

PROGRAM

33rd ANNUAL AAS GUIDANCE & CONTROL CONFERENCE

February 5 to February 10, 2010

Breckenridge, Colorado

At the Beaver Run Conference Center

FRIDAY, FEBRUARY 5, 2010

Room check-in at the Beaver Run Resort front desk 4:00 PM daily.

Conference registration

Daily 6:00 to 10:00 AM and 4:00 to 6:00 PM

Wine and Cheese.....6:00 – 9:00 PM

SATURDAY FEBRUARY 6

Session I.....7:00-10:00 AM

SPACE DEBRIS

Recent space collision events can be categorized as a disruptive moment in the history of space flight: Cosmos 1934 and Cerise were critically damaged in the 1990s from debris impacts; the 2006 Chinese anti-satellite test nearly doubled the number of catalogued fragments from 4000 to 7000; and in 2008, Iridium 33 and Cosmos 2251 were completely destroyed after colliding. The consequences of growing debris cross all lines of the space sector, placing astronauts at increased risk, prompting costly collision avoidance maneuvers, reducing mission lifetimes, and degrading or even destroying missions. Incidents also cross political boundaries, straining international relationships and spurring a 10-fold increase in US DoD investment in space surveillance. This session addresses the challenges of mitigating, tracking and avoiding debris, both near-term strategies and long-term opportunities.

National Chairpersons

Nicholas Johnson, NASA Johnson Space Center, nicholas.l.johnson@nasa.gov, 281-483-5313

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Michael Osborne, Lockheed Martin Space Systems, michael.l.osborne@lmco.com, 303-977-5867

10-011	Orbital Debris: The Growing Threat to Space Operations, N.L. Johnson (NASA/JSC)
10-012	The Space Surveillance Network (SSN) and Orbital Debris, T. Payne, B. Morris (AFSPC)
10-013	Current and Near-Term Future Measurements of the Orbital Debris Environment at NASA, G. Stansbery (NASA/JSC)
10-014	An Overview of NASA's Orbital Debris Environment Model, M. Matney (NASA/JSC)
10-015	NASA's Orbital Debris Conjunction Assessment and Collision Avoidance Strategy, R. Gavin (NASA/JSC)
10-016	The Kessler Syndrome: Implications to Future Space Operations, D.J. Kessler, N.L. Johnson, J.C. Liou, M. Matney (NASA/JSC)
10-017	Sustainable Use of Space Through Orbital Debris Control, H. Klinkrad (ESA), N. L. Johnson (NASA/JSC)

Session II.....5:00-8:00 PM

TECHNICAL EXHIBITS

The Technical Exhibits Session is a unique opportunity to observe displays and demonstrations of state-of-the-art hardware, design and analysis tools, and services applicable

to advancement of guidance, navigation, and control technology. The latest commercial tools for GN&C simulations, analysis, and graphical displays are demonstrated in a hands-on, interactive environment, including lessons learned and undocumented features. Associated papers not presented in other sessions are also provided and can be discussed with the author. Come enjoy an excellent complimentary buffet and interact with the technical representatives and authors. This session takes place in a social setting and family members are welcome!

Organizers

Scott Francis, Lockheed Martin Space Systems, scott.francis@lmco.com, 303-977-8253

Kristen Terry, Lockheed Martin Space Systems, kristen.terry@lmco.com, 303-971-7450

Vanessa Baez, Lockheed Martin Space Systems, vanessa.baez@lmco.com, 303-971-6481

The following companies have already signed up to participate in the Technical Exhibits

a.i. solutions, inc.

Advanced Solutions, Inc

Astro- und Feinwerktechnik Adlershof GmbH

Ball Aerospace Corp

BEI Precision Systems and Space Company

EADS SODERN

Emergent Space Technologies, Inc.

