

## Engineer Who Attempted to Halt Launch of the Challenger Shuttle Dies

by Wendy O'Dea  
March 28, 2016

Thirty years ago Bob Ebeling, an engineer at NASA contractor Morton Thiokol, raised a red flag about the potential disaster facing the launch of the Challenger space shuttle. Ebeling and four fellow engineers at Thiokol suspected that rubber O-rings used to seal fuel in the booster would fail in the unseasonably cold Florida weather in January 1986.

Thiokol had a contract to build solid rocket boosters for the shuttle program and Ebeling was providing data to the team in the days and hours leading up to the launch. Despite passionate arguments by Ebeling and other engineers against launching in extreme cold conditions, NASA leaders overruled them and decided to move forward with the launch. At 11:39 a.m. on January 28 the Challenger exploded, killing all seven crew members on board.

A dramatic video reenactment (see below) of the hours

leading up to the launch is now used in the Learning the Business of Aerospace class to reinforce the importance of speaking truth to power, and highlights the importance of having the integrity to act on one's convictions.

A recent interview with National Public Radio details the ongoing anguish Ebeling felt for not being able to stop the launch. However, an outpouring of support from the public following the broadcast brought Ebeling some peace, according to his daughter, before he died last week at age 89.

[Video Removed]



The maiden flight of the space shuttle Challenger lifts off on April 4, 1983. It was the sixth space shuttle mission. (Photo: NASA)



Robert Ebeling

# Awards and Recognitions – March 2016

by Gail Kellner  
March 23, 2016

Aerospace employees frequently earn recognition for their professional accomplishments. This Orbiter feature will acknowledge those honors and awards, including the publication of books. To nominate someone for consideration in this section, send details of the award in a timely fashion to [orbiter@aero.org](mailto:orbiter@aero.org), or contact Gail Kellner at [gail.d.kellner@aero.org](mailto:gail.d.kellner@aero.org).

## Dr. William Ailor

Dr. William Ailor, Aerospace Fellow, Vehicle Systems Division, is the recipient of the 2016 International Association for the Advancement of Space Safety (IAASS) Jerome Lederer Space Safety Pioneer Award. The award honors distinguished individuals who have made original and lasting contributions in the field of space safety. Ailor will accept the award at the Eighth IAASS conference gala dinner on May 19 in Melbourne, FL.



In a separate recognition, Ailor was also chosen as a Legend for The Affinity Group's Legends in Our Time event this spring. The organization is a support group of the Volunteer Center of the South Bay, and the annual event supports Operation Teddy Bear and other services for underserved children and their families.

## Kaushik Shah

Kaushik Shah, associate systems director, OPS Transition and Sustainment, Environmental Systems Directorate in Vaeros, was recently presented with the 2015 NOAA National Environmental Satellite, Data, and Information Services Team of the Year Award. He was selected for his oversight in the systems engineering support for the NOAA Jason Ground System helping to successfully integrate security and architecture into the system.

Shah is a NOAA and Environmental Intelligence team member supporting NOAA Satellite Operations Facility activities in Suitland, MD.

## Beau Backus and David Lubar

Beau Backus, senior project leader, and David Lubar, senior project engineer, both of the Systems Development OPS and Protection Directorate in Vaeros, jointly authored a paper with Dr. Paolo de Mattheis from NASA Goddard entitled, "Impacts to Remote Sensing and Direct Broadcast from Radio Spectrum Sharing."

The paper was recently presented at the American Meteorological Society New Generation Operational Environmental Satellite Systems session.

According to the authors, hydrological and meteorological end users may not realize that domestic and international proposals for spectrum reallocation have the potential to impact the products that these users depend upon.

# Austin Announces New Leaders, Innovation Award Winners

by Lindsay Chaney  
March 16, 2016

In her mid-year CEO's Report to Employees, delivered from the Aerospace Chantilly campus, Dr. Wanda Austin announced a new member of the board of trustees and a new corporate officer; announced the winner of the Aerospace Innovation Award; recapped launch activity for the quarter; and provided an update on Vaeros projects.

