Technical Sessions

Technical Session I: Space Mission Architectures

Proba-3: ESA’s Small Satellites Precise Formation Flying Mission to Study the Sun’s Inner Corona as Never Before
Luis Peñin, José Villa, Yann Scoarnec, José Fernandez-Ibarz, Carolina Cazorla - SENER Aerospace; Ronald Kassel - QinetiQ Space; Francisco Benito - Airbus; Luigi Strippoli - GMV Space and Defense

Enabling Hybrid Architectures and Mesh Network Topologies to Support the Global Multi-Domain Community
Stanley Kennedy, Danielle Cleveland, Alexander Dunn - Oakman Aerospace, Inc.

Design Drivers for a Viable Commercial Remote Sensing Space Architecture
Walter Scott, Neal Anderson, Aaron Rogers - Maxar Technologies

An Automated Constellation Design & Mission Analysis Tool for Finding the Cheapest Mission Architecture
Martin Fugmann, Sabine Klinkner - University of Stuttgart Institute of Space Systems

A New Paradigm for Implementing NOAA’s Low Earth Orbit Architecture
Frank Gallagher, David Spencer, Vanessa Griffin - National Oceanic and Atmospheric Administration

Army Decade in Space

Technical Session II: Year in Review

The LightSail 2 Controlled Solar Sailing Demonstration Mission
David Spencer - Purdue University; Bruce Betts - The Planetary Society; John Bellardo - California Polytechnic State University; Barbara Plante - Boreal Space; Alex Diaz - Ecliptic Enterprises Corporation; Justin Mansell - Purdue University

Landsat Imagery from a CubeSat: Results and Operational Lessons from the R3 Satellite's First 18 Months in Space
Dee Pack, Garrett Kinum, Patrick Johnson, Timothy Wilkinson, Christopher Coffman, Cameron Purcell, Jon Mauerhan, Brian Hardy - The Aerospace Corporation

On-Orbit Performance of the BCP-100 Green Propellant Infusion Mission
Brian Marotta, Christopher McLean, Brad Porter - Ball Aerospace & Technologies Corp.

Very Low Frequency Propagation Mapper (VPM) Experience and Results from the Systems Engineering Cycle of a Small Satellite
Lee Jasper, Brandon Shirley, Collin Enger, Ryan Jaynes - Space Dynamics Laboratory; Travis Gies, Tanya Rodriguez, Garrett Holt - Applied Technology Associates; Franklin Hinckley - Metis Technology Solutions Inc.
CAT Differential Drag Implementation and Lessons Learned
Dawn Moessner, Wen-Jong Shyong – The Johns Hopkins University Applied Physics Laboratory

Building Satellites in 18 Months: Lessons Learned from the Rogue CubeSats
Matthew Navarro - Department of Defense Space Test Program; Joel Gussy, Dee Pack, Darren Rowen, Deborah Salvaggio - The Aerospace Corporation

Session III: Science/Mission Payloads

The Coordinated Ionospheric Reconstruction Cubesat Experiment (CIRCE)
Alexander Agathanggelou, Gemma Attrill - Defense Science Technology Laboratory; Andrew Nicholas - US Naval Research Laboratory; Graham Routledge, Junayd Miah - Defense Science and Technology Laboratory; Cathryn Mitchell, Robert Watson - University of Bath; Dhiren Kataria - University College London

Development of a Low-Resource Combined Gamma-Ray and Neutron Spectrometer for Planetary Science
Katherine Mesick, Daniel Coupland, Kurtis Bartlett, Darrel Beckman, Stephen West, Laura Stonehill, Nicholas Dallmann - Los Alamos National Laboratory; William Feldman - Planetary Science Institute

Terahertz Imaging for Space Applications
Wenschel Lan, Harrison English, Fabio Alves, James Newman - Naval Postgraduate School

Sustainable Ozone and Aerosol Measurements from a 6U CubeSat: The Stratospheric Aerosol and Gas Experiment (SAGE) IV Pathfinder
Michael Obland, Robert Damadeo, Charles Hill, John Leckey - NASA Langley Research Center

Thermomechanical Design and Testing of the Deformable Mirror Demonstration Mission (Demi) CubeSat
Paula do Vale Pereira, Bobby Holden, Rachel Morgan, Jennifer Gubner, Thomas Murphy, Christian Haughwout, Gregory Allan, Yinzi Xin - Massachusetts Institute of Technology

NovaSAR and SSTL S1-4: SAR and EO Data Fusion
Rebecca Couchman-Crook, Claire Morris, Avyaya Kolhatkar, Jessica Park, Tobias Carman, James Lambert - Defence Science and Technology Laboratory

BOWIE-M: A Microwave Sounder for Next Generation Operational Weather
Sean Geiger, Victoria Hadel, Todd Pett - Ball Aerospace & Technologies Corp.