Lockheed Martin Space Systems Company

The Mathworks, Inc

Monarch High School Robotics Club

NAVSYS Corporation

Rockwell Collins

SELEX Galileo

Servo Corporation of America

Sierra Nevada Corporation

SimuLogix

Surrey Satellite Technology US LLC

SUNDAY FEBRUARY 7

Session III.....7:00-10:00 AM

ADVANCES IN GN&C PART 1 – SYSTEMS

Many programs depend on heritage, but the future is advanced by those willing to design and implement new and novel architectures, technologies, and algorithms to solve GN&C problems. This session is open to papers with topics ranging from theoretical formulations to innovative systems and intelligent sensors that will advance the state of the art, reduce the cost of applications, and speed the convergence to hardware, numerical, or design trade solutions.

National Chairperson

Bryan Dorland, U.S. Naval Observatory,
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 Thomas Strikwerda, Johns Hopkins Applied
 Physics Laboratory, tom.strikwerda@jhuapl.edu,
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Kyle Miller, Ball Aerospace & Technologies
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 Chris Randall, Ball Aerospace & Technologies
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10-031	JMAPS Instrument Fine Attitude Determination Approach, T. Lim (US Naval Research Laboratory)
10-032	Demonstration of an Aerocapture GN&C System Through Hardware-in-the-Loop Simulations, J. Masciarelli (Ball)
10-033	NigeriaSat-2: Advances in GN&C that enable a High Performance Small Satellite Earth Observation Mission, A. Carrel (Surrey Satellite Technology Ltd)
10-034	Stationkeeping for an Occulter-Based Exoplanetary Imaging System, D. Sirbu (Princeton University)

10-035	Automated Real-Time Targeting and Guidance (ARTGUID) for Lunar Decent and Precision Landing, B. Barbee (Emergent Space Technologies)
10-036	Trade Study on GNC Solutions for Pointing and Tracking System, S. Lim (The Charles Stark Draper Laboratory)
10-037	Formation Flying System in the Proba-3 Mission, J. Peyrard (GMV)
10-038	Preparing the GPS-Experiment for the SMALLGEO Mission, P. Zentgraf (ESA)

Session IV.....2:00-5:00 PM

ADVANCES IN GN&C PART 2 – HARDWARE

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10-041	Use of JMAPS Instrument as a High Accuracy ADCS Fine Guidance Sensor, B. Dorland (United States Naval Observatory)
10-042	Solar Probe Plus: Impact of Light Scattering by Solar System Dust on Star Tracker Performance, T. Strikwerda (Johns Hopkins University/Applied Physics Laboratory)
10-043	Shifting the Inertial Navigation Paradigm with MEMS Technology, T. Crain (NASA-JSC)

10-044	Fine Pointing Aspects of the Kepler ADCS, D. Putnam (Ball)
10-045	Active Pixel Sensor Technology Successfully Space Qualified for the Autonomous Star Tracker Astro APS, U. Schmidt (Jena-Optronik GMBH)
10-046	On-Bround and in Flight Qualification of the Alphabus Platform APS based Star Tracker, F. Boldrini (SELEX Galileo)
10-047	Multiple Heads Management and Validation in HYDRA Star Tracker, B. Gelin (EADS-Sodden)
10-048	Sensors for 1001 Nights, J. Leijtens (TNO Science and Industry)

MONDAY FEBRUARY 8

Session V.....7:00-10:00 AM

PRECISE ORBITAL DETERMINATION

Orbit determination is accomplished with a wide variety of methods, varying from ground ranging, to GPS measurements, to DSN observations and landmark navigation around other planetary bodies. Similarly, the methods for control vary widely, ranging from systems that perform maneuvers which are entirely planned on the ground and uploaded to the vehicle to missions that require time critical, real time onboard estimation and maneuver planning to meet mission objectives. This session is intended to discuss the challenges associated with precision orbit determination and control for space vehicles, ranging from Earth orbiting missions that require precise orbit knowledge to Constellation programs and deep space missions that have real time orbit determination and control requirements.

