leadership ADS grew consistently and significantly branching out into adjacent new markets building a team of seasoned professionals able to tackle some of the nation's most challenging technical problems. Ryan is a member of the American Astronautics Society, and he's an associate fellow of the American Institute of Aeronautics and Astronautics where he's been a member for 30 years.

MODELING



DAVID SPENCER

**Professor, Aerospace Engineering
Pennsylvania State University**

David Spencer joined Penn State in 1999. He is the faculty adviser for the Astrodynamics Research Group of Penn State and LionTech Rocket Labs. He is an American Astronautical Society (AAS) Fellow, an American Institute of Aeronautics and Astronautics (AIAA) Associate Fellow, and an International Academy of Astronautics (IAA) Corresponding Member. He is vice president of publications for AAS; a member of AIAA's Astrodynamics Technical Committee and Public Policy Committee; a member of IAF's Space Education and Outreach Committee; and a member of IAA's Committee on Space Debris and Commission 3: Space Technology and System Development. Since joining Penn State, Spencer has been honored for his teaching and service with a 2008 AIAA Sustained Service Award, a 2006 SAE International Ralph R. Teetor Educational Award, and a 2004 Penn State Engineering Alumni Society Outstanding Teaching Award. Spencer has been named the recipient of the 2018 International Astronautical Federation (IAF) Frank J. Malina Astronautics Medal, presented annually to an educator who has demonstrated excellence in taking the fullest advantage of the resources available to them to promote the study of astronautics and related space sciences.

POLICY



KEVIN O'CONNELL

Director, Office of Space Commerce, U.S. Department of Commerce

Kevin M. O'Connell is the Director of the Office of Space Commerce at the U.S. Department of Commerce. Within this position, Mr. O'Connell leads an office with responsibility as a space industry advocate within the Executive Branch of the U.S. government. Mr. O'Connell has researched and written extensively on the policy, security, and global market issues related to commercialization of remote sensing. He served as the Executive Secretary and Staff Director of the NIMA Commission (1999-2000). He was a member, and later Chair, of NOAA's federal advisory committee on remote sensing from 2002-2016. Mr. O'Connell's background also includes extensive experience in national security and intelligence matters, including assignments in the Department of Defense, Department of State, National Security Council, and the Office of the Vice President. He spent a decade conducting and managing research in these areas at the RAND Corporation, including as the first director of RAND's Intelligence Policy Center.

POLICY



ROBERT REGO

Strategic Missions Advisor to the Commander, U.S. Strategic Command

Robert D. Rego is the Strategic Missions Advisor to the Commander, U.S. Strategic Command, Offutt Air Force Base, Nebraska. In this role he assists the Commander in operationalizing the Space Joint Operating Area and supports the on-going execution of the nuclear, space, cyber and electronic warfare missions providing depth of experience and critical insight to innovatively and agilely deliver cross-domain integration for issues affecting Command capabilities. Mr. Rego is a highly qualified expert and will serve in this position for two years. Mr. Rego served a 31-year active duty and reserve career, retiring as a major general in 2017. He entered the Air Force in 1985 as a graduate of the Reserve Officer Training Corps program and held assignments as a Minuteman III intercontinental ballistic missile crewmember, duty in special projects at Headquarters, U.S. Space Command, as the Air Force Research Laboratory liaison to the U.S. Army Big Crow Program Office, in numerous assignments at Headquarters, Air Force Space Command, and as the Air Force Global Strike Command Director of Communications and Vice Commander. Prior to his current assignment, he was the Mobilization Assistant to the Commander, U.S. Strategic Command, Offutt Air Force Base, Nebraska.

KEYNOTES

➤ WEDNESDAY, NOVEMBER 14

POLICY



KENNETH HODGKINS

**Director, Office of Space and
Advanced Technology
Department of State, Bureau of
Oceans, Environment and
Science**

Mr. Ken Hodgkins is the director for the Office of Space and Advanced Technology in the Bureau of Oceans, International Environmental and Scientific Affairs in the U.S. State Department. The office is responsible for bilateral and multilateral cooperation in civil and commercial space and high-technology activities, including the International Space Station, collaboration in global navigation satellite systems, the International Thermonuclear Experimental Reactor (ITER), and nanotechnology, and represents the department in national space policy review and development. Mr. Hodgkins serves as the U.S. Representative to the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). He has been the state representative for major Presidential policy reviews on remote sensing, the Global Positioning Satellite (GPS) system, orbital debris, space traffic management and the use of space nuclear power sources in space. Before coming to the State Department in 1987, he was the director for international affairs at the National Environmental Satellite Data and Information Service (NESDIS) of the Department of Commerce. Mr. Hodgkins received a bachelor's degree in political science in 1978 and an MPA in 1980 from the University of Maine. He joined the U.S. federal government in 1980 as a Presidential Management Fellow. In 2010 and 2017, respectively, he was the first and only Department of State recipient of the American Institute of Aeronautics and Astronautics' International Cooperation Award and the American Astronautical Society's award for Advancement of International Cooperation. He was also named by GPS World as a "GNSS Leader to Watch in 2009-2010." Mr. Hodgkins is a member elect of the International Academy of Astronautics (IAA) and the International Institute of Space Law (IISL). Mr. Hodgkins was awarded by the University of Maine in May 2017 an Honorary Doctor of Humane Letters. In September of 2017 he was awarded by the IAA the Social Sciences Award for significant contributions to the advancement of astronautical sciences.

