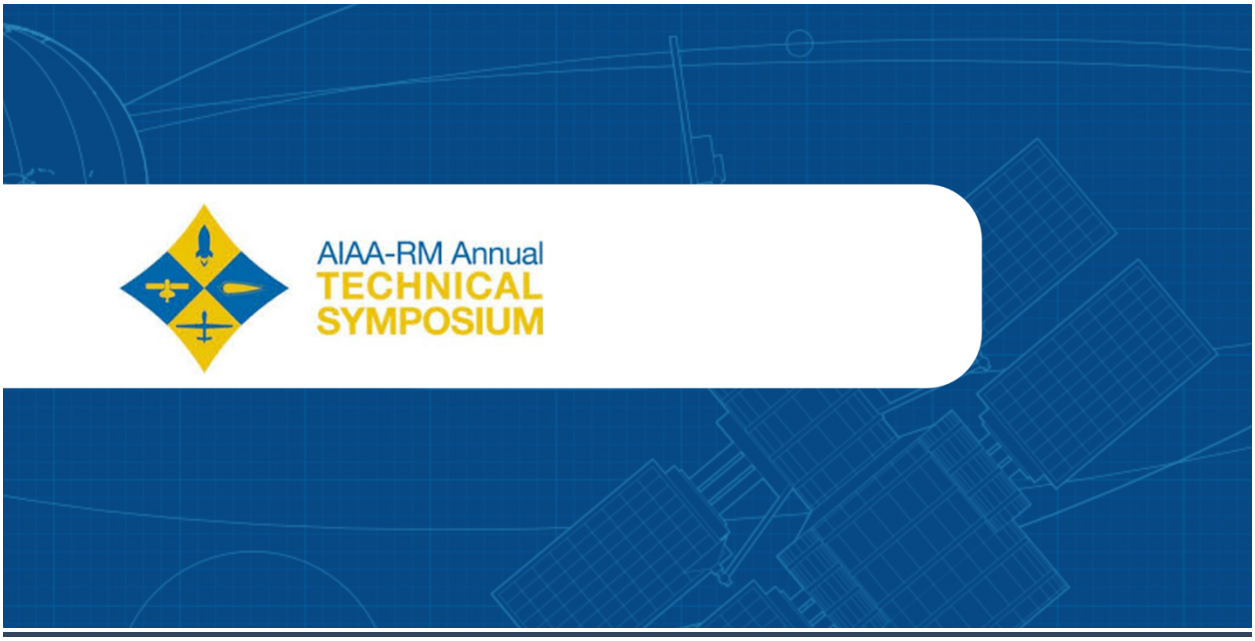

October 29th, 2018

University of Colorado, South Denver

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Notes

AIAA Rocky Mountain Section

Annual Technical Symposium

October 29th, 2018

Table of Contents

SYMPOSIUM AGENDA

Venue	Great Hall	Bear Atrium	Breakout Room 1	Breakout Room 2
7:00am	Breakfast is served 7:30 - 9am	Registration Opens		
8:00am	Welcome Address: Jay Lindell, Major General (Ret), USAF	Jay Lindell is a retired Air Force major general and is currently serving as the Aerospace and Defense Industry Champion, Colorado Office of Economic Development and International Trade. In this role, Jay promotes aerospace and defense industry economic development for Colorado. He has been in his current position since November 2013. Maj Gen Lindell is a 1978 graduate of the Air Force Academy and went on to serve over 33 years in the Air Force retiring 1 January 2012. His graduate education includes a Master's Degree in Public Administration from Troy University and numerous professional military and executive education programs.		
8:05am	Panel 1: Space and Global Security.	**Moderator** Shane Deichman, Teledyne Brown Engineering **Panelists** • Lt Col Kevin Amsden, USAF, CO 3rd Space Experimentation Squadron • Dr. Bob Racca, Chief Scientist, Air Force Life Cycle Management Center • Rich Burchfield, Chief Defense Development Officer, Colorado Springs Chamber & EDC		
			Unmanned Aircraft Systems	Advanced Manufacturing
9:00am	Understanding the Federal Government as a Customer Russell Long, Owner & Principal Consultant, Long Capture & Contract Management LLC	Exhibitor Marketplace	9:00am Autonomous Navigation Techniques for UAVs Michael L. Anderson, Lt Col, USAF	9:00am Common Issues Observed in the Aerospace Industry - Structures and Loads/Dynamics Poti Doukas, Instar Engineering and Consulting, Inc.
			9:20am Development of UAV-Deployed Air-Launched Drifters (ALD) for Aboveground Thermodynamic Measurements in Supercells Sara Swenson, University of Colorado, Boulder	9:20am Use of Heat Coils to Drive Shape Change in Bi-Stable Composites Matt Snyder, USAFA
9:30am	Gold Sponsor Showcase -ROCCOR- High Strain Composite Boom Deployer Design Through Iterative Test and Hardware Rich Development Brad Hensley & Tayler Thomas		9:40am Airborne Mapping and Quantification of Natural Gas Emissions with Active Remote Sensing Jarett Bartholomew	9:45am Feasibility Study of Additively Manufactured Al-6061 RAM2 Parts for Aerospace Applications David Waller, Principal Engineer, Ball Aerospace.