Session IV: Special Session

Future Directions: Delivering Capabilities
Derek Tournear

European Space Agency (ESA) - φ Lab & Future Earth Observation Mission Architectures
Amanda Regan
Essential Elements of the Hybrid Architecture
David Voss

Seizing Opportunities: SmallSats in NOAA’s Next-Gen Architecture
Vanessa Griffin

Session V: Next on the Pad

Design and Development of On-orbit Servicing CubeSat-class Satellite
Ansley Knight, Jin Kang, Trent Tetterton, Alec Engl, Peter Sinkovitz, Bailee Ward - US Naval Academy

The Small Satellite-Based, Imaging X-Ray Polarimeter Explorer (IXPE) Mission

BeaverCube: Coastal Imaging with VIS/LWIR CubeSats
Paula do Vale Pereira, Madeline Garcia, Madeleine Schroeder, Jim Clark, Humberto Caldelas, Charles Lindsay, Alex Choi, Kaila Pfrang - Massachusetts Institute of Technology

Overview of ESA’s Earth Observation Upcoming Small Satellites Missions
Massimiliano Pastena, Nicola Melega, Michel Tossaint, Amanda Regan, Michele Castorina – European Space Agency; Antonio Gabriele – Moltek Consultants Ltd; Pierre Mathieu, Josep Rosello – European Space Agency

The CaNOP Cubesat Mission, Remote Imaging of the Rain Forest and Testing AI Based Identification Tools
Andrew Santangelo - Sci_Zone; Kevin Crosby - Carthage College

Engineering Model Development of HIBARI: MicroSatellite for Technology Demonstration of Variable-Shape Attitude Control
Kei Watanabe, Yuhei Kikuya, Kiyona Miyamoto, Tsuyoshi Nakashima, Teruaki Hayashi, Naoki Kawaguchi, Hiroyuki Kobayashi, Soichi Sato - Tokyo Institute of Technology

A Mission Revived: Lessons Learned from Starshine 4 Re-design, Assembly, Test, and Integration
Ryan Williams, Walter Holemans - Planetary Systems Corporation

Session VI: Advanced Technologies I

A Foldable, Compact and Lightweight Solar Array Substrate with Large Deployed Wingspan for Small Spacecraft
Calvin Kee, Michael Marley, Mark Bryant, Erich Schulze, Kenneth Harclerode, Clint Apland, James Leary - The Johns Hopkins University Applied Physics Laboratory

Autonomous System Identification for Satellite Attitude Control
Evan Sperber, Daniel Hernandez, Hannah Weiher, Evan Ulrich, Mitchel Craun, Carlos Beltran, Alexander Harpenau, Richard Chiang - The Aerospace Corporation
Progress Towards the ELROI Satellite License Plate  
David Palmer, Michael Holloway, Rebecca Holmes, Donathan Ortega, Charles Weaver - Los Alamos National Laboratory

Deployable Optics for CubeSats  
G. Aglietti, M. Honeth - Space Institute - University of Auckland; S. Gensemer - Commonwealth Scientific and Industrial Research Organisation; O. Diegel - University of Auckland

NASA SpaceCube Intelligent Multi-Purpose System for Enabling Remote Sensing, Communication, and Navigation in Mission Architectures  
Cody Brewer, Nicholas Franconi, Robin Ripley, Alessandro Geist, Travis Wise, Sebastian Sabogal, Gary Crum, Sabrena Heyward - NASA Goddard Space Flight Center

Advancements of a MicroSat for On-Orbit Satellite Surgery  
Ted Nye, Mark Milam - Northrop Grumman Corporation

Cathode & Electromagnet Qualification Status and Power Processing Unit Development Update for the Ascendant Sub-kW Transcelestial Electric Propulsion System  
Ryan Conversano, Ansel Barchowsky, Vatché Vorperian, Vernon Chaplin, Giulia Becatti, Gregory Carr, Christopher Stell, Jessica Loveland - Jet Propulsion Laboratory

Session VII: Student Competition

A Versatile Magnetorquer Design for Microsatellite Constellation Missions  
Philip Hampton - University of Toronto

Applying Modern Software System Design to Small Satellite Development and Operations  
Michael Wilson – University of Michigan