The new board member is the Honorable Heidi Shyu, who most recently served as the assistant secretary of the Army for Acquisition, Logistics, and Technology from September 2012 to January 2016. In that position, Shyu served as the Army's senior procurement executive, science advisor to the secretary of the Army, and the Army's senior research and development official. She had principal responsibility for all Department of the Army matters related to logistics and managed a workforce of 42,000 acquisition employees. Earlier, she held technical leadership jobs at Hughes, Litton Industries, and Raytheon.



Dr. Wanda Austin delivers the mid-year CEO's Report to Employees on Tuesday, March 15, from Chantilly. (Photo: Kelly Hart)

Retired Air Force Maj. Gen. Edward Bolton Jr. will join Aerospace on April 4 as senior vice president, Special Studies. On July 1, he will become senior vice president of Systems Planning, Engineering, and Quality, replacing Rand Fisher, who will retire on that day.

Bolton retired from the Air Force in 2013 after 30 years of service. He then joined NextGen at the Federal Aviation Administration. NextGen is responsible for leading the modernization of the national airspace system. Bolton led a federal workforce of more than 900 employees, and managed a \$1 billion annual budget.

Austin reported on two launches during the quarter for which Aerospace was accountable. The first, on Feb. 5, was the GPS IIF-12 that was launched aboard an Atlas V from Cape Canaveral. It was the final satellite in the GPS Block IIF series, all of which Aerospace supported. Just five days later, Aerospace supported the launch of a national security spacecraft from Vandenberg Air Force Base.

Austin noted that there are still six more launches scheduled during the fiscal year, which runs until Oct. 1.

Commenting that the new entrant launch business is extremely busy, Austin said Aerospace is assisting the Air Force with the first competitive selection of launch services for national security missions in more than 15 years. The GPS III-2 will be the first of nine competitive launch service contracts. Aerospace also has been or is involved in the certification process for new rockets from SpaceX, United Launch Alliance, and Orbital ATK.

Among highlights of Vaeros work during the quarter, Aerospace began its third consecutive contract with the U.S. Geological Survey in December. Most of this work is focused on the Landsat program in Sioux Falls, S.D., and Reston, Va., and involves systems engineering and analyses as well as flight operations support.

Another Vaeros project was an independent assessment for NASA of the feasibility of sending astronauts to Mars in the near future. The results of the assessment, presented in January, concluded that a human flyby mission to Mars is technically possible, but carries very high mission-execution and crew risk. In order to meet a 2021-2022 deadline that many people are proposing, the government would have to greatly increase funding for both a space system and a crew habitation system, Aerospace concluded.

Vaeros is also involved in projects for the Canadian and Japanese governments and a project to support a process for evaluating new investment opportunities within the commercial space community that could benefit U.S. intelligence community missions.

The winner of the Aerospace Innovation Award, chosen from among 10 nominations, is the QuickDart team. The team

developed a space debris analysis and visualization capability that is more accurate, provides better visualization, and runs faster than previous tools. Team members are: Jeffrey Cummings, engineering specialist, Performance Modeling and Analysis Department, Systems Engineering Division; Brian Hansen, engineering specialist, Mission Analysis and Operations Department, SED; Dr. Felix Hoots, Aerospace Fellow, SED; Ryan McKennon-Kelly, project engineer, GEOINT Innovations, National Systems Group; and David Stodden, senior project leader, Engineering Applications Department, Computers and Software Division.

Turning to the subject of communications, Austin said there has been a significant increase in positive media coverage of the corporation during 2015, much of it associated with technical excellence.

“That makes me incredibly proud because our technical excellence is the foundation upon which all of our work is built,” Austin said. “The more aware people are of our technical capabilities, the more likely they are to seek our expertise and support our mission.”

She called particular attention to outside media coverage during the past quarter about Aerospace’s counter-drone technology that has been featured in articles by Bloomberg Business News and Aviation Week, among other media outlets.

She also noted that although communications is a serious part of the company’s business, it can also be fun. She thanked everyone who participated in the Orbiter’s math and poetry challenge in honor of Engineer’s Week last month and gave a shout-out to Dr. Michael Forney, reading his winning haiku submission:

Engineers wrangle  
Theory and reality  
To make both ends meet

Three questions were submitted to the “Ask the CEO” email before the CEO’s Report to Employees. Following are the questions and answers, edited somewhat for space and conciseness.