Agenda Cont..

Venue	Great Hall	Bear Atrium	Breakout Room 1	Breakout Room 2	Museum
10:00am	Panel 2: Commercialization of Space	**Moderator** **Brian Gulliver, Kimley-Horn** **Panelists** **• Kevin Clinton, Sierra Nevada Corporation** **• Adam Dissel, Reaction Engines** **• Ray Gonzales, Colorado Air and Space Port** **• Brad Tousley, Ball Aerospace**	The goal of the panel is to hear from a diverse group of panelist on a broad range of topics necessary for the success of the commercial space industry, literally from the ground up. This will include discussions on commercial spaceports, commercial launch vehicle technologies, and spacecraft.		
			Aeronautics	Astronautics	
11:00am	The Use of Visualization in the Development of Commercial Launch Sites and Spaceports John Barden Kimley-Horn	Exhibitor Marketplace -	11:00am Exoskeletal Rim Drive for Electric Aircraft Propulsion Thomas Scott, Red Canyon Software and Engineering	11:00am: Photonics-based Microwave Radiometer for Hyperspectral Earth Remote Sensing. Jennifer Lee, Ball Aerospace Authors: Todd Pottl, Jennifer Lee1, Yousef Ehrlichman2, Hayk Gevorgyan3, Anatol Khilo3, Milos Popovic3	
			11:20am The Use of Virtual Reality Technology in Aviation Accident Analysis and Reconstruction Tim Jung, Engineering Systems, Inc.	11:20am James Webb Space Telescope Mirror Cryogenic Alignment Optical Evaluation Overview Laura Coyle, Ball Aerospace. Laura E. Coyle a, Taylor S. Chonis a, Koby Z. Smith a, J. Scott Knight a, D. Scott Acton a, Joseph M. Howard b, Lee D. Feinberg a Ball Aerospace & Technologies Corp., 1600	
	Lunch service to begin at 11:45		11:40am A Compact Directional Total Pressure Probe for Inlet Development. Sibylle Walter, Northrop Grumman	11:40am Satellite Servicing Made Easier: An Introduction to Altius Cooperative Servicing Interfaces and Bulldog Satellite Servicing Vehicle Jonathan Goff, President/CEO, Altius Space Machines, Inc.	
12:00pm	**Lockheed Martin Space Systems** **Diamond Sponsor** **Luncheon Keynote**	**Salvator (Tory) Bruno** **President and CEO** **United Launch Alliance** Salvatore T. "Tory" Bruno is the president and chief executive officer for United Launch Alliance (ULA). In this role, Bruno serves as the principal strategic leader of the organization and oversees all business management and operations. Bruno has been invited to be a member of the National Space Council Users' Advisory Group chaired by Vice President Pence. In addition, he is an American Institute of Aeronautics and Astronautics (AIAA) Fellow, a companion of the Naval Order of the United States, a member of the Navy League and a former member of the Board of Directors of the Silicon Valley Leadership Group. He served on the National Blue Ribbon Panel for Bettering Engineering & Science Education and as Chairman of the Diversity Council of Lockheed Martin Space Systems.			

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Agenda Cont..