DEBRIS - A Small Satellite Approach to Active Debris Removal  
Niklas Wendel, Tilman Hoffbauer, Louisa Gerhard – University of Applied Sciences Aachen

Optical Modeling, Alignment, and Testing for the Deformable Mirror Demonstration Mission (DeMi) CubeSat Payload  
Rachel Morgan - MIT

Initial Development and Verification of a Precise Orbit Determination Filter for the APEX CubeSat Mission  
Kyle Craft, Grant Hecht - Missouri University of Science and Engineering

Maneuver Planning for Demonstration of a Low-Thrust Electric Propulsion System  
Madeleine Schroeder, Christopher Womack, Amelia Gagnon - MIT

Session VIII: Space Access
Implementing Responsive and Reliable Access to Space for Small Satellites  
Lars Hoffman - Rocket Lab

John Bacon, Jer Chyi – NASA Orbital Debris Program Office

The STP-2 Mission: Rideshare Lessons Learned from the Air Force’s First Falcon Heavy Launch  
David Voelkel, Barbara Braun, Sabrina Herrin, Arthur Menichiello - The Aerospace Corporation; Michael Marlow - Department of Defense Space Test Program

Leveraging the Success of the CubeSat Standard to Create a SmallSat Standard for ESPA Spacecraft  
Ryan Nugent, Dave Pignatelli, Alicia Johnstone, John Bellardo, Pauline Faure - California Polytechnic State University

VV16: The First VEGA Rideshare Mission Flight  
Christophe Roux - AVIO SpA

Building a Global Launch Network: Extending the Reach of Dedicated Small Satellite Launch Using New, Data-Driven Spaceport Assessment Tools  
John Fuller, Sirisha Bandla, Ren Liao, Monica Jan, Kirit Patel, Ren Liao - Virgin Orbit; Wade McElroy, Mandy Vaughn - VOX Space

Session IX: Propulsion

Nytrox as a Volumetrically-Efficient, Green Oxidizer for SmallSat Hybrid Propulsion Systems  
Stephen Whitmore - Utah State University; Rob Stoddard - Jacobs Engineering

Testing of a Green Monopropellant Integrated Propulsion System  
Joseph Cardin, Tate Schappell, Chris Day - VACCO Industries

An Off-Axis Iodine Propulsion System for the Robusta-3A Mission  
Javier Martínez - ThrustMe; Xavier Laurand – University of Montpellier; Dmytro Rafalskyi - ThrustMe; Sara Martínez, Gary Quinsac - University of Montpellier; Ane Aanesland - ThrustMe

Design of a Green Monopropellant Propulsion System for the Lunar Flashlight CubeSat Mission  
Dawn Andrews, Grayson Huggins, Glenn Lightsey, Nathan Cheek, Nathan Lee, Sterling Peet, Ali Talaksi, Sahaj Patel - Georgia Institute of Technology

The uHETSat Hall Effect Thruster Payload to Platform Coupling Tests: Results and Lessons Learnt  
Vincenzo Stanzione, Alberto Corbelli, Alessandro Avanzi, Valentino Fabbri, Stefan Gregucci, Ugo Cesari, Luca Guglielmi, Lorenzo Fontani - Sitael S.p.A.

A Miniaturized Green End-Burning Hybrid Propulsion System for CubeSats  
Tyson Smith, Zachary Lewis, Kurt Olsen, Marc Bulcher - Space Dynamics Laboratory; Stephen Whitmore - Utah State University; Stephan Whitmore - Utah State University
Session X: Ground Systems

Merging Diverse Architecture for Multi-Mission Support
Kyle Colton, Joseph Breu, Bryan Klofas, Sydney Marler, Chad Norgan, Matthew Waldram - Planet Labs

A Prototype Virginia Ground Station Network
Zachary Leffke, Kevin Shinpaugh, Ian Harnett, Bryce Clegg, Nick Angle - Virginia Polytechnic Institute; Chris Goyne, Connor Segal, William LaCour – University of Virginia

NASA Near Earth Network (NEN) DVB-S2 Demonstration Testing for Enhancing Higher Data Rates for CubeSat/Small Satellite Missions at X-band and Ka-band
Yen Wong, Scott Schaire, Steven Bundick, Peter Fetterer - NASA Goddard Space Flight Center; Trish Perrotto, Peter Celeste - Booz Allen Hamilton

