

January 2015 - A Quarterly Publication

Ames' involvement in the SpaceX-5 resupply launch

NASA Ames launched four life science experiments to the International Space Station aboard NASA's fifth commercial cargo resupply flight of the SpaceX Dragon spacecraft Jan. 10, 2015. The research missions include validation of a new capability for model organism study in space, an infection process investigation in the unique conditions of space, the first step in a multi-part study to track microbes on the space station and an examination of immune system changes that curiously happen in both elderly people and people exposed to spaceflight.

This launch delivered more than 5,000 pounds of supplies and scientific experiments, including:

Fruit Fly Lab-01: This validation flight of the Ames-led Fruit Fly Lab provides a research platform aboard the International Space Station for long-duration fruit fly (*Drosophila melanogaster*) experiments in space. Such experiments will examine how microgravity and other aspects of space affect fruit flies, providing information relevant to long-term human

spaceflight, in particular for FFL-01, the response to infection. The lab will be open to principal investigators on the first full science mission, FFL-02,

scheduled for late 2015.

Micro-5: This investigation studies how microgravity alters the infection

continued on page 12



NASA photo

A SpaceX Dragon spacecraft on a Falcon 9 rocket launched (above) from Space Launch Complex 40 at Cape Canaveral Air Force Station in Florida, Jan. 10, 2015. The Dragon is loaded with more than two tons of supplies and NASA science investigations for the International Space Station.

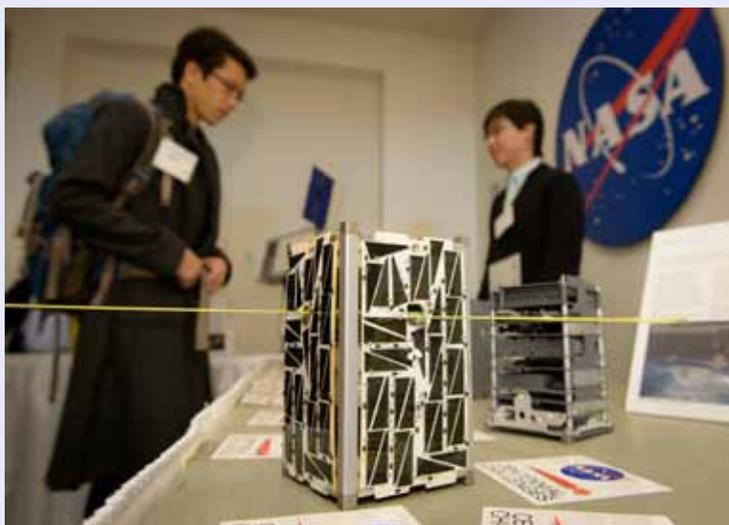
Inventors for Cube Quest Challenge hosted at Ames

BY MARIA ALBERTY

We are a nation of inventors. Thomas Edison, Benjamin Franklin, the Wright Brothers, Temple Grandin, George Eastman and Elon Musk are just a few individuals in a massive catalog of creative makers who have used the inspiration of the innovative culture of the United States to advance technology. At the same time, government research has pushed the fundamental, but not-yet-commercial side of research in an incredibly important way, and at the core of that is NASA.

For more than fifty years, NASA has transferred its cutting-edge technologies to the private sector, helping create new commercial products, improve existing products and boost the competitiveness of the U.S. economy.

continued on page 19



NASA photo by Dominic Hart

Ames hosted a summit Jan. 7 and 8, 2015 for the Cube Quest Challenge under the agency's series of Centennial Challenges. For the Cube Quest Challenge, teams must design, develop and deliver a small spacecraft the volume of six combined single CubeSat units that can catch a ride to lunar orbit or further in deep space, and then rapidly transfer large data volumes from itself to Earth, while surviving the extended duration in space.

Ames plays critical role in successful Orion flight test

On Dec. 5, Orion was successfully launched atop a Delta IV Heavy rocket from Cape Canaveral Air Force Station Space Launch Complex Flight Test on the Orion Flight Test: a two-orbit, four-hour flight that tested many of the systems most critical to safety. The spacecraft is built to take humans farther than they've ever gone before.

Orion will serve as the exploration vehicle that will carry the crew to space, provide emergency abort capability, sustain the crew during space travel and provide safe re-entry from deep space return velocities. The Orion Flight Test evaluates launch and high-speed re-entry systems such as avionics, attitude control, parachutes and the heat shield. It successfully splashed down in the Pacific Ocean four and a half hours later.

In the future, Orion will launch on NASA's new heavy-lift rocket, the Space Launch System (SLS). More powerful than any rocket ever built, SLS will be capable of sending humans to deep space destinations



The United Launch Alliance Delta IV Heavy rocket with NASA's Orion spacecraft mounted atop, lifted off from Cape Canaveral Air Force Station Space Launch Complex 37, Dec. 5, 2014, in Florida.

NASA HQ photo by Bill Ingalls



NASA photo by Dominic Hart

Ames hosted an EFT-1 Orion social media event Dec. 3, 2014 in the Ames auditorium as well as a series of tours, culminating with a public launch event Dec. 4 (left photo) in the Ames Exploration Center. The launch was delayed until Dec. 5, 2014.

such as an asteroid and eventually Mars. Exploration Mission-1 will be the first mission to integrate Orion and the Space Launch System.

NASA Ames played a critical role in the development and preparation for the flight test of Orion. Designated Exploration Flight Test 1, or EFT-1, the mission will provide critical data that will enable engineers to improve Orion's design and reduce risk for the

astronauts it will eventually carry.

One of the biggest challenges for Orion is that it will re-enter Earth's atmosphere faster and encounter more heating than any previously manned missions including Apollo and the space shuttle. To test Orion's new heat shield made of a material called Avcoat, Ames used its Arc Jet facility to simulate the heating and airflow conditions that occur during atmospheric

re-entry. During these tests, the Avcoat surface reached temperatures of more than 3,000 degrees Fahrenheit.

Ames developed a group of sensors that was built into the heat shield itself to monitor how well it performed during EFT-1. Thirty-four of these sensors measured the near-surface and internal temperatures

continued on page 11

NASA signs lease with Planetary Ventures LLC



NASA photo by Paul Langston

In an effort to reduce costs and shed surplus property, NASA recently signed a lease with Planetary Ventures, LLC to manage Moffett Federal Airfield (MFA) and rehabilitate its historic Hangar One. NASA estimates the lease will save the agency approximately \$6.3 million annually in maintenance and operation costs and provide \$1.16 billion in rent over the initial 60-year lease term.

MFA, currently maintained by NASA Ames, includes approximately 1,000 acres of land located on South San Francisco Bay. The land includes Hangars One, Two and Three, an airfield flight operations building, two

runways and a private golf course.