Venue	Great Hall	Bear Atrium	Breakout Room 1	Breakout Room 2	Museum
1:00pm	Posterboard Abstract Presentations	Exhibitor Marketplace	**Poster Presenters** • Zachary Warren – Integrated Kinetic Energy/Direct Energy Weapons. • Anthony Cabri & Thomas Osheka - Impact of Humid, Salt-Water Environment on Steel's Tensile Test Behavior • John Ferguson - Experimental Nonlinear Dynamics of a Post-Buckled Composite Laminate Plate • Nick Campbell – Commercial Aerobreaking • Dawson Beatty - Autonomous Ground Navigation (Project DRAGON) • Emily Ranquest - Airborn sUAS gust observation techniques • Christopher A. Roseman and Brian Argrow – Targeted Weather Forecasts for small UAS • Joseph Pointer - In-situ measurements of stratospheric turbulence • Chris Gehrig, Mechanical Engineer, SEAKR Engineering, Inc. Iridium NEXT Processor: How manufacturing and heat pipes became mission critical for providing voice and data capabilities to the world via the largest satellite constellation to date. • Carlos Pinedo – The Design of an International Lunar Village along the Gerlache Crater Author(s): Carlos Pinedo, Kadambari Suri, Markus Peukert, Mario Maggio, Brendan Perry, Sarah Yenchik, Alexander Verbuch, Zachary Richardson, Matthew Bair, and Uriel Cain • Sean Cohen, Kevin Weed and Jeremy Lambert of Ball Aerospace - Non-Dimensional Correlations for the Optimization of Micro Pin Fin Arrays		
2:00pm	Panel 3: Space Weather.	**Moderator** Edgar Johansson, CU LASP **Panelists** • Tom Berger NOAA, • Valentin Pillet National Solar Observatory, • Scott McIntosh is the Director of NCAR's High Altitude Observatory, NCAR • Mike Gazarik Ball Aerospace			
3:00pm	**Platinum Sponsor Showcase:** Ball Aerospace	**Next Generation Defense Weather Missions Based on the Global Precipitation Measurement (GPM) Microwave Imager (GMI) Calibration Standard** Michael Berberich, Ball Aerospace			
3:30pm	**Afternoon Keynote:**	**Bradley Cheetham, President and CEO - Advanced Space -**			
4:00pm - 5:00pm	Please join us after the symposium in the Museum Gallery for a Sponsor Appreciation Reception **Diamond:** CU LASP, Lockheed Martin Space Systems **Platinum:** Ball Aerospace, SEAKR Engineering **Gold:** Teledyne Brown Engineering, CSBR, Colorado Business Roundtable, Citizens for Space Exploration, Roccor, AGI, Black Swift Technologies, Red Canyon Engineering & Software, ISYS Technologies, Cablenet Wiring Products, Inc., Sierra Nevada Corp., MAIG				Sponsor Appreciation Reception

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Features

Welcome address

Enjoy your breakfast while hearing an opening address from Colorado Aerospace and Defense Industry Champion, Jay Lindell.

Jay Lindell, Major General (Ret), USAF

Jay Lindell is a retired Air Force major general and is currently serving as the Aerospace and Defense Industry Champion, Colorado Office of Economic Development and International Trade. In this role, Jay promotes aerospace and defense industry economic development for Colorado. He has been in his current position since November 2013.

Maj Gen Lindell is a 1978 graduate of the Air Force Academy and went on to serve over 33 years in the Air Force retiring 1 January 2012. His graduate education includes a Master's Degree in Public Administration from Troy University and numerous professional military and executive education programs.

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Panel: The Role of Space in Global Security

Hear how Space has become an integral part of our military's capabilities. Our panelists will speak on the operational as well as the programmatic aspects of Space from a defense and security perspective. The increasing availability of access to space will have profound consequences for the global security environment. Since Colorado has more aerospace jobs per capita than any other state in the Union, this is a topic that is very important to us all.

Moderator:
Shane Deichman
Teledyne Brown Engineering, Inc.

Shane Deichman is Senior Director for Business Development at Teledyne Brown Engineering, in the company's Colorado Springs office. His role is to support strategic business development, partnering, and acquisitions in the defense, space, energy, and intelligence community markets. Shane joined Teledyne Brown in March 2017. Prior to joining Teledyne, Shane was Program Manager for Space Integration & Early Warning in the *Command, Control, Battle Management, and Communications*(C2BMC) Directorate at the Missile Defense Agency (MDA), where he was responsible for integrating space-based sensors into the C2BMC architecture – providing Warfighters with better data more quickly. A graduate of the U.S. Naval War College (1994) and Harvard's Kennedy School of Government "Senior Executive Fellows" Program (2003), Shane also holds an M.S. in Engineering Systems from Naval Postgraduate School-Monterey (2016), an M.S. in Management from Salve Regina University (1997), and a Baccalaureate in Nuclear Physics from the University of California at Berkeley (1989).