National Chairpersons

Tim Crain, NASA Johnson Space Center,
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10-051	Evaluation of Linked, Autonomous, Interplanetary Satellite Orbit Navigation (LiAISON) in Sun-Earth Lagrange Regime Using Herschel & Plank Ephemeris Data, B. Cheetham, E. Villalba, K. Davis, G. Born (University of Colorado at Boulder)
10-052	Crater Identification Algorithm for the Lost in Low Lunar Orbit Scenario, C. Hanak, T. Crain (JSC)
10-053	Formation Flying for Planet Searches with an External Occulter, R. Linfield, S. Lipsy (Ball)
10-054	Validation of IAU2000A/IAU2006 Frame Transformation Implementations, L. Barker and A. Dorsey (LMSSC)
10-055	ORION Optical Navigation for Loss of Communications Lunar Return Contingencies, J. Getchius, D. Kubitschek (Jacobs, LMSSC)
10-056	Near Real Time GPS Orbit Determination: Strategies, Performance, and Applications to OSTM/Jason-2, J. Weiss, W. Bertiger, S. D. Desai, B. J. Haines, N. Harvey, C. M. Lane (JPL)
10-057	A Vision-Based Navigation Algorithm for Pin-Point Landing V. S. Bilodeau, S. Clerc, J. de Lafontaine, R. Draï (Université de Sherbrooke, Thales Alenia Space France, NGC Aerospace Ltd., ESA)

Session VI.....4:00-6:00 PM

Robotic Lunar Exploration

Robotic exploration of the moon has experienced a resurgence in the past few years. From recent international missions to the Google Lunar X Prize competition – teams from a wide variety of backgrounds are designing new ways to deal with the GN&C challenges of lunar exploration. This session will focus on GN&C solutions, performance, mission design, and lessons learned from both recent and upcoming missions to the moon.

National Chairpersons

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Zach Wilson, Lockheed Martin Space Systems,
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10-061	Taking The Next Giant Leap, B. Cohanim, M. Joyce, T. Mosher, S. Tuohy, P. Cunio, (Draper Laboratory)
10-062	Guidance, Navigation & Control Challenges For Team Omega Envoy's GLXP Mission Design, J. Dunn, (Earthrise Space Inc.)
10-063	Challenges Of Control And Guidance Of Chandrayaan-1, T.K.Alex (ISRO)
10-064	Kaguya AOCs Evaluation Results On Lunar Orbit, S. Matsumoto, H. Maejima, (Japan Aerospace Exploration Agency), K. Ogo, Y. Iwamoto, Y. Iwayama, K. Tanaka, T. Kawamura (NEC TOSHIBA Space Systems, Ltd), S. Ikegami, S. Ichikawa, A. Sasaki (NEC Corp)

10-065	NEXT Lunar Lander: Descent & Landing GNC Analysis, Design And Simulations, D. Neveu, J.F. Hamel, J. De Lafontaine (NGC), J. Christy (Thales Alenia Space)
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BANQUET ACTIVITIES

SOCIAL HOUR.....6-7 PM

DINNER.....7-9 PM

DINNER SPEAKER.....8-9 PM

Berrien Moore III
Executive Director
Climate Central
Princeton, NJ

TUESDAY FEBRUARY 9

Session VII.....7:00-10:00 AM

ALTIMETRY

Satellite-based-altimetry is one of the key methods of global and local environmental monitoring such as ocean topography (hence currents), lakes/river elevations and land ice thickness. This session will highlight demands placed on GN&C systems to support these unique missions, including precision orbit determination, timing, and pointing controls.

National Chairpersons

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Local Chairpersons

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Bill Frazier, Ball Aerospace & Technologies Corp.,
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10-071	Guidance and Control Requirements for Current Altimeter Missions, N Picot (CNES), J. Lambin, S.Desai (JPL) W. Emery (University of Colorado)
10-072	Modern Radar Altimetry Challenges to Precise Orbit Determination, F. Lemoine, L. Cerri (NASA/GSFC), N. Zelensky, J. Ries (University. of Texas), W. Bertiger , (NASA /JPL)
10-073	Near Real-Time Precision Orbit Determination for OSTM, and Impact on NRT Sea Surface Height., S. Desai (NASA/JPL)
10-074	A New Tracking Mode for Altimeters Using a Digital Elevation Model, J. Desjonqueres, N Picot (CNES)
10-075	ICESat Precision Orbit Determination, B. E. Schutz, H.-J. Rim, S. Yoon (University. of Texas)
10-076	Low-latency POD for Operational Altimetry Missions, B. Schutz (University. of Texas), S, Mitchell, B. Frazier (Ball)
10-077	CryoSat-2: an Unusual Way to Specify a Mission, R. Francis (ESA/ESTEC)

Session VIII.....4:00-7:00 PM

RECENT EXPERIENCES

Lessons learned through experience prove most valuable when shared with others in the G&C community. This session, which is a traditional part of the conference, provides a forum for candid sharing of insights gained through successes and failures. Past conferences have shown this session to be most interesting and informative.