“As NASA expands its presence in space, we are making strides to reduce our footprint here on Earth,” said NASA Administrator Charles Bolden. “We want to invest taxpayer resources in scientific discovery, technology development and space exploration – not in maintaining infrastructure we no longer need. Moffett Field plays an important role in the Bay Area and is poised to continue to do so through this lease arrangement.”

After a fair and open competition, the U.S. General Services Administration (GSA) and NASA selected Planetary Ventures, LLC as the preferred

lessee in February 2014 and began lease negotiations. The negotiated lease, which is neither a procurement action nor a government contract, will put Hangar One to new use and eliminate NASA’s management costs of the airfield, with the federal government retaining title to the property.

“Hangar One is an important landmark in Silicon Valley,” said GSA Administrator Dan Tangherlini. “GSA was proud to support NASA in delivering the best value to taxpayers while restoring this historic facility and enhancing the surrounding community.”

Planetary Ventures currently plans

continued on page 14

Center director discusses the agency’s ASIP among other topics



photo by James Schwab

On Jan. 14, Ames Center Director S. Pete Worden gave an all hands (left photo) discussed several topics, including a discussion of last year’s accomplishments and significant events such as LADEE, SOFIA, Orion, IRIS, ISS, SPHERES, small sats and the 75th Anniversary Open House. The director mentioned that this year is the 100th anniversary of NACA (National Advisory Committee for Aeronautics, 1915 - 2015) and that NACA enabled America to become the world’s leader in aeronautics. Worden then discussed senior management updates, namely the retirement of Lewis Braxton III and that Chuck Smith is the acting deputy center director until a replacement is selected and hired on permanently. Worden spoke about the budget for Ames, which he mentioned is in amazingly good shape. He stated that NASA’s budget was approved at \$18.01 billion, \$549 million over the White House request, with increases in aeronautics and planetary sciences; funding for SOFIA, though also a decline in space technology. Also discussed was the Agency Strategy Implementation Plan (ASIP), which looks to the future and what capabilities we should use and how do we formulate these efforts, such as getting humans to Mars, etc. He closed with comments about how NASA is again ranked by employees as the number one place to work in the federal government and how he expects NASA to be around for a very long time. The all hands was followed by a town hall discussion so that questions from audience members could be answered directly.

NASA Ames, Nissan sign autonomous vehicle research agreement

by Jessica Culler

NASA Ames and Nissan North America recently signed a Reimbursable Umbrella Space Act Agreement and the first annex

and network-enabled applications. The first annex to this agreement initiates cooperative research and development of algorithms, concepts and integrated prototypes for self-driving cars.

Ames and Nissan have extensive expertise and interest in autonomous vehicles. Ames will assist in reimbursed design, development, testing and assessment of Nissan's autonomous vehicles, including limited use of Ames'

NASA parallels to the way it remotely operates planetary rovers from a mission control center.

"All of our potential topics of research collaboration with Nissan are areas in which Ames has strongly contributed to major NASA programs," said Ames Center Director S. Pete Worden. "Ames developed Mars rover planning software, robots onboard the International Space Station and Next Generation air traffic management systems to name a few. We look forward to applying knowledge developed during this partnership toward future space and aeronautics endeavors."

As Ames participates in this reimbursed partnership, NASA will benefit from Nissan's shared expertise in innovative component technologies for autonomous vehicles, shared research to inform development of vehicular transport applications, and access to appropriate prototype systems and provision of test beds for robotic software.

Lessons learned from integration, testing and demonstrations will enable Nissan North America to better plan for development and commercialization of autonomous vehicles and applications.



NASA photo by Dominic Hart

An all-electric Nissan Leaf fitted with autonomous drive equipment parked at NASA Ames.

to that agreement. The umbrella agreement allows for partnerships in autonomous vehicle systems, robotics, human-machine interface, software analysis/verification

campus for testing. These tests will build toward a proof-of-concept remote operation of autonomous vehicles to transport materials, goods, payloads or humans, which

Ames Contractor Council presents Excellence Awards 2014



NASA photo by Dominic Hart

Ames held the annual Contractor Excellence Awards Ceremony, sponsored by the Ames Contractor Council (ACC) November 2014. The ceremony recognized the outstanding contractor teams and individuals that contribute daily to our critical missions here at Ames. The ACC awards committee presented 23 individual and 19 team awards. Photo left: Dell Services Federal Government (DSFG), Agency Cloud Services, contractor awardees shown here (not in order in photo) are: Frank King, Richard Schroeder, Justin Dietrich, Matt Chew Spence, Penny Hubbard, David Burkhalter, Nicholas Theodore, James Marshall, Erica Liao, Dan Cosio, Chris Antoun, Paul Feigelman, William Endter, Mike Nelson and Matt Antoun. Please visit the ACC website link to view the extensive list of names of all award recipients at: <http://www.amescontractorcouncil.org/excellenceawards.html>

NASA's Airborne Observatory begins 2015 science campaign

BY NICHOLAS A. VERONICO

The Stratospheric Observatory for Infrared Astronomy (SOFIA) Program began its third season of science flights Jan. 13, 2015. SOFIA is NASA's next generation flying observatory and is fitted with a 2.5-meter (100-inch) diameter telescope that studies the universe at infrared wavelengths.

"Last night's flight used the German Receiver for Astronomy at Terahertz Frequencies (GREAT) spectrometer to study the chemical composition and motions of gas in a star-forming region, a young star, and a supernova remnant," said Pamela Marcum, NASA's SOFIA project scientist. "Observing at infrared wavelengths enables us to see through interstellar dust to record the spectral signatures of molecules in these regions. From this, we can study the abundances of molecules and their formation process."

Water vapor in the Earth's atmosphere absorbs infrared radiation, preventing a large section of the infrared spectrum from reaching ground-based observatories. SOFIA is a heavily modified Boeing 747 Special Performance jetliner that flies at altitudes between 39,000 to 45,000 feet (12 to 14 km), above more than 99 percent of Earth's atmospheric water vapor giving astronomers the ability to study celestial objects at wavelengths that cannot be seen from ground-based observatories.

"The flights in January will conclude SOFIA's second annual observing series, known as Cycle 2, and the observatory will begin the Cycle 3 programs in March," said Erick Young, SOFIA's observatory director and a member of the Universities Space Research Association (USRA) team that operates the SOFIA Science Center at NASA



NASA photo

NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) performed ground tests prior to its first science flight of 2015. The year's first mission was flown on the night of Jan. 13/14, with the German Receiver for Astronomy at Terahertz Frequencies (GREAT) spectrometer on board.

Ames. "Plans for Cycle 3 include 70 flights with more than 400 hours of science observations. The observations will span a broad range of astronomical topics including the interstellar medium, star formation, stars, bodies in our solar system and extrasolar planets."