Panel: The Role of Space in Global Security cont…
Panelists

LIEUTENANT COLONEL KEVIN G. AMSDEN Commander, 3rdSpace Experimentation Squadron

Lt Col Kevin G. Amsden is the Commander of the 3d Space Experimentation Squadron, 50th Space Wing, Schriever Air Force Base, Colorado. In this role, he leads the Air Force's only unit for space-based demonstrations and experimentation. In addition to developing operational concepts for current and future space systems, the squadron recently operated the Automated Navigation and Guidance Experiment for Local Space (ANGELS) satellite, managed the Multi-Mission Satellite Operations Center (MMSOC) ground system, and oversees operations of the X-37B Orbital Test Vehicle (OTV). Lt Col Amsden entered the Air Force in 1999 through the Reserve Officer Training Corps at Brigham Young University. His background includes various duties in intercontinental ballistic missile (ICBM) and space situational awareness (SSA) operations, as well as research, development, test and evaluation (RDT&E) and satellite command and control. He was the lead orbital analyst for the Operation Burnt Frost satellite engagement, a Service Chiefs Intern at the Defense Advanced Research Projects Agency (DARPA), and an executive officer for an Air Force Scientific Advisory Board study on extended uses of space sensors.

DR. BOB RACCA Chief Scientist, Air Force Life Cycle Management Center (AFLCMC/HBQ)

Dr. Bob Racca is the Chief Scientist of the Strategic Warning and Surveillance Systems Division under the Air Force Life Cycle Management Center (AFLCMC/HBQ) which is part of Air Force Materiel Command (AFMC). This organization is responsible for the design, fielding and maintenance of the U.S. Strategic Warning system with the responsibility to characterize adversary missile threats against the U.S. and its allies. Dr. Racca's responsibilities include the generation of the operational databases and algorithms used by both the Missile Warning and Missile Defense Communities.

Dr. Racca has 35 years of experience modeling both ballistic missile and satellite trajectories and recently completed an operational model to predict impact trajectories for hypersonic vehicles. He holds a Ph.D. and Master's degree in Physics from Kansas University and a Master of Engineering in Astrodynamics from the University of Colorado

RICH BURCHFIELD , Chief Defense Development Officer Colorado Springs Chamber of Commerce & EDC

As Chief Defense Development Officer for the Colorado Springs Chamber of Commerce & EDC, Rich leadsAs Chief Defense Development Officer for the Colorado Springs Chamber of Commerce & EDC, Rich leads their community engagement with military and aerospace and defense industry, as well as support to economic development and government affairs activities as they relate to the defense sector. In the context of the Chamber & EDC, the defense sector comprises military bases and missions, private sector companies and organizations, and the organizations that support them. He shares responsibility for cultivating, recruiting and maintaining relationships with Chamber & EDC members and investors, with his primary focus on military installations and defense companies in the Pikes Peak Region.

Panel: Commercialization of Space

The goal of the panel is to hear from a diverse group of panelist on a broad range of topics necessary for the success of the commercial space industry, literally from the ground up. This will include discussions on commercial spaceports, commercial launch vehicle technologies, and spacecraft.

Moderator

Brian Gulliver
Kimley-Horn

Brian Gulliver is a registered professional engineer, project manager, and the leader of the Aerospace and Spaceport practice at Kimley-Horn and Associates. Over the past decade Brian has completed detailed studies, analyses and designs for more than a dozen launch complexes and spaceports. Brian is an industry leader in the development and licensing of commercial spaceports and has consulted on many of the current spaceports in development, including the Spaceport here in Colorado, as well sites in Florida, California, Texas, Virginia, Georgia, Hawaii and the UK.

Panelists

Dr. Adam Dissel
President – Reaction Engines Inc.

Adam heads the US-based subsidiary of Reaction Engines, Reaction Engines Inc. located in Castle Rock, Colorado. For the past two year, Adam has led the expansion of the company's development efforts with the US government and potential industry partners.

Adam has over 15 years' experience in the design of advanced hypersonic and launch vehicle systems with particular emphasis in the improvement of system affordability, responsiveness, and reusability.