Question: The “Aerospace Employees’ Retirement Plan for Participants in the New Combined Retirement Program – AERP 2” shows a simulated model of what our total retirement benefit will look like given very generous assumptions such as a 4% annual wage increase every year over 25 years. Given Aerospace’s philosophy of much lower raise percentages and lump sums, please provide a more realistic model of what the total retirement benefit will be taking into account lump sums and much lower raise percentages.

Answer: All employees can model their retirement benefits through the retirement planning website at <https://www.aeroretirement.com>. In the modeler, the salary assumption can be set at any level.

Question: All of a sudden many (not all) program offices have been telling us in ETG that they are experiencing serious budget cuts. This affects us disproportionately as we are more “optional” than their own staff. What is going on? Will there be layoffs?

Answer: The demand from our customers continues to be strong and is consistent with the level of support that was requested last year. We expect to deliver 2,266 STE, which is 21 STE lower and within 1% of what we delivered last year. That small decrease is mostly due to a change in demand by the NRO, which also largely accounts for the program office budget cuts. The corporate plan for FY16 is to continue hiring to meet existing customer demands and to fill strategic positions. Our goal for FY16 is a net increase of 100 MTS. As we continue to progress through the year, we will be closely monitoring the use of Extended Work Week, casuals, and consultants to ensure that we do not exceed any of our STE ceilings. There are no corporate plans for a layoff or reduction in force.

Question: In recent years, there seems to have been a lessening of the attention paid to our corporate value of “commitment to our people,” in favor of increased attention on two others, “dedication to mission success” and “technical excellence.” Our focus seems to be much more on new business, and new buildings and facilities, at the cost of personnel morale and pay increases. Staff seems not to be valued for their talents and contributions as they once were. Can you comment?

Answer: The Aerospace leadership team and managers continue to be committed to all the corporate values. Everyone is very well aware that our success cannot be achieved without the dedicated efforts of all employees and our people are valued as our greatest asset. The most important thing we can do to support employees is to ensure and protect our ability to continue to operate the FFRDC, which is our major contract. At the same time we have been able to create state of the art facilities and update our computers and technical tools so that our employees have excellent working conditions. We also have emphasized our commitment to maintaining a safe and inclusive work environment free of harassment. We continue to support employee professional development through our training programs and by providing support for continuing education. Finally, if you review the Orbiter you will see a significant number of AEA activities to encourage work-life balance. Employee suggestions for additional efforts are always welcomed.

**View the entire CEO’s Report to Employees below.**

[Video Removed]

# Aerospace and Smithsonian Honor Clintons

by Matthew Kivel  
March 11, 2016

“The way to right wrongs is to turn the light of truth upon them.”

– Ida B. Wells-Barnett

Civil rights pioneer Ida B. Wells-Barnett was born into slavery in the 1800s and spent her entire adult life working to improve conditions for women and African Americans in the United States. She was fearless and principled in her beliefs and dedicated herself to the pursuit of truth, justice, and equality at a time when uncompromising actions of social progress were often met with violence and intolerance. The above quotation from Mrs. Wells-Barnett is emblazoned on a wall inside the Smithsonian Institution’s soon-to-be-opened National Museum of African American History and Culture (NMAAHC) in Washington D.C.

On the evening of March 9, her words were also quoted by Aerospace President and CEO Dr. Wanda Austin at a special event held at the Smithsonian National Museum of American History — located just across the street from the construction site of the NMAAHC.

The event celebrated and honored Aerospace’s Senior Vice President and General Counsel Malissia Clinton and her family, who, in February of 2015, were the recipients of an unprovoked and possibly racially motivated attack on their Manhattan Beach home.

In the months following the incident at the Clinton home, Aerospace established a fund that collected donations from employees and community members in support of the NMAAHC in the name of the Clinton family. The concept was to take a negative action and transform it into a philanthropic gift that could benefit future generations through the promotion of a relevant and important cause — the NMAAHC. The March 9 event served both to bring together those closest to the Clintons and to solidify the connection between Aerospace and the NMAAHC, which will continue to partner together in the years ahead.