The observatory is expected to make a deployment to the Southern Hemisphere in June 2015, with science flights based out of Christchurch, New Zealand. There scientists will have the opportunity to observe areas of interest such as the Galactic Center and other parts of the Milky Way that are not visible from the Northern Hemisphere.

SOFIA is a joint project of NASA and the German Aerospace Center (DLR). The aircraft is based at and the program is managed from NASA Armstrong Flight Research Center's

facility in Palmdale, California. NASA Ames manages the SOFIA science and mission operations in cooperation with the Universities Space Research Association (USRA) headquartered in Columbia, Maryland, and the German SOFIA Institute (DSI) at the University of Stuttgart.

For more information about SOFIA, visit: <http://www.nasa.gov/sofia> or <http://www.dlr.de/en/sofia>

Employees recognized at NASA Honor Awards ceremony

The 2014 NASA Honor Awards ceremony for Ames Research Center was held November 2014. Sixty-eight employees were presented with individual NASA Honor Awards and 46 groups were selected for the NASA Group Achievement Award.

The names of the honorees are listed here.

2014 NASA HONOR AWARDEES:

Distinguished Public Service Medal

Thomas Pierson - posthumously

Early Career Achievement Medal

Michael F. Barad
Colleen J. Berry
Zachary J. Burkland
Matthew J. Daigle
Misty D. Davies
Michelle Inouye
Sharon K. Lozano
Edward A. Mazmanian
Kevin W. Reynolds
Nghia D. Vuong
Lynnette Zipp

Equal Employment Opportunity Medal

Dana G. Bolles
Karen C. Bradford
Rose M. King

Exceptional Achievement Medal

Bernard D. Adelstein
John A. Balboni
Ho-Cheung P. Chan
Hyo J. Chang
Edward M. Goolish
Chris Henze
James R. Murphy
Matthew D. Sharpe
Kent C. Shiffer

Exceptional Engineering Achievement Medal

Michael J. Aftosmis
Gary A. Allen
Aaron M. Brandis
Nathan J. Burnside
Dmitry G. Luchinsky
Marcus S. Murbach
Donald V. Sullivan

Exceptional Public Achievement Medal

Julie K. Fletcher
Yueh-Liang Shen

Exceptional Public Service Medal

David W. Bogdanoff
Kamalika Das
William E. Endter
Gordon H. Hardy
Kevin P. Jordan
Laura H. Pryor

Exceptional Scientific Achievement Medal

Daniel Huber

Exceptional Service Medal

Eduardo Almeida
David J. Des Marais
Donald A. Durston
Patricia B. Hudson
Sonie Lau
Kazuko J. Nozaki
James B. Scott
Caroline To
Alan A. Wray
Larry A. Young

Exceptional Technology Achievement Medal

Dimitra Giannakopoulou
David J. Kinney
Harry N. Swenson

Outstanding Leadership Medal

James D. Alwyn
Max A. Amaya
Paresh A. Bhavsar
Maria G. Bualat
Howard N. Cannon
Cetin Kiris
Bill Lewis
Jessica J. Marquez
Edward R. Martinez
Dawn M. McIntosh
Patricia C. Morrissey
Phillip T. Snyder
Charles K. Sobek
James Strong

Outstanding Public Leadership Medal

John Kiss

Silver Achievement Medal

Michael Lowe

Group Achievement Award

ACAWS Systems Engineering Analysis Demo Team
Adaptive Aeroelastic Wing Shaping Control Team
Ames Arc Jet Operations Team
ARC – I3P Center Integration Team
ARC Code I Website Recovery Team
ARC Event Planning Team (EPT)
ARC FAMILY - 2013
ARC I3P CMDB and Invoice Reconciliation Team
Arc Jet Consolidation Team
ARC SharePoint 2010 Migration Team
Autonomous Loss-of-Control Cueing Team
Flight Deck-ATC Departure Simulation Team

continued on next page

continued from previous page

Photo below: Early Career Achievement Medal award recipients Lynnette Zipp (left) and Michelle Inouye (right) after the awards ceremony holding their certificates. Right photo: Ramsey Melugin (left) recipient of the 50 Year Service Award standing with Ames Center Director S. Pete Worden (right).



NASA photos by Dominic Hart

- IKOS Team
- LADEE Manufacturing, Test & Operations Team
- LADEE Project Integration and Test Team
- LADEE Project Management
- LADEE Project Mission Operations Team
- LADEE Safety and Mission Assurance Team
- LADEE Spacecraft Team
- Large Civil Tilt-Rotor Wind Tunnel Test Team
- MIZOPEX Team
- MMOC LADEE Support Team
- Nanosat Launch Adapter System (NLAS) Team
- NAS Facility Support Team

- NASA Communities of Practice Team
- NASA/GSA Hangar One Moffett Field RFP Review Team
- NTR-13 Acquisition Team
- Ocean Color Ecosystem Assessment Team
- OpenNEX Implementation Team
- Orion EFT-1 Heatshield Instrumentation Team
- Planetary Lake Lander Team
- Precision Departure Release Capability (PDRC) Team
- Prognostics Team
- Rotary Uninterruptible Power Supply Integration
- RSE Safety Case Team
- Sea Grass/Coral Reef UAV team

- SEAC4RS
- Single Pilot Operations (SPO) Experiment Team
- Small Spacecraft Tech State of the Art Report Team
- SOFIA Outreach Team
- SOFIA Safety and Mission Assurance Team
- Solar Array Constraints Engine Handover Team
- Space Launch System (SLS) Aeroacoustics Test Team
- Surface Telerobotics Team
- The SOFIA Program
- UAS Integration in the NAS Full-Mission Sim Team

Northern California NASA scientists bring drought research home

BY RUTH DASSO MARLAIRE

Following the driest calendar year on record for California, 2014 carried critical consequences for both agriculture and natural ecosystems. To support the state's

“Applying NASA observations, science and technology to the nation’s critical challenges is paramount to our mission,” said Bradley Doorn of the Applied Science Program in the Earth Science Division at NASA Headquarters in Washington. “The key to success of this effort is the partnerships established with end-users and

Forrest Melton presented results from a joint project involving Ames, the California Department of Water Resources (CDWR), the U.S. Department of Agriculture (USDA), the U.S. Geological Survey (USGS), and California State University, Monterey Bay. This effort has demonstrated the feasibility of using satellite data to track drought impacts on agricultural production in near real-time.

The project is using a constellation of NASA and USGS satellites to monitor the extent of fallowed agricultural land in California’s Central Valley, and is tracking crop development across nearly 200,000 Central Valley



NASA photos by Dominic Hart

ability to monitor and mitigate drought effects, scientists at NASA Ames have been working closely with water managers and agricultural producers in their home state. NASA researchers at the agency’s Bay Area center presented research at the annual American Geophysical Union Fall Meeting in San Francisco Dec. 15-19, 2014.