Adam was previously System Architect for Responsive Space at Lockheed Martin Space Systems in Colorado. He holds a PhD and master's degree in Aerospace Engineering from the University of Maryland and a bachelor's degree in Mechanical Engineering from Utah State University.

Panel: Commercialization of Space cont..

Kevin J. Clinton
Program Manager, Gateway Power and Propulsion Element (PPE), Sierra Nevada Corporation

Kevin Clinton leads development and program execution for the first element of NASA's Lunar Gateway. He was the Program Manager for the NextSTEP PPE study, which SNC successfully completed in April 2018, and is responsible for the continued development of a flexible lunar spacecraft to meet a broad set of of commercial and government objectives. Kevin previously served as the Director of Systems Engineering for Dream Chaser, a commercial space plane designed to take cargo and crew to the International Space Station and other desinations in LEO. He led development of launch vehicle systems and control centers, as well as vehicle subsystems for the Dream Chaser flight test at Edwards AFB.

Prior to SNC, Kevin held engineering and management roles at NASA's Kennedy Space Center (KSC). His most recent assignment was as NASA's Lead for Nuclear Launch Approval, where he was responsible for hardware development and analysis, operations planning, incident response, and interagency coordination of launch activities for NASA missions involving nuclear power sources. He was appointed to the executive staff of the KSC Center Director, and also worked as an electromagnetics engineer on NASA's flagship robotic exploration missions.

Raymond H. Gonzales
Colorado Air and Space Port

Raymond H. Gonzales has over 20 years of experience in Federal, State and local government. He currently serves as County Manager for Adams County, where he oversees a budget of approximately $468 million that provide direct services for the community through Public Works, Parks and Open Space, Community & Economic Development and Human Services Departments; Administrative functions of Facilities and Fleet, Information Technology, Finance, and Budget and Performance measurement; and a newly dedicated People and Culture Services where he oversees the empowerment of over 2000 employees personal impact, influence and inspiration regardless of title or designation. An ever industrious conductor, Raymond continuously strives for organizational improvement and premier delivery of public services to meet the needs of an ever increasing diverse community. Most recently, Raymond has furthered the Adams County dedication to aviation by securing a Spaceport launch site license from the Federal Aviation Administration. The Colorado Air and Space Port establishes the eleventh Spaceport in the nation and the only facility where the first mile is free."

Lockheed Martin Space Systems
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Keynote Luncheon

Salvatore T. "Tory" Bruno
President and Chief Executive Officer
United Launch Alliance (ULA)

Salvatore T. "Tory" Bruno is the president and chief executive officer for United Launch Alliance (ULA). In this role, Bruno serves as the principal strategic leader of the organization and oversees all business management and operations.

Prior to joining ULA, he served as the vice president and general manager of Lockheed Martin Strategic and Missile Defense Systems. The business is a leading provider of ballistic missile and ballistic missile defense systems, supporting U.S. Department of Defense customers, as well as the U.K. Royal Navy and Ministry of Defence. Programs included the Navy's Trident II D5 Fleet Ballistic Missile (FBM), the Air Force's Intercontinental Ballistic Missile (ICBM) Reentry Systems, and the Missile Defense Agency's Terminal High Area Altitude Defense (THAAD), Targets and Countermeasures and CommonExoatmospheric Kill Vehicle (EKV) Concept Definition. He also managed the corporation's responsibilities in Atomic Weapons Establishment (AWE) Management Limited, a joint venture that produces and safely maintains the U.K.'s nuclear weapons. He is a former member of the board of directors of Lockheed Martin U.K. Ltd.

Bruno joined Lockheed Martin in 1984. He previously served as vice president and general manager of FBM and ICBM, as vice president of the THAAD Missile, as vice president of Engineering, as chief engineer for Strategic Missile Programs, as program manager for FBM Rocket Propulsion and in engineering positions involving design and analysis for control systems of rockets and hypersonic reentry vehicles. He holds several patents.

He holds a bachelor's degree in mechanical engineering from the California Polytechnic State University, in San Luis Obispo, California, and has completed graduate courses and management programs at Harvard University, Santa Clara University, the Wye River Institute, San Jose State University and the Defense Acquisition University.