National Chairpersons

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10-081	GOCE Mission: Design Phases and In-flight Experiences, A. Anselmi, A. Allasio, S. Cesare, G. Catastini, M. Dumontel, M. Saponara, G. Sechi, A. Tramutola, B. Vinai (Thales Alenia Space), G. Andre, M. Fehringer, D. Muzi (ESA/ESTEC)
10-082	In Orbit Experience – LEOP & Commissioning of the Attitude and Orbit Control of Planck, D. Zorita, A. Agenjo, S. Lorente (SENER), G. Chlewicki, A. Cocito (Thales Alenia Space), S. Thuerey, C. Watson, A. McDonald, M. Mueck, J. deBruin (ESA)
10-083	Life in L2 – Herschel Attitude and Orbit Control, Early In-orbit Experience, J.J.A. Oort (Dutch Space), M. Palomba (ESA), D. Procopis (Selex Gallileo), D.Dungate, M. Pigg (Tessella), A. Bacchetta, Y. Roche (Thales Alenia Space), M. Tuttlebee (ESOC)
10-084	Design Experiences and Flight Test Results from NASA's Max Launch Abort System (MLAS): A Flight Mechanics Perspective, N. Dennehey, D. Ychnovicz (NASA/LaRC), J. Lani, P. Ward C. Shreves (NASA/WFF)
10-085	Launch and Commissioning of the Lunar Reconnaissance Orbiter (LRO), N. Shah, P. Calhoun, J.R. Chen, G. Cruz-Ortiz, J. Garrick, O. Hsu, J. Simpson (NASA/GSFC)
10-086	Flight Results from the HST SM4 Relative Navigation Sensor System, J. Van Eepoel, B. Naasz, S. Queen (NASA/GSFC)

10-087	Straight on til Morning: G&C Flight Experience from the Dawn Spacecraft, T. Vanelli, B. Smith, E. Swenka, S. Collins (NASA/JPL)
10-088	Kepler Overview and Early Mission Experiences, C. Schira, D. Putnam (Ball)

WEDNESDAY FEBRUARY 10

Session IX.....7:00-10:00 AM

**OPERATIONAL RESPONSIVE SPACE
GN&C (US ONLY)**

High reliability national space systems are plagued by extremely long development and build schedules, yet the warfighter needs for new and modified space assets may develop in weeks and months. The Operationally Responsive Space office has recognized the need for the short-term injection of capability and has begun to answer the needs of the warfighter through short-turnaround mission implementation and modification of existing assets tasked to satisfy urgent military needs. This session focuses on the technical and programmatic challenges associated with flexible GNC design for responsive mission deployment and existing system modifications.

National Chairpersons

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10-091	Open Questions and Other Thoughts on Responsive Space Guidance, Navigation and Control , A. Fosbury (AFRL)
10-092	Onboard Inertia Estimation and Adaptive Compensation for Large-Scale Actuator Misalignments in Responsive Space Systems , T. Mercker, M. Akella (University of Texas, Austin)
10-093	Guidance Navigation and Control Challenges Associated with ORS Utilization of Earth-Moon Lagrange Orbits , B. Cheetham (University of Colorado, Boulder)

10-094	Minitature Momentum Control System: A Small Control Moment Gyroscope System that Enables Agile Responsive Space Satellites , M. McMickell (Honeywell)
10-095	Precise Torque Mapping for Pico-Satellite Single-Gimbal Control Moment Gyroscopes , F. Leve (University of Florida)
10-096	Self-Calibration and Self-Alignment for Spacecraft GN&C Components and Payloads , K. Kolcio (Microcosm)
10-097	STP-SIV Attitude Determination and Control , K. Reese (AFRL), B. Marotta (Ball)

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