Last year, many California agricultural growers received from 0-10 percent of their full allocation from the State Water Project and the Central Valley Project, forcing growers in the Central Valley to turn to ground-water-pumping and water markets to sustain their crops. Supported by NASA’s Applied Sciences Program, collaborative work among growers, managers and scientists at Ames is working to use NASA technologies to better manage water supplies.

stakeholders. The partnership between Ames Research Center and California and western water agencies is a great example.”

Three Ames researchers presented California drought-related research at the national conference, held annually in the Bay Area.

fields each week. The team provided updates of idled agricultural acreage to water managers at CDWR on a monthly basis throughout 2014. Project partners also are currently working to establish an operational fallowed land-monitoring service as

continued on page 15

Above photos: Nearly 24,000 scientists descended in San Francisco Dec. 15, 2014 to discuss the latest research in Earth and space sciences.

Kepler marks 1,000th exoplanet discovery, uncovers more habitable zone worlds

BY MICHELE JOHNSON

How many stars like our sun host planets like our Earth? NASA's Kepler Space Telescope continuously monitored more than 150,000 stars beyond our solar system, and to date has offered scientists an assortment of more than 4,000 candidate planets for further study -- the 1,000th of which was recently verified.

Using Kepler data, scientists reached this millenary milestone after validating that eight more candidates spotted by the planet-hunting telescope are, in fact, planets. The Kepler team also has added another 554 candidates to the roll of potential planets, six of which are near-Earth-size and orbit in the habitable zone of stars similar to our sun.

Three of the newly-validated planets are located in their distant suns' habitable zone, the range of distances from the host star where liquid water might exist on the surface of an orbiting planet. Of the three, two are likely made of rock, like Earth.

"Each result from the planet-hunting Kepler mission's treasure trove of data takes us another step closer to answering the question of whether we are alone in the universe," said John Grunsfeld, associate administrator of NASA's Science Mission Directorate at the agency's headquarters in Washington. "The Kepler team and its science community continue to produce impressive results with the data from this venerable explorer."

To determine whether a planet is made of rock, water or gas, scientists must know its size and mass. When its mass can't be directly determined, scientists can infer what the planet is made of based on its size.

Two of the newly validated planets, Kepler-438b and Kepler-442b, are less than 1.5 times the diameter of Earth. Kepler-438b, 475 light-years away, is 12 percent bigger than Earth and orbits its star once every 35.2 days. Kepler-442b, 1,100 light-years away, is 33 percent bigger than Earth and orbits its star once every 112 days.

Both Kepler-438b and Kepler-442b orbit stars smaller and cooler than our sun, making the habitable zone closer to their parent star, in the direction of the constellation Lyra. The research paper reporting this finding has been accepted for publication in *The Astrophysical Journal*.



NASA Kepler's Hall of Fame: Of the more than 1,000 verified planets found by NASA's Kepler Space Telescope, eight are less than twice Earth-size and in their stars' habitable zone. All eight orbit stars cooler and smaller than our sun. The search continues for Earth-size habitable zone worlds around sun-like stars.

"With each new discovery of these small, possibly rocky worlds, our confidence strengthens in the determination of the true frequency of planets like Earth," said co-author Doug Caldwell, SETI Institute Kepler scientist at NASA Ames. "The day is on the horizon when we'll know how common temperate, rocky planets like Earth are."

With the detection of 554 more planet candidates from Kepler observations conducted May 2009 to April 2013, the Kepler team has raised the candidate count to 4,175. Eight of these new candidates are between one to two times the size of Earth, and orbit in their sun's habitable zone. Of these eight, six orbit stars that are similar to our sun in size and temperature. All candidates require follow-up observations and analysis to verify they are actual planets.

"Kepler collected data for four years -- long enough that we can now tease out the Earth-size candidates in one Earth-year orbits", said Fergal Mullally, SETI Institute Kepler scientist at Ames who led the analysis of a new candidate catalog. "We're closer than we've ever been to finding Earth twins around other sun-like stars. These are the planets we're looking for".

These findings also have been submitted for publication in *The Astro-*

physical Journal Supplement.

Work is underway to translate these recent discoveries into estimates of how often rocky planets appear in the habitable zones of stars like our sun, a key step toward NASA's goal of understanding our place in the universe.

Scientists also are working on the next catalog release of Kepler's four-year data set. The analysis will include the final month of data collected by the mission and also will be conducted using sophisticated software that is more sensitive to the tiny telltale signatures of small Earth-size planets than software used in the past.

Ames is responsible for Kepler's mission operations, ground system development and science data analysis. NASA's Jet Propulsion Laboratory in Pasadena, California, managed Kepler mission development. Ball Aerospace & Technologies Corp. in Boulder, Colorado, developed the Kepler flight system and supports mission operations with the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder. The Space Telescope Science Institute in Baltimore archives, hosts and distributes Kepler science data. Kepler is NASA's 10th Discovery Mission and was funded by the agency's Science Mission Directorate in Washington.

David Morrison announced as recipient of AAS Education Prize



NASA photo

The American Astronomical Society (AAS), the major organization of professional astronomers in North America, at its 225th semiannual meeting in Seattle, Washington, named the recipients of its 2015 prizes for outstanding achievements in research, instrument development and education. The AAS Education Prize goes to David Morrison (SETI Institute and NASA Ames) for a lifetime of outstanding contributions to the understanding of astronomy by college students and the public and to the debunking of astronomical pseudoscience through his textbooks, popular books, slide sets, websites, articles, public talks and work with the media. As the primary spokesperson for the scientific response to public fears of a doomsday on Dec. 21, 2012, Morrison exemplified the dedication of scientists who devote themselves to sharing their knowledge and enthusiasm with the public while maintaining the highest standards of technical accuracy. For additional information, visit the AAS website at: <http://aas.org/media/press-releases/aas-announces-2015-award-recipients>

Evergreen Valley College's Enlace Program commemorates one of our own

BY GEOVANNY SEVILLA

"We cannot seek achievement for ourselves and forget about progress and prosperity for our community... Our ambitions must be broad enough to include the aspirations and needs of others, for their sakes and for our own." These are the words of the late Cesar E. Chavez. With this quote Chavez reminds us that as we advance in life we cannot reach fulfillment if we forget about those that still need our help. One individual that has this quote embedded in his heart is the chief of the Logistics and Documentation Services Division and former Hispanic Advisory Committee of Employees (HACE) chair, Eric Kristich.

During the time he served as the HACE chair, Kristich was able to expand the purpose of the advisory group to include educational outreach to the community and by doing so helped establish relationships with Hispanic-serving Institutes such as Evergreen Valley College (EVC).