Bruno has been invited to be a member of the National Space Council Users' Advisory Group chaired by Vice President Pence. In addition, he is an American Institute of Aeronautics and Astronautics (AIAA) Fellow, a companion of the Naval Order of the United States, a member of the Navy League and a former member of the Board of Directors of the Silicon Valley Leadership Group. He served on the National Blue Ribbon Panel for Bettering Engineering & Science Education and as Chairman of the Diversity Council of Lockheed Martin Space Systems.

He is the author of two books that explore the organization of the medieval Knights Templar from the perspective of modern business management: "Templar Organization: The Management of Warrior Monasticism" and "Templar Incorporated." He is a recipient of the Order of Merit of the Sovereign Military Order of the Temple of Jerusalem.

Panel: Space Weather

It's cold out there!! In this panel we'll explore what's happening in the field of space weather. From what it is, to how it's measured, to why it matters. Space weather is one of the biggest threats to technology and people in space, and our understanding of it is critical to all space missions.

Moderator

Edgar Johansson
Manager of Strategic Initiatives, LASP

Edgar Johansson is dual tasked as the Manager for Strategic Initiatives at the Laboratory for Atmospheric and Space Physics (LASP) and in the same capacity at the newly developed Space Weather Technology, Research and Education Center (SWx-TREC)both at the University of Colorado Boulder. In this capacity of **Edgar is responsible for communications and the development of new business pipeline.** **In** Edgar's earlier time with LASP (2004-2008) his responsibilities included Risk Manager on the TIM instrument for the NASA mission Glory as well as Risk Manager for TSIS on NPOESS. Through Edgar's extensive network of federal, state and commercial contacts he was able to re-secure $4.5 million in the NASA budget for Glory TIM in 2005 and play a key role in the $34 million re-manifestation of the TSIS suite on the NPOESS C1 satellite which was announced in May 2008. The TSIS Suite now lives on the ISS.

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Laboratory for Atmospheric and Space Physics
University of Colorado **Boulder**

Panelists

Scott McIntosh
Director, NCAR High Altitude Observatory
Bio not available

Dr. Michael Gazarik
Vice President, Engineering Ball Aerospace

Mike Gazarik is the vice president of Engineering at Ball Aerospace, where he is responsible for overall strategic and operational leadership of the organization, which includes all disciplines of engineering as well as manufacturing, test, supply chain management, facilities, IRAD and intellectual property. Prior to this position, he served as Technical Director where he worked to align Ball's technology development with business development and growth strategies

Tomas Berger
Director, NOAA Space Weather Prediction Center

Dr. Thomas Berger is the founding director of the Space Weather Technology, Research, and Education Center (SWx-TREC) at the University of Colorado (CU) at Boulder. Prior to forming the SWx-TREC with Profs. Jeff Thayer and Dan Baker, Dr. Berger was a Federal SES employee directing NOAA's Space Weather Prediction Center. In this role, he interacted with researchers, operational forecasters, and government policy makers to guide national-level decisions on space weather research, operations, and mitigation strategies. In 2014—2015, he led a working group of the White House Office of Science and Technology Policy's Space Weather Operations, Research, and Mitigation (SWORM) task force. Dr. Berger's research interests are in the design of instrumentation for the observation and analysis of solar magnetic structure, particularly eruptive flux ropes and their associated prominence formations. He is a Co-Investigator on the Japanese/US/UK *Hinode*mission which has produced the highest resolution observations of the solar atmosphere and magnetic field from space since 2006. Dr. Berger received his Ph.D. in Astrophysics from Stanford University following a B.S. degree in Engineering Physics from the University of California at Berkeley.

Valentin Pillet
Director, National Solar Observatory,

Valentin Pillet has served as the Director at the National Solar Observatory since 2013. He served as Principal Investigator for Co-PI: SO/PHI (Solar Orbiter Polarimetric and Heloseismic Imager) for the ESA/NASA Solar Orbiter mission, PI: Imaging Magnetograph eXperiment (IMaX), funded by the Spanish space program. Co-I SUNRISE balloon project, led by the Max-Planck Institute, Lindau, Germany, and as a Developer for Liquid-Crystal Based Optical Retarders, funded by the Centre for Technological and Industrial Development (CDTI, Spain). He has served as a member for more than a dozen National & International Advisory Bodies, and has authored hundreds of published and presented works.