As the sun set on an unseasonably warm day in Washington D.C., the African American history wing of the National Museum of American History filled with Aerospace employees, Smithsonian employees, friends, and supporters. Cocktails and a buffet of gourmet Southern cuisine were served as guests strolled around the hall and took in the exhibits and installations.

The event opened with a short film about the Clinton family, which chronicled the attack on their home and the subsequent response of their community members and local authorities. After the film concluded, Austin took to the podium and spoke about Aerospace’s efforts to support the Clintons and commended each of the family members for their bravery and resilience in the face of tremendous adversity.

Ambassador Barbara Barrett, chairman of the Aerospace board of trustees, followed Austin’s remarks by emphasizing the historical connections between significant events and artifacts in American history — touching upon both points of pride and points of shame. “Tonight, here in the National Museum of American History, we are surrounded by artifacts of our past,” said Barrett. “Two pieces of Plymouth Rock are here. The star spangled banner is here ... yet within these walls there is another part of our history memorialized as well. When I look at the Woolworth’s lunch counter from Greensboro, North Carolina ... I am reminded of the courageous men and women who, daring greatly, stood up for what is right.”

Barrett went on to praise the Clinton family for their success and their contributions to society. At the end of her speech, the



Ambassador Barbara Barrett, chairman of the Aerospace board of trustees, addresses the Smithsonian event audience. (Photo: Michael Barnes)



Aerospace leaders and family members in front of the National Museum of African American History and Culture under construction. (Photo: Michael Barnes)

members of the crowd rose to their feet and emotionally applauded the Clintons.

Following Barrett, Beverly Morgan-Welch of the NMAAHC delivered a speech rich with historical anecdotes and intellectual insight. Afterward, each member of the Clinton family expressed gratitude for the solace found in the supportive actions of the community.

Malissia Clinton closed the event with a moving speech that recounted significant events from her family history, the lessons she learned from the attack, and the incredible pride and graciousness she feels toward her coworkers, community members, and friends.

## Austin Speaks at Applied Physics Laboratory

March 02, 2016

Dr. Wanda Austin, Aerospace president and CEO, was the featured speaker at a Johns Hopkins University Applied Physics Laboratory (JHU/APL) Colloquium Lecture on Feb. 19. Her speech was titled "Diversity and STEM – Building a More Inclusive Future."

Her visit started with a breakfast attended by a select group of JHU/APL staff, including the leadership of the African-American Culture Club and senior leaders, followed by her speech and a question-and-answer session.

Austin discussed the challenges the nation faces in regard to science, technology, engineering, and math (STEM) education, explained how space can inspire new interest in STEM, and gave some practical ways that audience members could promote STEM.

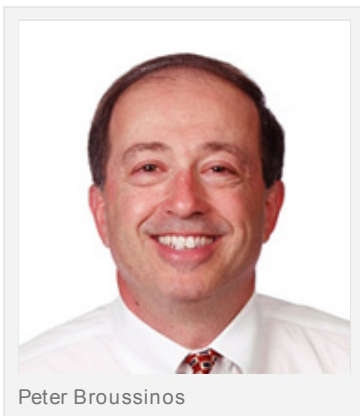
During her visit, Austin enjoyed a tour of Central Spark, a new innovation center that allows JHU/APL staff to design, build, learn, and share their knowledge. She was also afforded the opportunity to see a model of the New Horizons spacecraft that briefly visited the Pluto system last summer.



Applied Physics Laboratory Director Ralph Semmel shows Wanda Austin a model of the New Horizons spacecraft during her visit. (Photo courtesy JHU/APL)

## Broussinos Principal Engineer in Launch

March 09, 2016



Peter Broussinos

Peter Broussinos has been promoted to principal engineer for Launch Acquisition within the Launch Systems Division, Space Launch Operations.

In his new role, Broussinos is leading Aerospace acquisition support activities in a new competitive environment for Evolved Expendable Launch Vehicle (EELV) launch services. With new entrant launch service providers such as SpaceX planning to compete to provide launch services for National Security Space missions, the Launch Systems Division will provide continued focus on mission success in a recurring competitive environment.