Expanding the Capability of Satellite Operations using a Global Federated Ground Station Network
Matthew Szczerba, Justin Schachter, Kaylee Bell, Michael Wilson, James Cutler - University of Michigan

A Comparison of Fixed Threshold CFAR and CNN Ship Detection Methods for S-band NovaSAR Images
Tobias Carman, Ayyaya Kolhatkar – Defence Science and Technology Laboratory

Session XI: Advanced Technologies II

A GaN-Based Four-Switch Buck-Boost Converter Using Ripple Correlation Control for Maximum Power Point Tracking in Dynamic Deep Space Environments
Sadab Mahmud, William Collings, Roshan Kini, Ahmad Javaid, Raghav Khanna - University of Toledo; Ansel Barchowsky, Ahmadreza Amirahmadi, Chris Stell - Jet Propulsion Laboratory

On-orbit Results from an Ultra-Low SWaP Black Silicon Star Tracker
Darren Rowen - The Aerospace Corporation; Martin Pralle - SiOnyx, Inc.; Alexander Utter, Garrett Kinum, Hannah Weiher, Andy Wu, Richard Dolphus, Eddson Alcid - The Aerospace Corporation

Design and Verification of a Clock System for Orbital Radio Interferometry
Nicholas Belsten, Frank Lind, Cadence Payne, Mary Knapp, Frank Robey, Paul Serra, Philip Erickson, Kerri Cahoy - Massachusetts Institute of Technology

Experimental Study for Synthetic Aperture Telescope Using Formation Flying Micro-satellites for High-frequency and High-resolution GEO Remote Sensing
Ryo Suzumoto, Satoshi Ikari - University of Tokyo; Norihide Miyamura - Meisei University; Shinichi Nakasuka - University of Tokyo

Soft-Switching GaN-Based Isolated Power Conversion System for Small Satellites with Wide Input Voltage Range
Ahmadreza Amirahmadi, Ansel Barchowsky, Chris Stell - Jet Propulsion Laboratory; Brandon Grainger, Thomas Cook - University of Pittsburgh

Session XII: Communications
Demonstration of 2.6 Gbit per Sec X Band Radiowave Down Link Communications from LEO Small Satellite
Hirobumi Saito, Keishi Murakami, Yoshinori Kunii, Takahisa Tomoda – Japan Aerospace and Exploration Agency; Tomoki Kaneko, Noriyuki Kawano, Shinichi Nakasuka - University of Tokyo; Seiko Shirasaka - Keio University

Results from Rapid Testing of Space-based Mobile Network Technology
Tyghe Speidel, Joseph Thatcher Chamberlin, Bob Noteboom, Joe Bravman, Remi Gourdon - Lynk Global, Inc.

LunaNet: A Flexible and Extensible Lunar Exploration Communications and Navigation Infrastructure and the Inclusion of SmallSat Platforms
David Israel, Kendall Mauldin, La Vida Cooper, Katherine Schauer – NASA Goddard Space Flight Center

Small Satellite Regulation in 2020
Lynne Montgomery, Christopher Bair - Wilkinson Barker Knauer LLP

A Novel Approach to Transport-Layer Security for Spacecraft Constellations
Edward Birrane, Sarah Heiner – The Johns Hopkins University Applied Physics Laboratory

SatCat5: A Low-Power, Mixed-Media Ethernet Network for Smallsats
Alexander Utter, Mark Zakrzewski, Andrew Keene, Samuel Dietrich, Sammy Lin, Eric McDonald, Nathan Whitehair, Jason Zheng - The Aerospace Corporation

A Comparison of Techniques for Non-Data-Aided Carrier Tracking of Phase-Modulated Signals
Brendan Hill, Nazia Mozaffar, Salwan Damman - Naval Information Warfare Center Pacific

S-Band Transponder Multi-Network Compatibility, Space Environment and Radiation Testing
Kevin Lynaugh, Stuart Golden, Nathan Moore, Yashmar Marashi - Vulcan Wireless Inc; Serhat Altunc, Obadiah Kegege, Behnam Azimi, Michael Campola - NASA Goddard Space Flight Center

Workshop Talks

Session I: Advanced Concepts I

Radiation Tolerance of Low-Cost Magnetometer for Space Applications
Leonardo Regoli – The Johns Hopkins University Applied Physics Laboratory; Mark Moldwin, Connor Raines - University of Michigan; Tom Nordheim - Jet Propulsion Laboratory; Cameron Miller, Sara Pozzi - University of Michigan; Martin Carts - NASA Goddard Space Flight Center