- Platinum Sponsor showcase -

Next Generation Defense Weather Missions Based on the Global Precipitation Measurement (GPM) Microwave Imager (GMI) Calibration Standard

Michael Berberich, Ball Aerospace

Next-generation defense weather satellite system require accurate measurements of top-of-atmosphere brightness temperatures to determine ocean surface vector winds, tropical cyclone intensity, and other environmental products necessary to support our war fighters. At Ball Aerospace, we have built the Global Precipitation Measurement (GPM) Microwave Imager (GMI) designed to be the radiometric calibration standard for a group of national and international passive microwave instruments in the GPM constellation. GMI has operated nearly continuously since March 4th,. 2014. This paper presents GMI's on-orbit performance and calibration results and provides a top-level overview of how the GMI can be leveraged for next-generation defense weather missions.

- Gold Sponsor Showcase -

ROCCOR 

High Strain Composite Boom Deployer Design
Through Iterative Test and Hardware Rich Development

Brad Hensley & Tayler Thomas

Roccor is an industry leader in the development and implementation of high strain composite materials in spacecraft deployable systems. Metallic strained deployables have been used in space for over 50 years; a common example is a slit tube, or “tape measure”, boom. These mechanisms coil a long “C” cross-section boom around a spool and then deploy the boom on-orbit, providing a high packaging efficiency and the ability to deploy to various lengths. Metallic slit tubes booms can have many advantages over other deployable structures (telescoping booms, hinged booms, etc.) but are limited in their structural performance and are susceptible to large thermal deformations.

Roccor is expanding slit tube boom technology by using High Strain Composite (HSC) materials as the rollable structural element. The nature of the composite laminate enables a neutrally stable system that, unlike metallic slit tubes, does not require a complex set of root mechanisms to restrain the stored energy of the coil. These laminates, consisting of space qualified materials, can also be designed to have a near zero coefficient of thermal expansion, eliminating thermal deformations. Roccor has also developed the capability to embed conductors into the boom, which can then act as an RF element or transfer power and data without a standalone harness.

Using these technologies Roccor has developed a high strength, high precision Cubesat boom for use in tensioned structures. This system is designed for use in complex precision structures, such as deployable antennas, optical systems, and solar arrays. The key performance parameters of this system are a deployed axial precision of .1 mm and a deployed compressive strength of 225 N. HSC’s allowed Roccor to develop a system with higher performance than comparable deployables in terms buckling strength, dimensional stability, and mechanism simplicity. One key to utilizing HSC structures is the clear understanding of the physical shape of the deformed material. The strains within the laminate are directly tied to the long duration performance of the material and hence are important to characterize to a high level of certainty. In addition, residual stresses within the laminate can cause the material to creep over time, causing changes to the deployed shape long after the deployment is complete. Roccor has developed several processes to combat these issues utilizing contact free measurement techniques enabled by a Portable Coordinate Measurement Machine (PCMM). Roccor also ran into several issues during the design development, most notably composite damage during repeated deployments, that were solved through the techniques developed using the PCMM and a hardware rich development process. This talk will present Roccor’s design and risk mitigation methods in detail and discuss the solutions Roccor implemented, including the testing and analysis methods Roccor developed to evaluate potential designs. Three protoflight units of this system have been delivered for flight, and further development has been ongoing on a second generation design.

Session 1 Abstract Presentations

*To read full abstracts, go to aiaa-rm.tech/abstracts

Breakout Room 1

9:00am	Michael L. Anderson, Lt Col, USAF
	Autonomous Navigation Techniques for UAVs
9:20am	Sara Swenson, University of Colorado, Boulder
	Development of UAV-Deployed Air-Launched Drifters (ALD) for Aboveground Thermodynamic Measurements in Supercells
9:40am	Jarett Bartholomew
	Airborne Mapping and Quantification of Natural Gas Emissions with Active Remote Sensing

Breakout Room 2

9:00am	Poti Doukas, Instar Engineering and consulting, Inc.
	Common Issues Observed in the Aerospace industry – Structures and Loads/Dynamics
9:25am	Matt Snyder, USAFA
	Use of Heat Coils to Drive Shape Change in Bi-Stable Composites
9:45am	David Waller, Principal Engineer, Ball Aerospace.
	Feasibility Study of Additively Manufactured Al-6061 RAM2 Parts for Aerospace Applications

Session 2 Abstract Presentations

*To read full abstracts, go to aiaa-rm.tech/abstracts

Breakout Room 1

11:00am	Thomas Scott, Redline Consulting
	Exoskeletal Rim Drive System for converting aircraft to electric-hybrid propulsion.
11:20am	Tim Jung, Engineering Systems, Inc.
	The Use of Virtual Reality Technology in Aviation Accident Analysis and Reconstruction
11:40am	Sibylle Walter, Northrop Grumman
	A novel compact probe for inlet distortion measurement.