For the past 13 years, 10 of which were under Kristich's leadership, HACE and EVC's Enlace Program have worked together to award scholarships to students that complete their term at EVC and advance to a four year institution to continue their quest for education. Furthermore, the HACE/Enlace collaboration has brought several students the opportunity to intern

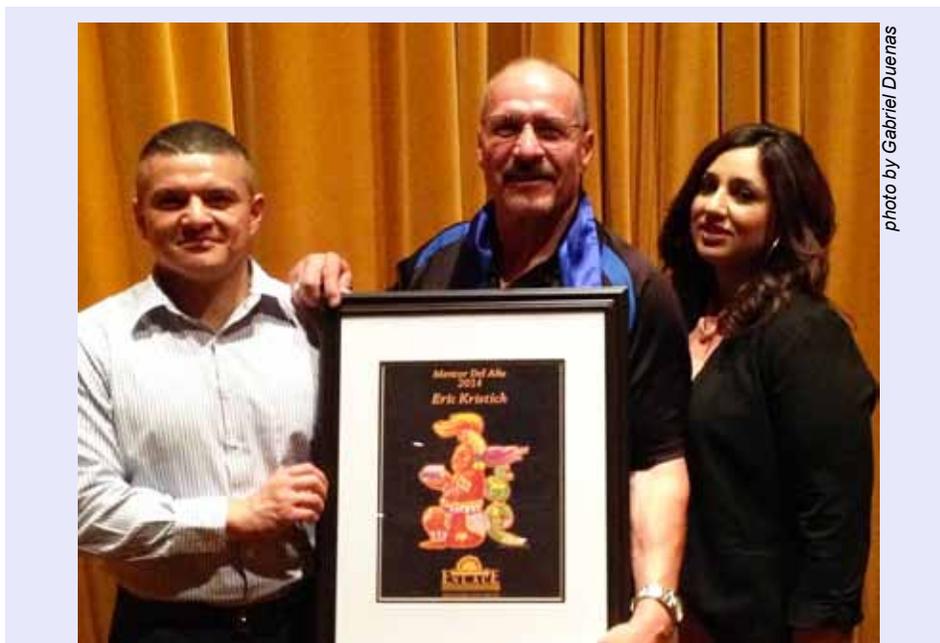


photo by Gabriel Duenas

Geovanny Sevilla (far left), Eric Kristich (center) and Jeanette Zamora-Ortega (far right). Sevilla recently presented Kristich with the "Mentor del Año," award for his role as an advocate for the advancement of Hispanics, students and the community.

at NASA Ames.

In recognition of his role as an advocate for the advancement of Hispanics, students and the community, in May 2014, the Enlace Program and EVC honored Kristich with the Mentor of the Year award. To make the recognition even more significant I, Geovanny Sevilla, a former Enlace student,

a recipient of the HACE scholarship and now a NASA Ames employee, presented the "Mentor del Año" award to Kristich.

This is vivid testimony of the fruits given when someone like Kristich broadens their ambitions to include the "aspirations and needs of others."

Ames plays critical role in successful Orion flight test

continued from page 2

of the heat shield as Orion re-entered the atmosphere. This gave engineers a complete data profile of its performance, allowing them to see what succeeded and how to make future improvements to the thermal protection system.

To optimize the design of the Orion Crew Vehicle, an eight-percent scale model was coated with pressure sensitive paint and was tested in the Ames 11-foot Unitary transonic wind tunnel. This testing simulated airflow and temperature changes the capsule will experience in flight after re-entering the atmosphere. The data collected also is essential to validating the accuracy of computational models that simulate the performance of space vehicles during planetary re-entry.

The Orion Launch Abort System required testing in the wind tunnels at Ames to better understand the behavior of the system during a complex variety of launch conditions. The focus of the study was to determine the interaction between the plume from the jets with the airflow effects of separation from the rocket.

Another test used a six-percent scale model of the Launch Abort System in the 11-foot wind tunnel to find ways of minimizing how loud the system would be, during an actual flight.

Built in the 1960s to support the Apollo missions, Ames' Horizontal Free Flight Facility can fire models through a 75-foot-long test chamber at speeds ranging from 500 to 18,000 miles per hour. Tests of the Orion capsule were essential to understanding how well the vehicle flew through the air after re-entering the atmosphere, but before the critical parachute deployment.

Ames also specializes in the use of computer modeling simulations referred to as computational fluid dynamics or CFD. This work has been important to understanding the turbulent wake behind the Orion capsule as it slowed down enough to deploy its parachutes.

Studies also have been conducted to optimize the thermal heating performance of Orion by using an Ames-developed software tool called Data Parallel Line Relaxation or DPLR. Engineers will compare their predicted results with actual data from the Arc



NASA photo

Following a perfect launch and more than four hours in Earth's orbit, NASA's Orion spacecraft is seen from an uncrewed aircraft descending under three massive red and white main parachutes and then shortly after its bullseye splashdown in the Pacific Ocean, 600 miles southwest of San Diego. During the uncrewed test, Orion traveled twice through the Van Allen belt, where it experienced periods of intense radiation and reached an altitude of 3,600 miles above Earth. The spacecraft hit speeds of 20,000 mph and weathered temperatures approaching 4,000 degrees Fahrenheit as it entered Earth's atmosphere.

Jet tests and data collected from the EFT-1 flight to improve the DPLR code for spacecraft design in the future.

The scientists, engineers and researchers at Ames are proud to have played a critical role in the EFT-1

flight test as NASA continues to move forward on its human journey to Mars.

For more information about the Orion EFT-1 Mission, visit: www.nasa.gov/orion

Klein speaks about diversity at work

The Diversity and Inclusion Lecture Series invited Freeda Kapur Klein to speak at the center Nov. 6, 2014. She is the founder of the Level Playing Field, based in Oakland, California, which was created to provide consulting to organizations on issues of discrimination and diversity. Klein has spent three decades consulting and researching various areas, which include hidden bias, diversity in the workplace and inequality of access to students of color in K-12 STEM education.



NASA photo by Dominic Hart

Test pilot George Cooper earns SETP Doolittle Award

Venerable Ames test pilot George Cooper was bestowed with the 2014 Doolittle Award of the Society of Experimental Test Pilots (SETP). The Doolittle Award, named for aviation pioneer and NACA member James Doolittle, recognizes a lifetime of sustained and excellent engineering achievement in aerospace technology. It is the highest award of the premier organization of test pilots, of which Cooper is a charter member.

Cooper joined Ames in June 1945, after a brilliant military career over Europe on D-Day and the ensuing advance. By 1953, he became Ames' chief test pilot and the award largely recognizes his leadership of the renowned Ames test pilot branch and his insights in exploiting the overlapping advantages of Ames' new research flight simulators, experimental aircraft and operational data. The award citation emphasized just two of Cooper's individual accomplishments, possible only because of the esteem with which he was held by his pilot colleagues.