Guidance, Navigation, and Control for Agile Small Spacecraft with Articulating Solar Arrays
Robert Magner, Niels Roth, Brad Cotton, Robert Zee - University of Toronto, UTIAS Space Flight Laboratory

CubeSat Electrical Interface Standardization for Faster Delivery and More Mission Success
Mengu Cho, Takashi Yamauchi, Marloun Sejera, Yukihisa Ohtani, Sangkyun Kim, Hirokazu Masui - Kyushu Institute of Technology

**NASA Centers and Universities Collaborate in Annual Smallsat Technology Partnerships**
James Cockrell – NASA Ames Research Center; Christopher Baker – NASA Headquarters; Roger Hunter, Elwood Agasid – NASA Ames Research Center

**Ground-based 1U CubeSat Robotic Assembly Demonstration**
Ezinne Uzo-Okoro, Christian Haughwout, Emily Kiley, Mary Dahl, Kerri Cahoy – Massachusetts Institute of Technology

**Thermal Storage for High-Power Small Satellites**
Michael Izenson, Darin Knaus, Lucas O’Neill – Creare LLC

**A Non-Hohmann Method for Orbital Element Database Pre-Processing**
William Hudnut, Cameron Mehlman, Kurt Anderson - Rensselaer Polytechnic Institute

**Qualification and Flight of a Cutting Edge Sunsensor for Constellation Applications**
Johan Leijtens, Stefan Schmidt, Dick Broekmans, Johan Uittenhout - Lens Research & Development

**Session II: A Look Back: Lessons Learned**

**Advanced eLectrical Bus (ALBus) CubeSat: From Build to Flight**
Deboshri Sadhukhan, Allen Guzik, Othmane Benafan, Issam Boukabou, Brian Tomko, Mark Sorrells, William Fabanich – NASA Glenn Research Center

**Spooqy-1: The First Nano-Satellite to Demonstrate Entanglement Generation in Space**
Aitor Villar, Alexander Lohrmann - SpeQtral; Xueliang Bai - Centre for Quantum Technologies; Tom Vergoossen, Robert Bedington - SpeQtral; Chithrabhanu Perumangatt - Centre for Quantum Technologies; Huai Ying Lim - SpeQtral; Tanvirul Islam - Centre for Quantum Technologies

**Diwata-2: Earth Observation Microsatellite with a Compact Bus System, Electronically Tunable Multi-Spectral Imager, and Amateur Radio Communications Capability**
Ariston Gonzalez - University of the Philippines - Diliman; Yuji Sakamoto - Tohoku University; Marc Talampas, John Leur Labrador, Delburg Mitchao, Joel Marciano - University of the Philippines - Diliman

**Phoenix: A CubeSat Mission to Study the Impact of Urban Heat Islands Within the U.S.**
Sarah Rogers, Jaime Sanchez de la Vega, Judd Bowman, Daniel Jacobs, Craig Knoblauch, Yegor Zenkov, Devon Bautista, Trevor Bautista - Arizona State University

**A Deeper Look into the Ionospheric Scintillation eXplorer (ISX): A Failure Analysis**
Grigory Heaton, Dave Pignatelli, Cassandra Kraver, John Bellardo, Pauline Faure, Ryan Nugent, Alicia Johnstone - California Polytechnic State University

**Session III: Instruments/Science I**
CubeSatTOF: Planetary Atmospheres Analyzed with a 1U High-Performance Time-Of-Flight Mass Spectrometer
Rico Fausch, Peter Wurz, Marek Tulej - University of Bern

Environmental Testing of the CubeSat Laser Infrared CrosslinK (CLICK-A) Payload
Ondrej Čierny, Paul Serra, William Kammerer, Peter Grenafl, Grant Gunnison, Joseph Kusters, Cadence Payne, Paula do Vale Pereira - Massachusetts Institute of Technology

Hyti: High Spectral and Spatial Resolution Thermal Infrared Imaging from a 6U Cubesat
Robert Wright, Miguel Nunes, Paul Lucey, Luke Flynn - University of Hawaii, Manoa; Sarath Gunapala, David Ting, Sir Rafol, Alexander Soibel - Jet Propulsion Laboratory

VTXO: The Virtual Telescope for X-ray Observations
John Krizmanic, Neerav Shah - NASA Goddard Space Flight Center; Steven Stochaj, Hyeongjun Park, Kyle Rankin, Daniel Smith - New Mexico State University; Asal Naseri - Space Dynamics Laboratory; Alice Harding - NASA Goddard Space Flight Center