Breakout Room 2

11:00am:	Jennifer Lee, Ball Aerospace
	Photonics-based Microwave Radiometer for Hyperspectral Earth Remote Sensing. Authors: Todd Pett[1], Jennifer Lee[1], Yossef Ehrlichman[2], Hayk Gevorgyan[3], Anatol Khilo[3], Milos Popovic[3] [1] Ball Aerospace[2] University of Colorado[3] Boston University
11:20am	Laura Coyle, Ball Aerospace.
	James Webb Space Telescope Mirror Cryogenic Alignment Optical Evaluation Overview
11:40am	Jonathan Goff, President/CEO, Altius Space Machines, Inc.
	Satellite Servicing Made Easier:An Introduction to Altius Cooperative Servicing Interfaces and Bulldog Satellite Servicing Vehicle

Poster Presentations

1:00 – 2:00pm – Great Hall

- Zachary Warren – Integrated Kinetic Energy/Direct Energy Weapons.
- Anthony Cabri - Impact of Humid, Salt-Water Environment on Steel's Tensile Test Behavior
- John Ferguson - Experimental Nonlinear Dynamics of a Post-Buckled Composite Laminate Plate
- Nick Campbell – Commercial Aerobreaking
- Dawson Beatty - Autonomous Ground Navigation (Project DRAGON)
- Emily Ranquest - Airborn sUAS gust observation techniques
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- Christopher A. Roseman and Brian Argrow – Targeted Weather Forecasts for small Unmanned Aircraft Systems
- Joseph Pointer - In-situ measurements of stratospheric turbulence
- Chris Gehrig, Mechanical Engineer, SEAKR Engineering, Inc.

Iridium NEXT Processor: How manufacturing and heat pipes became mission critical for providing voice and data capabilities to the world via the largest satellite constellation to date.

- Carlos Pinedo – The Design of an International Lunar Village along the Gerlache Crater

Author(s): Carlos Pinedo, Kadambari Suri, Markus Peukert, Mario Maggio, Brendan Perry, Sarah Yenchik, Alexander Verbuch, Zachary Richardson, Matthew Bair, and Uriel Cain

- Sean Cohen, Kevin Weed and Jeremy Lambert of Ball Aerospace - Non-Dimensional Correlations for the Optimization of Micro Pin Fin Arrays

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AGENDA HIGHLIGHTS:

- NASA Agency-Wide and Mission Directorate Visions and Strategic Priorities
- NASA SBIR/STTR Program Overview & Updates
- Commercialization & Infusion Opportunities Across Agencies
- Other Accelerated Government Funding Opportunities
- NASA Future Technology Needs
- Writing Responsive Proposals for NASA
- STTR Overview and Panel of Research Institutions
- Office of Small Business Programs & Mentor Protégé Program
- Technology Commercialization Panel: Stories from the Trenches
- Small Business Resource Rapid-Fire: How We Can Help
- Elevator Accelerator: Pitch Your Innovation!
- "Ask Me Anything" Plenary
- And more!

HEAR FROM & NETWORK WITH:

- Steve Jurczyk, NASA Associate Administrator
- Scott Tibbitts, Katasi CEO
- Jenn Gustetic, NASA SBIR/STTR Program Executive
- Therese Griebel, NASA STMD Deputy Associate Administrator for Programs
- NASA Principal Technologists, Mission Directorate Representatives, and Contracting Experts
- NASA Game Changing Development, Small Spacecraft Technology Programs, Tipping Point, and Flight Opportunities
- Defense Advanced Research Projects Agency (DARPA)
- Small Business Administration (SBA)
- U.S. Air Force SBIR and Air Force Research Lab Accelerators
- University of Virginia Seed Fund
- AAMU RISE Foundation
- NIST Public Safety Communications Research (PSCR)
- Department of Energy SBIR & NREL Innovation and Entrepreneurship Program
- MD5 National Security Technology Accelerator
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