He was nominated for the award by four SETP Fellows: Ames pilot Dan Dugan, Dryden pilot Rogers Smith, Boeing pilot Dennis O'Donoghue and Robert Harper, then of Calspan Corporation, and his co-investigator on the Cooper-Harper Handling Quality Rating Scale. The U.S. Navy approached Ames to learn how handling qualities impacted the minimal approach speed for landing on an aircraft carrier.

Cooper surveyed hundreds of his fellow pilots, drew upon his own experience in miscommunication with engineers, then presented the Cooper Pilot Opinion Rating Scale at the first meeting of the SETP in 1957.

Following a decade of use by pilots with NASA, the military and the airline and aircraft industry, both in flight and with simulators, the scale was refined in collaboration with Harper. Published in 1969, it today remains the global standard for standardizing pilot opinion.

Also, in the decade following his retirement in 1973, Cooper served as chief consultant to the Ames team researching cockpit resource management.

He spearheaded a program using flight simulators to observe how flight crews respond to challenges, an inci-



George Cooper (seated with the Doolittle Award) at the September 2014 awards banquet of the Society of Experimental Test Pilots. Behind him are (left to right) Dennis O'Donoghue of the Boeing Company, Kevin Prosser, president of the SETP and Jimmy Doolittle III.

dent reporting system to which pilots could report on flight incidents, and dissemination of lessons learned to everyone in the aircraft industry. His research effort grew into the Aviation Safety Reporting System, credited

with dramatically improving air safety over the past three decades.

Cooper later established Cooper-Garrod Estate Vineyards and remains active with the Ames retiree lunch group, the Owl Feathers.

SpaceX-5 resupply launch

continued from front page

process between host and pathogen. The study focuses on identifying and characterizing the cellular, molecular and immune response mechanisms that play a role in the disease process in microgravity. The experiment is managed and supported by Ames, and the principal investigator is Cheryl Nickerson of Arizona State University in Tempe, Arizona.

Microbial Tracking-1: Microbial Tracking-1A is the first flight in a three-part investigation that seeks to characterize airborne and surface-associated populations of microorganisms aboard the International Space Station. Conducting three separate sampling missions will allow the investigators to assess how the microbial communities aboard the station change over a period of months. Ames is the payload developer and implementer for the Microbial Tracking-1A, and the Space Biology Project at Ames manages the Microbial Tracking-1A investigation.

Kasthuri Venkateswaran of NASA's Jet Propulsion Laboratory is the principal investigator for the investigation.

T-Cell Activation in Aging: This second flight in a two-part investigation examines the genetic and molecular mechanisms that underlie diminished T-cell activation that occurs in both the aging population and astronauts. T-cell activation is a critical event during which T-cells, which are specialized immune system cells, recognize infections within the body and initiate a defensive response.

Ames is the integration partner and provides science team support to the principal investigator. The National Institute on Aging is the sponsoring agency for the T-cell Activation in Aging mission, and the principal investigator is former NASA astronaut Millie Hughes-Fulford, a researcher at Northern California Institute for Research and Education at the San Francisco Veterans Affairs Medical Center.

Astronaut Class of 2013 tours west coast centers



NASA photo by Dominic Hart

The graduating Astronaut Class of 2013 toured west coast NASA centers and Ames was the first stop of their journey in November 2014. While visiting Ames, they met scientists and engineers and toured several projects. In this photo, they are seen visiting the SPHERES lab, which will someday impact their future missions on International Space Station.

Rover searches desert for water to simulate future lunar missions

BY MARIA ALBERTY

Water is critical for human existence, whether on our planet or distant destinations. In support of future space exploration, researchers from Ames are searching for water closer to home -- in the desert near the Mojave National Preserve in Southern California.

The Mojave Volatiles Prospector (MVP) project team will remotely operate a planetary rover, named K-REX, developed and managed at Ames, to determine how moisture varies across surface and subsurface soil types. Collectively, the rover and a suite of tools housed on the rover, are being integrated to mature technology concepts into better designed and built systems for prospecting materials in permanently shadowed regions on the Moon.

"Because the Mojave is extremely dry like the moon, the test makes it a great analog to future lunar polar rover missions. We'll be studying water dis-



NASA photo

The K-REX rover during an engineering field test at the Basalt Hills quarry, California.

continued on page 20

Astronaut Bernard Harris speaks at Martin Luther King celebration



NASA photo by Dominic Hart

Ames employees were invited to the annual Martin Luther King, Jr., Colloquium with guest speaker Bernard Harris, Jr., Jan. 20. (left photo). Martin Luther King, Jr. progressed society and deeply influenced the world through his words and actions that catalyzed an increase of civil rights, equality, justice and compassion for all individuals. King was a leader who brought a voice of reason, striving to create a peaceful environment that allows individuals of any race to achieve their dreams. Our nation has grown immensely from his contributions and the contributions from countless others he inspired. To honor Martin Luther King Jr.'s contribution to humanity, this year's event celebrated the success of the man who became the first African-American astronaut to walk in space, which he did during the space shuttle Discovery STS-63 mission. Harris has logged more than 438 hours and traveled more than 7.2 million miles in space. Before leaving Earth, he completed a National Research Council Fellowship at NASA Ames and returned this month to share his journey to the stars. The colloquium was co-hosted by the Office of the Center Director, the African American Advisory Group (AAAG), the Office of Diversity and Equal Opportunity (ODEO) and the Office of the Chief Scientist (OCS).

NASA signs lease with Planetary Ventures LLC

continued from page 3

to invest more than \$200 million in capital improvements to the property and commits, in this lease, to several undertakings that will benefit the public upon completion, including:

- Refurbishing and protecting historic Hangar One in accordance with standards established for historic properties by the U.S. Secretary of the Interior;
- Rehabilitating historic Hangars Two and Three;
- Operating MFA in accordance with the Programmatic Environmental Impact Statement for public and private use; and,
- Creating an educational facility where the public can explore the site's legacy and the role of technology in the history of Silicon Valley.

"We are fortunate to have had significant input from surrounding com-

munities on setting a future path for Moffett Field," said Ames Center Director S. Pete Worden. "With the involvement of the citizens of Mountain View and Sunnyvale, we are confident the results will benefit all parties."

Planetary Ventures will assume operation of the site following the finalization of a joint plan with NASA, the federal Environmental Protection Agency and California Regional Water Quality Control Board to ensure continued environmental stewardship and protection of the existing remedies of the site.

As a tenant to NASA, Planetary Ventures will be required to comply with all applicable laws, regulations and policies, including those on topics of historic preservation, environmental compliance, security, health and safety and airfield operations to support on-

going missions and other government objectives.