LICIACube on DART Mission: An Asteroid Impact Captured by Italian Small Satellite Technology
Simone Pirrotta, Marilena Amoroso, Simone Pizzurro, Gabriele Impersario - Italian Space Agency; Valerio Di Tana, Federico Miglioretti, Biagio Cotugno, Simone Simonetti - Argotec

In-Orbit Demonstration of the Isim-170 Optical Payload Onboard the ISS
Rafael Guzmán, Stuart Davis, Eider Ocerin, Marta Massimiani, Aitor Conde, Luis Carlos Fernández - Satlantis

Stereoscopic Meteor Observation: Determining Satellite Bus and Formation Parameters Requirements
Jona Petri, Sabine Klinkner - University of Stuttgart Institute of Space Systems

Session IV: Advanced Concepts II

Accelerating Deep Learning Applications in Space
Martina Lofqvist, José Cano - University of Glasgow

Drag Augmentation Systems for Space Debris Mitigation
Zaria Serfontein, Jennifer Kingston, Stephen Hobbs - Cranfield University; Ian Holbrough - Belstead Research Ltd.

Active Thermal Architecture: Design and Status
Lucas Anderson, Charles Swenson - Utah State University; Arthur Mastropietro, Jonathan Sauder - Jet Propulsion Laboratory

Cellular Based Aggregated Satellite System: The Design and Architecture of a Three Degree of Freedom Near-Frictionless Testbed for Ground Validation of CubeSat Operations
Michael Smat, Lizvette Villafaña, Kirby Overman, David Barnhart - University of Southern California

Integrating Globally Dispersed Calibration in Small Satellites Mission Value
Afreern Siddiqi, Olivier de Weck, Sheila Baber - Massachusetts Institute of Technology; Christopher Durell, Brandon Russell, Jeff Holt - Labsphere, Inc.
Session V: Educational Programs

**ARKSAT-1, 1U CubeSatellite Developed at the University of Arkansas**  
Cassandra Sands, Po-Hao Adam Huang, Morgan Roddy, Haden Hodges - University of Arkansas

**A Collaborative Platform to Provide a Relevant Training on Nanosat Technology for the South West of Europe**  
Marion Gariteau - Aerospace Valley, Jorge Monteiro, Anna Guerman - University of Beira Interior

**Preparing CySat-1: A Look at Iowa State University's First CubeSat**  

**Building an Academic Community SmallSat Program**  
Royce James - US Coast Guard Academy; Richard Freeman, Lorraine Allen - US Coast Guard Academy;  
Erik Tejero - US Naval Research Laboratory; Brian Kay - US Air Force Institute of Technology

**A Methodology for Successful University Graduate CubeSat Programs**  
Aaron Aboaf, Elliott Harrod, Matthew Zola, Arunima Prakash, Scott Palo, Robert Marshall, Marcin Pilinski, Nicholas Rainville - University of Colorado at Boulder

**The ITA Space Center and Its Role in Space Education in Brazil**  
Luis Loures, Pedro Kukulka, Christopher Cerqueira, Jonas Fulindi, Willer Gomes, Lidia Sato, Ana Carolina di Iorio Jeronymo, Renan Menezes - Aeronautical Institute of Technology

**EyeSat: A Great Student Adventure Within the French Space Agency Leading Up to Lessons Learned from Orbit**  
Fabien Apper, Antoine Ressouche, Nicolas Humeau, Matthieu Vuillemin, Guillaume Crooks, Gregor Vindry - U-Space; Frédérick Viaud, Nicolas Verdier - CNES

**Closed Loop Analysis of Space Systems (CLASS): A Modular Test System for CubeSat Development**  
Marc Akiki, Michael Lembeck - University of Illinois at Urbana-Champaign

**USMA Space Cadets: The First Class**  
Chalie Galliand, Alexander Kedrowitsch, Dianna Loucks - United States Military Academy at West Point

Session VI: Advanced Concepts III

**Safe Construction in Space: Using Swarms of Small Satellites for In-Space Manufacturing**  
Rahul Rughani, David Barnhart - University of Southern California

**Design and Prototyping of a Nanosatellite Laser Communications Terminal for the Cubesat Laser Infrared CrosslinK (CLICK) B/C Mission**  
Peter Grenfell, Paul Serra, Ondrej Čierny, William Kammerer, Joseph Kusters, Grant Gunnison, Cadence Payne, Kerri Cahoy - Massachusetts Institute of Technology
The First Solution to the Lost in Space Problem
Andrew Dahir - University of Colorado at Boulder; Scott Palo - Laboratory for Atmospheric and Space Physics; Daniel Kubitschek - University of Colorado at Boulder