POLICY



PETER MARTINEZ

**Director, Secure World
Foundation**

Dr. Martinez brings a multidisciplinary background to SWF with over 20 years of experience in leadership, management, education and scientific research, as well as international engagement encompassing capacity-building and workforce development, strategic planning, multilateral space diplomacy, space policy formulation and implementation, and the regulation of space activities. Dr. Martinez joins SWF from Cape Town, South Africa, where he has coordinated the Space Studies programme at the University of Cape Town (UCT) since 2014 while also serving on several international working groups and committees. From 2010 - 2015, he was the Chairman of the South African Council for Space Affairs. In June 2018, he concluded his service to the United Nations Committee on the Peaceful Uses of Outer Space, where he served as the chair for 8 years for its Working Group on the Long-term Sustainability of Outer Space Activities.

KEYNOTES

➤ WEDNESDAY, NOVEMBER 14

POLICY



STEPHEN GARBER

Historian, NASA History Division

Stephen J. Garber is a policy analyst and historian in the NASA History Division at NASA Headquarters. He has also worked in the Pentagon's Space Policy office, the Congressional Research Service, and NASA's Office of Space Science. He has done research and writing on a variety of applied history topics relevant to national space policy such as orbital debris and President George W. Bush's Vision for Space Exploration. This year, his article "Incentives for Keeping Space Clean: Orbital Debris and Mitigation Waivers" was published in the Journal of Space Law and he gave a presentation on orbital debris policy at the 10th annual Government Forum on CubeSats sponsored by the National Reconnaissance Office.

POLICY



JEAN-LUC FROELIGER

Vice President, Satellite Operations & Engineering Intelsat S.A.

Jean-Luc Froeliger oversees the operation of more than 70 satellites which comprise the Intelsat's satellite fleet as well as the third-party satellites that Intelsat operates. He has been with Intelsat for 28 years, serving in a variety of satellite program management roles. Prior to his current role, Mr. Froeliger was Intelsat's Senior Director of Space Systems Acquisition, where he was responsible for overseeing the development, production and launch of all satellites procured by Intelsat. Before joining Intelsat in 1990, he served as Systems Engineer with Airbus Germany and with Thales France. Mr. Froeliger earned a Master of Science Degree in Aeronautics and Astronautics from the Massachusetts Institute of Technology. Intelsat S.A. (NYSE: I) is the world's leading provider of satellite services, delivering high performance connectivity solutions for media, fixed and mobile broadband infrastructure, enterprise and government and military applications for more than 50 years. Intelsat's satellite, teleport and fiber infrastructure is unmatched in the industry, setting the standard for transmissions of video and broadband services. From the globalization of content and the proliferation of HD, to the expansion of cellular networks and mobile broadband access, with Intelsat, envision your future network, connect using our leading satellite technology and transform your opportunities. Envision...Connect... Transform...with Intelsat. For more information, visit www.intelsat.com.

KEYNOTES

➤ THURSDAY, NOVEMBER 15

CONSORTIUM FOR EXECUTION OF RENDEZVOUS AND SERVICING OPERATIONS



DAVID BARNHART

**Director, Space Technology and Systems Group,
University of Southern California**

David Barnhart leads ISI's Space Systems and Technology group, which combines disruptive research with a hands-on, small-satellite design and launch for USC Viterbi students. Barnhart's specialties include second-generation space morphology design, robotics applied to and with satellites, and application-based engineering capabilities. He works with space experts both on USC's main campus, via the Space Engineering Research Center (SERC), and with government and commercial space entities. A SERC founder and current director, he previously developed new aerospace and satellite systems and technologies, design tools that dramatically reduce project time-to-completion, and contact dynamic surface platens for full-size space simulation solutions. Barnhart recently returned to ISI from DARPA, where he was a senior space project manager. Before USC he helped found and lead two space companies, Millennium Space Systems and Germany-based Vanguard Space. Barnhart earned his BSAE from Boston University and his master's degree from Virginia Polytechnic Institute, both in aerospace engineering. Including his previous tenure, he has been with ISI for 7 years.