"We look forward to rolling up our sleeves to restore the remarkable landmark Hangar One, which for years has been considered one of the most endangered historic sites in the United States," said David Radcliffe, Vice President of Real Estate and Workplace Services at Google Inc.

Once renovations are complete, Hangar One will again be home to high-tech innovation as Planetary Ventures begins using the historic facility for research, development, assembly and testing in the areas of space exploration, aviation, rover/robotics and other emerging technologies. Hangars Two and Three will be used for similar purposes."

Astrophysicist Amanda Ford discusses greatest questions of the cosmos



NASA photo by Dominic Hart

A Director's Colloquium was presented Jan. 15, by Amanda Ford, a scientific staff member at the Max Planck Institute for Astrophysics (MPA) in Garching, Germany. Observing the stars seem to have created more questions than it answered, but many discoveries have been made while studying the universe. In his day, Edwin Hubble vastly expanded our view of the cosmos from a single astronomical nest to a much larger universe consisting of a sea of galaxies. Today, modern experiments with advanced telescopes and computer simulations have enriched the capability for astrophysicists to analyze galactic composition, formation and evolution. At NASA Ames, the Pleiades Supercomputer performs simulations of galaxies and the surrounding intergalactic medium as they evolve. During the colloquium, Ford described her work in this field and discussed some of the greatest questions of the cosmos. At the institute, she uses sophisticated hydrodynamic simulations and observations from both ground- and space-based instruments to understand complex problems in star and galaxy formation, galaxy evolution and cosmology.

Northern California NASA scientists bring drought research home

continued from page 8

part of a California drought early-warning information system, a pilot project of the National Integrated Drought Information System (NIDIS) led by the National Oceanic and Atmospheric Administration (NOAA). The primary goal of the project is to provide objective, accurate and timely assessments of fallowed acreage to decision-makers in California to support drought impact assessment and mitigation planning.

Jennifer Dungan presented results from work to characterize drought impacts on ecosystems in California using the Visible Infrared Imaging Radiometer Suite (VIIRS), which was launched in 2011 on the Suomi National Polar-orbiting Partnership (S-NPP) satellite. VIIRS vegetation index data were mapped by the Ames project team to show the severity of the drought's effects in crops, forests and grasslands around the state.

Lee Johnson presented results

from a project that developed a calculator to assess a range of irrigation efficiency metrics using NASA and USGS satellite data in combination with information from CDWR, USDA and farm irrigation records. The tools use these satellite data to monitor crop water requirements and evaluate irrigation schedules.

All three of these efforts used the NASA Earth Exchange (NEX) to accelerate processing of thousands of satellite images, and to streamline algorithm development and testing. NEX is a platform for the Earth science community that combines state-of-the-art supercomputing, Earth system modeling, workflow management, NASA remote-sensing data feeds and a knowledge-sharing platform to deliver a complete work environment in which users can explore and analyze large datasets, run modeling codes, collaborate on new or exist-

ing projects, and quickly share results among the Earth science communities. NEX is a partnership between the Earth Science Division and the NASA Advanced Supercomputing (NAS) Division at Ames that helps accelerate scientific understanding of global change and associated impacts to natural resources.

NASA monitors Earth's vital signs from land, sea, air and space with a fleet of satellites and ambitious airborne and surface-based observation campaigns. With this information computer analysis tools, and the research expertise at its field centers such as Ames, NASA studies Earth's interconnected systems to better see how our planet is changing. The agency shares this unique knowledge with the global community and works with institutions in the United States and around the world that contribute to understanding and protecting our home planet.

In Memorium:

Marcelline Chartz Smith, Ames supercomputing pioneer, dies

BY FRED VANWERT

Marcelline C. Smith passed away peacefully Oct. 23, 2014, at her home in Los Altos Hills at the age of 88 following a brief illness. Born Jan. 29, 1926, in San Francisco to John and Marguerite Chartz, she was raised in Carson City, Nevada.

Marcie attended Lone Mountain College in San Francisco, where she chose to major in mathematics because, she said, "I didn't want to spend the time reading for English and history and had no language skills, and after a chemistry course I didn't want to clean up from the lab experiments, so that left mathematics."

She pursued graduate studies at Stanford, receiving an M.S. degree and developing an interest in applying numerical techniques to the new field of digital computing. When she learned that NASA Ames had just acquired a computer and was facing the challenge of developing mathematical equations for it, she was hooked and applied for a position. Thus began a more than 43-year career spanning what we refer to as the digital revolution.

She worked alongside some of the luminaries of Ames computational development, including Harvard Lomax

testing and development as deputy manager of the Institute for Advanced Computation.

The research it enabled resulted in significant advances in computer science and computational fluid dynamics. She was later named chief of the Computational Research and Technology Branch and then assistant chief for Computer Technology in the Computer Systems Division.

During this period, Marcie led the creation of the Research Institute for Advanced Computational Sciences to further advance NASA's capabilities in computational methods. At the same time, she developed an innovative strategy to procure leading-edge computational resources for the center, resulting in the acquisition of a series of Cray supercomputers.

As deputy chief of the Numerical Aerodynamic Simulation Projects Office, Marcie was a major contributor to the development of NASA's premier supercomputer facility at Ames. In 1986, she was named chief of the Computer Systems and Research Division, a position she held until her retirement in 1993.

In this role, she was the first woman at the center promoted to Senior Executive Service (SES) rank.

Marcie was twice awarded the NASA Exceptional Service Medal for leadership in establishing Ames as the leading center for large-scale computer technology and in 1993 she received the Presidential Rank Award of Meritorious Executive for leadership and professional achievement. She also was chair and Pacific Regional Representative of the San Francisco-Peninsula Chapter of the National Association for Computing Machinery (ACM).

Although she was the only woman in the computation organization when she started her career at Ames

in 1950, she was nevertheless "well accepted and given every opportunity to do the same level and type of work as the men," (quoted from an interview Marcie gave in 2013 for the Lone Mountain History Project that was



Marcelline C. Smith

published in "du coeur," Newsletter for Alumnae of the Sacred Heart San Francisco, Spring 2013).

Marcie was a strong leader, firm manager and innovator. She worked to expand opportunities for women in technical and leadership roles and opened doors for the professional women who followed. She was an excellent mentor and friend to many in the Ames community.

Vic Peterson, director of Aerophysics (Code R) in 1985-1988, states "Marcie was a great contributor to the Ames mission. Back in the late '50s I was running the largest computer program at Ames at that time. The cases could only be run on the overnight shift because they took eight to 10 hours to run a case. Without Marcie's help and persistence, I couldn't have obtained results. I was Marcie's supervisor when she was selected for the well-deserved SES position in the mid '80s. Marcie was an exceptional woman."