Moreover, new and evolving launch systems will be coming online over the next several years, and Aerospace will work with the Space and Missile Systems Center's Launch Enterprise Directorate to ensure these new systems will meet all national security space mission requirements. Broussinos will have a significant role in the development of these new launch systems and in the competitive acquisition of launch services.

Previously, Broussinos was systems director for the EELV Mission Management Department. This team has supported Air

Force and National Reconnaissance Office mission integration efforts resulting in 100 percent mission success for every EELV launch in that period, many of them first flights.

Broussinos has a bachelor of science in mechanical and environmental engineering from UC Santa Barbara, and a master of science in mechanical engineering from UC Berkeley.

## Mirrors Help Drone Accurately Measure Airborne Particles

by Kimberly Locke  
March 07, 2016

While unmanned aerial vehicles (UAVs), more commonly known as drones, have gained widespread attention in recent years, the use of mirrors on these flying vehicles is not so commonplace.

However, a new drone developed by an Aerospace team led by Dr. Steven Beck, a member of the Electronics and Photonics Lab, Engineering and Technology Group, uses strategically mounted mirrors and Global Positioning System (GPS) receivers to assist with guiding a laser beam to a designated target in the detection and tracking of airborne chemicals.

These chemicals can range from warfare agents and explosive device precursors to greenhouse gases, industrial airborne effluents, and rocket plumes.

Traditional laser remote detection systems fire lasers through airborne chemicals of interest and measure the laser light reflected off a naturally occurring obstacle such as a cloud or distant mountain. But, as Beck points out, these traditional systems are limited because scientists cannot control the location or reflectivity of a cloud or any other naturally occurring reflector.

The Aerospace team's innovative chemical detection and tracking system, known as TADA or the Tracking Atmospheric Differential Absorption system, also relies on laser-based differential absorption, a remote sensing technology that identifies and measures airborne chemicals by passing laser beams from a transmitter through the air, where they are reflected off of a mirror and then travel back to the transmitter.

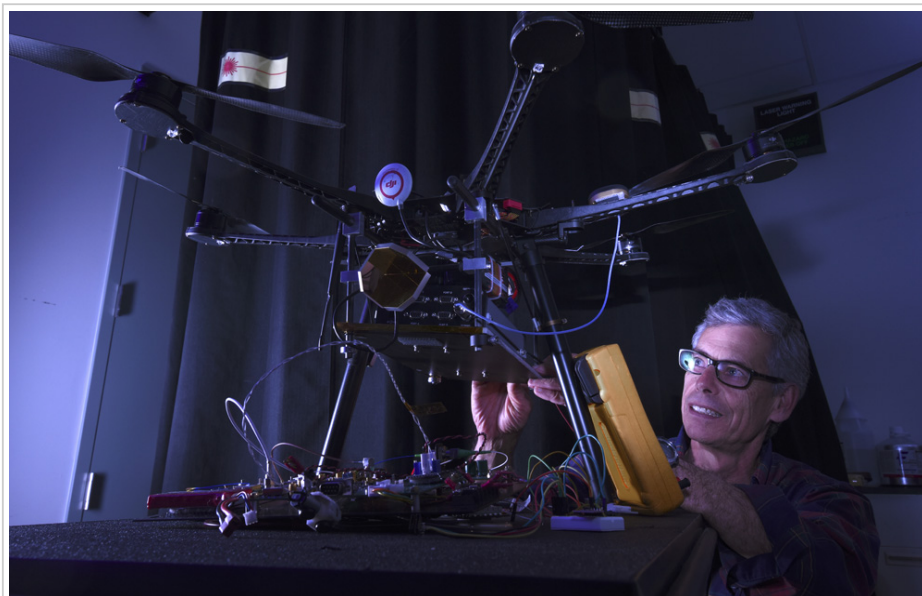
According to Beck, analyzing the intensity of the return laser light as the frequency of the laser is tuned across a molecular absorption feature allows the identity and concentration of trace chemicals in the laser path to be measured.

"The innovative aspect of the Aerospace system is that the retro-reflecting mirror is mounted onto a UAV, allowing the mirror and subsequently the measurement path, to be continuously repositioned," explains Beck. "The laser transmitter must then track the UAV in order to hit the mirror and receive a signal.