MATTHEW FORSBACKA

**Micrometeoroid and
Orbital Debris Program
Executive NASA Office
of Safety and Mission
Assurance**

As the program executive for MMOD, Forsbacka is responsible for program execution of NASA's Procedural Requirements for limiting Orbital Debris, and as the NFSAM, he is responsible for reviewing the Nuclear Launch Safety Approval Requests submitted by programs and projects that plan to launch radioactive material in space. In this role, he also coordinates ad hoc Interagency Nuclear Safety Review Panels, which evaluate the risk to the public and environment for any mission containing radioactive materials above the prescribed threshold. Forsbacka also is the OSMA representative for the Nuclear Systems, Space Radiation and Space Protection Working Groups. Until his recent appointment, Forsbacka did a detail at NASA Glenn Research Center as chairman of the Standing Review Board for NASA's Radioisotope Power Systems program. As chairman, he led review teams that report findings to Glenn's Center Management Council, the leadership of NASA's Science Mission Directorate (Planetary Science Division) at NASA Headquarters, the NASA administrator and the NASA Agency Program Management Council. He presented issues and proposed solutions to NASA senior management. As a captain in the U.S. Air Force, Forsbacka held various roles, which included program manager for the Defense Threat Reduction Agency, master instructor of physics for the U.S. Naval Academy and reactor operations supervisor for the Armed Forces Radiobiology Research Institute. Forsbacka has a doctorate in nuclear engineering from the University of Virginia and both a master's and bachelor's degree in nuclear engineering from the University of Florida.

SESSIONS

SESSION 1 ➤ *Space Situational Awareness, Commercial Enterprise*



MODERATOR
RYAN FREDERIC
*Managing Partner
Humble Rogue Ventures*



ALAN DECLERCK
*Vice President
Business Develop and Strategy LeoLabs*



DOUG HENDRIX
*CEO
ExoAnalytic Solutions*



ROBERT MACMILLAN
*Vice President and General
Manager, L3 Applied Defense
Solutions*

SESSION 2 ➤ *Space Situational Awareness, Tracking and Identification*



MODERATOR
RAY SEDWICK
*Director
Center for Orbital Debris Education and Research*



ANDREW ABRAHAM
*Senior Member, Technical Staff, Aerospace
Corporation*



JAMES WERTZ
President, Microcosm



CHRISTINE HARTZELL
*Assistant Professor, Aerospace Engineering,
University of Maryland*



ARTHUR LUE
*Technical Staff, MIT Lincoln
Laboratory*

SESSION 3 ➤ *Space Traffic Management*



MODERATOR
DAVID SPENCER
*Professor, Aerospace
Engineering, Pennsylvania
State University*



MARSHALL KAPLAN
*Associate Director, Center for
Orbital Debris Education and
Research*



JOSHUA SLOANE
*Flight Test Mission
Planning Analyst,
Johns Hopkins
University APL*



NATHAN REILAND
*Graduate Research
Assistant, University of
Arizona*

SESSION 4 ➤ *Atmospheric Modeling and Re-entry*



MODERATOR
MARSHALL KAPLAN
*Associate Director, Center for Orbital Debris
Education and Research*



ERIC EILER
*Technical Staff Member, Aerospace
Corporation*

MARTIN RATLIFF
*Principal Space Environments
Specialist JPL, California Institute
of Technology*



DAN BRANDT
Doctoral Candidate, University of Michigan

SESSIONS

SESSION 5 ► *Roundtable: Moving Forward on Debris Mitigation and SSA/STM*



MODERATOR
THERESA HITCHENS
*Senior Research Associate
Center for International and Security Studies at Maryland (CISSM)*



DIANE HOWARD
*Assistant Professor
Commercial Space Operations
Embry Riddle University*



VICTORIA SAMSON
*Washington Office Director
Secure World Foundation*



JOSEF KOLLER
*Systems Director
Aerospace Corporation*



THERESE JONES
*Senior Director of Policy
Satellite Industry Association*

SESSION 6 ► *Debris Mitigation Technologies*



MODERATOR
ROGER THOMPSON
*Senior Engineering Specialist
The Aerospace Corporation*



WILLIAM SCHONBERG
*Professor, Civil Engineering
Missouri University of Science &
Technology*



HOSSEIN NAMAZYFARD
*Graduate Research Assistant
University of Arizona*



SAMUEL DISERENS
*Ph.D. Candidate
University of Southampton*

SESSION 7 ➤ *Orbital Debris Remediation Systems and Technologies*



MODERATOR
DAVID BARNHART
Secure World Foundation



MARSHALL KAPLAN
*Chief Technology Officer
Launchspace Technologies Corporation*



JAN ANIKE NIKOLAJSEN
*Ph.D. Fellow Dept. of Civil Engineering
Aalborg University*



JAMES THORNE
*Instructor, Launch Space Services
Lt. Colonel USAF (Ret.)*



CHARITY WEEDEN
*US Managing Representative
Astroscale*

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