Nanosatellite Tracking Using Passive Radar Retroreflectors
Daria Lane, Terry Albert, Austin Mroczek, Frederick Verd, Shawn Kocis - Naval Information Warfare Center Pacific

Wireless Bus Interconnects for Small Satellite Systems
Adam Fifth, Russel Trafford, Kenneth Wagner, Timothy Roche, Jake Matteo, Sangho Shin - Rowan University

Thermal Management for High Power Cubesats
Boris Yendler - YSPM LLC; Ashton Meginnis, Adam Reif - Pumpkin Inc.

Analysis and Design of a Sub-Optimal Mekf for Low Earth Orbit Attitude Estimation Using a Radically Inexpensive Mems Imu
Peter Jorgensen, Omar Awad, Robert Bishop - University of South Florida

Session VII: Instruments/Science II

ArgoMoon: Italian Cubesat Technology to Record the Maiden Flight of SLS Towards the Moon
Gabriele Mascetti, Simone Pirrotta, Edmondo ScorzaFava - Italian Space Agency; Valerio Di Tana, Simone Simonetti - Argotec

The NASA Cubesat Missions Flying on Artemis-1
Dawn McIntosh - NASA Ames Research Center; John Baker - Jet Propulsion Laboratory; Joe Matus - NASA Marshall Space Flight Center

On-Orbit Polymer Degradation Results from MakerSat-1: First Satellite Designed to be Additively Manufactured in Space
Stephen Parke, Connor Nogales, Benjamin Campbell, Mitch Kamstra, Braden Grim, Joshua Griffin - Northwest Nazarene University

CSAC Flight Experiment to Characterize On-Orbit Performance
Yashica Khatri, Aaron Aboaf, Daniel Dowd, Christopher Flood, Henry Dixon, Penina Axelrad - University of Colorado at Boulder

SmallSat Platform Development for Coast Guard Academy Collaborative Space-Based Research
Royce James, Richard Freeman, Lorraine Allen - US Coast Guard Academy; Erik Tejero - US Naval Research Laboratory; Brian Kay - US Air Force Institute of Technology; Jin Kang - US Naval Academy

Scintillation Observations and Response of The Ionosphere to Electrodynamics (SORTIE) Mission First Light
Erik Stromberg, Geoff Crowley, Irfan Azeem, Chad Fish, Crystal Frazier, Adam Reynolds, Anthony Swenson, Ted Tash - Atmospheric and Space Technology Research Associates, LLC
Kevin Pohl, Jonathan Black, Jonathan Pitt, Edward Colbert - Virginia Polytechnic Institute and State University

Session VIII: Communications

Antennas for Academic CubeSats: VHF thru S-Band, What, How and Why
Albert Lyerly, Peter Pachowicz - George Mason University

Nicholas Franconi - University of Pittsburgh; Munther Hassouneh, Jason Mitchell, Christopher Wilson - NASA Goddard Space Flight Center; Alan George, Sebastian Sabogal - University of Pittsburgh

Improvement of Communication System for 1U Cubesat
Makiko Kishimoto, Abhas Maskey, Tharindu Malmadayalage, Dulani Withanage, Pooja Lepcha, Yuta Kakimoto, Yuji Sasaki, Hari Shrestha - Kyushu Institute of Technology

Miniaturized Radio Transceiver for PocketQubes, Exceeding Performance of CubeSat Solutions
Casper Broekhuizen, Stefano Speretta, Michael van den Bos, Mehmet Uluda, Jasper Haenen, Alessandra Menicucci, Eberhard Gill - Delft University of Technology

Pointing Enhancement for an Optical Laser Downlink Using Automated Image Processing
Sebastian Wenzel, Steffen Gaisser, Sabine Klinkner, Christian Kley, Johannes Reinhart - University of Stuttgart Institute of Space Systems

Store and Forward CubeSat using LoRa Technology and Private LoRaWAN-Server
Marut Muangkham, Nuttawat Punpigul, Parinya Anantachaisilp, Mason Thammawichai - Navaminda Kasatriyadhiraj Royal Thai Air Force Academy

Experimental Evaluation of On-Board Contact-Graph Routing Solutions for Future Nano-Satellite Constellations
Blas Vega - Agencia Espacial del Paragua; Juan Fraire – The National University of Cordoba

A Dual-Band Circularly Polarized Printed Antenna for Deep Space CubeSat Communication
Muhammad Hossain - University of South Alabama; Mohammad Qudrat-e-Maula - Global Skyware; Saeed Latif, Edmund Spencer - University of South Alabama

Swifty Sessions

Swifty Session I

On Demand Vicarious Calibration for Analysis Ready Data - The FLARE Network
Christopher Durell, Brandon Russell - Labsphere, Inc.