"This is a breakthrough approach that gives us the ability to much more accurately measure, and therefore assess, the level of a particular airborne agent," said Beck. "It allows us, for example, to measure and even map elevated targets, such as smoke stack plumes, from the ground. By putting a differential GPS unit on the drone and continuously relaying that position back to the ground-based laser transmitter, we have the ability to point the laser to within one inch of the flying target, and hit the retro-reflecting mirror."

Working in tandem with the GPS unit is a real time kinematic (RTK) system to enhance the precision of positioning data derived from the GPS. The same type of RTK systems are used for precision farming to help guide farmers in planting crops and setting up irrigation systems.

The concept was patented by Aerospace about a year ago and has broad application. Ultimately, Beck anticipates that this system will be used for such purposes as seeking out gas leaks from fracking fields and testing chemical agents in the battlefield. The project is funded under an independent research and development contract by the corporation's Research and Program Development Office headed by Dr. Randy Villahermosa.



Dr. Steven Beck with the Aerospace TADA mirrored drone. (Photo: Eric Hamburg)



The Tracking Atmospheric Differential Absorption system drone.  
(Photo: Eric Hamburg)

This highly discriminating system enables multi-dimensional mapping of trace levels of airborne chemical types even in less-than-optimal conditions, Beck said. This groundbreaking approach dramatically improves current capabilities in the tracking of a variety of tiny airborne chemical compounds for an assortment of applications. Using the agility of UAVs to perform chemical monitoring also allows the development of more sophisticated mapping and imaging schemes.

“This airborne particle detection method really affords us the opportunity to target vapors with unparalleled accuracy,” said Beck. “Before incorporating mirrors on the drone, we could achieve only a modicum of accuracy when it came to measuring the degree of a particular airborne species as identified with the laser,” he added.

## March 2016 Obituaries

by Elaine Young  
March 01, 2016

Sincere sympathy is extended to the families of:

Robert Durant, member of administration staff, hired June 1, 1961, retired Dec. 1, 1993, died Aug. 19, 2015.

William Heller, member of technical staff, hired Dec. 1, 1960, retired Feb. 1, 1995, died Dec. 4, 2015.

Lee Rosen, member of technical staff, hired May 14, 1979, retired Sept. 1, 2015, died Oct. 22, 2015.

Thomas Sherman, stockkeeper, hired Dec. 16, 1969, retired Sept. 1, 1996, died Jan. 15, 2016.

## March 2016 Anniversaries

by Elaine Young  
March 01, 2016

### 55 YEARS

Space Systems Group

Rosemary Ray

### 35 YEARS

Engineering and Technology Group

Daryl Kim

Operations and Support Group

Irving Jones

### 30 YEARS

Engineering and Technology Group

Kirk Crawford, Todd Nygren

National Systems Group

Donald Love



## 25 YEARS

Engineering and Technology Group

Val Vaughn

## 20 YEARS

Engineering and Technology Group

Margot Wasz

National Systems Group

Harry Tucker

Operations and Support Group

Genina Day

Space Systems Group

Cynthia Carranza

## 15 YEARS

Engineering and Technology Group

Charles Wright, Herand Bedrossian

Enterprise Information Services

Cynthia Sabarudin

Operations and Support Group

Emily Devlin, Gabriel Spera

Space Systems Group

Alexander Polack, John Philip, Paul Su, Russell Thornton

Systems Planning, Engineering, and Quality

Sabrina Herrin

## 10 YEARS

Engineering and Technology Group

Brian Wood, James Helt, Ming-Shin Wu

Enterprise Information Services

Douglas Fitzpatrick, Janelle Hu

Space Systems Group

Douglas Becker, Joel Fink, Steven Schiff

## 5 YEARS

Engineering and Technology Group

Benjamin Wright, Betty Kwan, Michael Owens, Vanessa Oklejas, Wendy Golden

Enterprise Information Services

Lianghsiung Wang

National Systems Group

Christopher Florentine, Regina Joslin

Operations and Support Group

Gary North

Space Systems Group

Emi Lin, Frances Salafia, Henry Chang, Rosie Duenas, Shirley Gillim