Modular Array for Distribution and Integration of Energy - MADDIE
Chris Oesch, Chris Pearson, William Francis, Steven Isaacs, Becca Lidvall - ROCCOR LLC

**Designing a SmallSat to Withstand its Vibration Test**
Tom Sarafin, Poti Doukas, Mike Browning, Lenny Demchak - Instar Engineering and Consulting, Inc.

**HIVE: A Space Architecture Concept**
Henry Helvajian, Allison Taylor - The Aerospace Corporation

**Integrating the Cubesat Space Protocol into GSOC's Multi-Mission Environment**
Lukas Grillmayer, Saskia Arnold - German Aerospace Center DLR

**The Cloud Meets Ground Processing**
Matt Prechtel - AMERGINT Technologies, Inc.

**Geosynchronous Orbit CubeSat Operating Guidelines to Help the Space Situational Awareness Community**
Christopher Tamanini - Lockheed Martin Space Systems Company

**Small Satellite Trending & Reliability 2009-2018**
Kara O'Donnell, Gregory Richardson - The Aerospace Corporation

**Building a State-of-the-Art Small Launch Vehicle**
Stefan Brieschenk - Rocket Factory Augsburg

**From Craft to Industrial Standardization – the Commoditization of the Satellite Bus**
F.Brent Abbott - NanoAvionics

**Space Launch System Artemis I CubeSats: SmallSat Vanguards of Exploration, Science and Technology**
Kimberly Robinson, Renée Cox, Scott Spearing, David Hitt - NASA Space Launch System

**Hybrid Architecture Performance and Evaluation for Quantitative and Comparative Analysis**
Matthew Stein - MITRE; Kyle Kemble - US Air Force; Pete de Graaf, Sean Kinser, John Muhonen, Rob Roller - MITRE; Amanda Salmoiraghi, David Voss - US Air Force

**Mission Design for a Small Mars Lander**
Ryan Woolley - Jet Propulsion Laboratory

**Evolving NOAA's Geostationary Orbit Architecture**
Frank Gallagher, Vanessa Griffin, Pam Sullivan - National Oceanic and Atmospheric Administration; Ed Grigsby - NASA

**Choosing Your Best launch: A Guide to Current and Future Launch Solutions**
Philip Bracken - Spaceflight Inc (Washington)

**Lessons Learned from the First Build of Phase Four’s Maxwell Engine**
Michael Kwapisz, Grant Dunaway, M. Umair Siddiqui - Phase Four, Inc

**GaN-Based, Ultra-Compact Power Conversion System for the PUFFER Autonomous Mobility Platform**
Ansel Barchowsky, Ahmadreza Amirahmadi, Jessica Loveland, Autumn Lui, Jacqueline Rapinchuk, Louis Freitas, Chris Stell, Kalind Carpenter - Jet Propulsion Laboratory

**Lunar Node -1 Navigation Beacon Demonstrator**
Randall Montgomery, Evan Anzalone - NASA Marshall Space Flight Center

**NASA Short Talks**

**Participation Opportunities for Teams Using Third Party Launchers**
Elizabeth Hyde - NASA Ames Research Center

**How to Make Your ODAR Easy**
Yusef Johnson – NASA Kennedy Space Center

**Four-ish Minutes in the Life of a SPIM: How Space Launch System Secondary Payload Integration Managers Pave Payloads’ Way to Launch**
Courtney Ryals - NASA Marshall Space Flight Center

**Splashdown is Just the Beginning: The End of Artemis I is the Beginning for SLS CubeSats. Here’s a Look Ahead at the Years to Come**
Scott Spearing – NASA Marshall Space Flight Center

**Leaving No CAPSTONE Unturned: How a CubeSat Pathfinder Will Enable the Lunar Gateway Ecosystem**
Tom Gardner - Advanced Space, LLC

**Mission to the Moon: Supporting NASA’s CAPSTONE Mission to Lunar Orbit with Rocket Lab’s Electron Vehicle and Photon Satellite Platform**
Amanda Stiles - Rocket Lab

**NASA Flight Opportunities - A Stepping Stone to Orbit**
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