She married William F. Smith in 1966 and they built a home in Los Altos Hills, where they often entertained friends, family and colleagues. Bill passed away earlier in 2014.

Marcie is survived by numerous nieces and nephews with whom she shared close family bonds, including travel, family dinners and wonderful memories. Services were held Nov. 8, 2014 at St. Nicholas Church, Los Altos.



Marcie is seated at the console of an IBM 704 Electronic Data Processing Machine (right) and likely the first large-scale digital computer at Ames, taken in 1958.

and Bill Mersman. She was instrumental in aiding Ames Center Director Hans Mark in bringing to Ames the world's most powerful supercomputer, a parallel processing system called the ILLIAC-IV, in 1971 and overseeing its

Former Ames aircraft inspector Robert Bruce Tinkey passes on

BY CHRISTINE TINKEY

Bob Tinkey passed away, Oct. 29, 2014, at home with family and loved ones surrounding him, at the age of 86. He never lost his sense of humor, always had a smile and a gentle touch.

He joined the Army Air Corp in 1946 and was discharged from the Air Force, and went to work for NACA in 1949, which later became NASA at Moffett Field, California. He served as an airplane mechanic, becoming an airplane inspector and was part of the crew on the Boeing 714 Airborne Observatory and the Minuteman III test launch in 1982.

He met many famous people during his career and often spoke about how well he knew Neil Armstrong. There is a photo of Bob standing next to Neil hanging in the kitchen near the table where Bob could see it every day. Also, during that time, he was his son's Boy Scout troop master and received his Wood Badge in 1964.

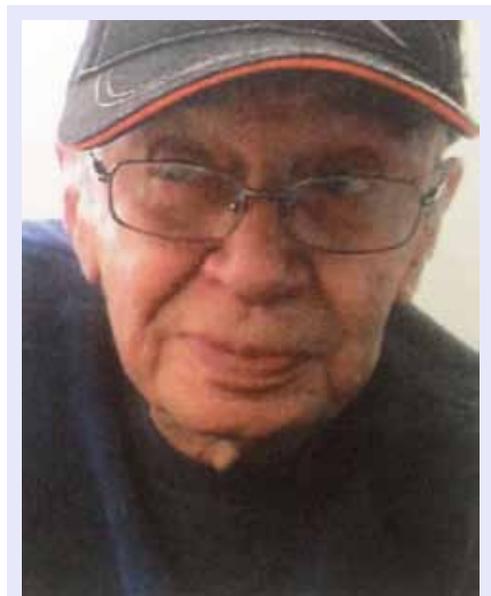
Bob retired from NASA in 1983 with 37 years of credited service as

they recognized his Army time. He moved to Modesto in 1988 and met his wife, Christine, on New Year's Day in 1991.

In 2001, Bob founded the Modesto Central Valley Region of the Antique Automobile Club of America (AACA). Bob had joined the El Camino Region in 1957. He was awarded his 50-year pin with the AACA in Hershey, PA in 2007.

Bob is survived by his wife, Christine, two sons Ron and Ben; two daughter-in-laws, Laurie and Julie; his daughter Amber; six grandchildren, Emily, Rene, Brian, Nichole, Amanda and Rebecca; several great grandchildren and three cousins, Beverly Harper of Eureka, California, Doyle Tinkey of Centennial, Colorado and Roger Tinkey of Coeur d'Alene, Idaho.

A viewing was held Nov. 3, 2014 in Modesto, Calif. Bob was laid to rest next to his parents and grandparents in Eureka, California.



Robert Bruce Tinkey

Eugene Bekstrom, Space Sciences' mechanical technician, dies

BY ED ERICKSON

Former Ames employee Eugene "Geno" Bekstrom passed away Dec. 18, 2014, shortly before his 78th birthday. He is survived by his wife of 53 years, Charlene, their son Michael and grandsons Michael, Mathew and Mark. Eugene served in the United States Air Force for more than a decade and retired from Ames September 1998 after more than 40 years of government service.

Most of Geno's time at Ames was spent as a mechanical technician in the Space Science Research Laboratory in Building N-245, spanning a period of about 28 years prior to his retirement. His principal colleagues there (sequentially) were master machinists John Gerdt, Bob Zeiger and Dave Scimeca.

During most of this time, he supported the Airborne Infrared Astronomy Group of Dr. Ed Erickson.

This entailed building parts for and maintaining the group's science instruments and laboratory equipment, and developing hardware for calibrating science instruments on the Kuiper Airborne Observatory telescope.

Geno loved his profession and always enjoyed coming to work. He also pursued his remarkable mechanical talents in his spare time, for example restoring to mint condition a 1934 Ford Roadster in which he installed a V-8 engine.

I had the pleasure of a brief visit with Geno and Charlene at their home in Shasta City last August. He was seriously troubled with his congenital heart problem then, but was still full of the cheerful vitality and enthusiasm which endeared him to his many friends. NASA is fortunate to have had the valuable

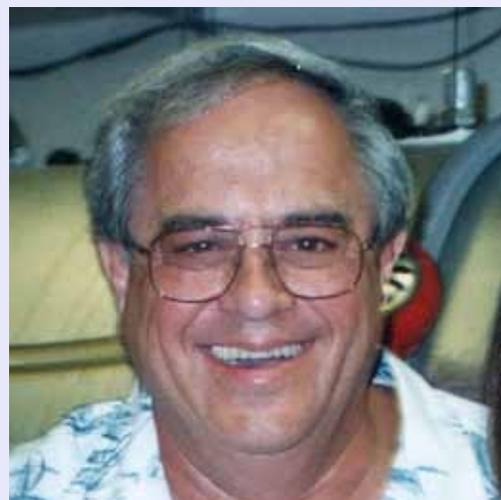


photo by Ed Erickson

Eugene Bekstrom (at retirement, 1998)

services of this fine individual. His funeral was held Dec. 23, 2014, at the Chapel of the Chimes in Hayward, California.

Ames hosts Breakthrough Prize in Life Sciences ceremony



NASA photos by Dominic Hart

NASA Ames established a Non-Reimbursable Space Act Agreement with Breakthrough Prize in Life Sciences (BPLS), a non-profit corporation, to host the awards ceremony at Ames, November 2014. The Breakthrough Prize in Life Sciences (BPLS), is a not-for-profit corporation dedicated to advancing breakthrough research, celebrating distinguished scientists changing the world and generating excitement about the pursuit of science as a career.

The BPLS award ceremony, for approximately 350 invited people, honors achievements in life science, physics and mathematics and on par with other highly regarded scientific and technical awards such as the Draper and National Academy of Sciences Awards.

NASA is a recognized world leader in life science and physics with key contributions being made to the field by people at NASA Ames. This high-profile event brings well-deserved and needed attention to the importance of STEM (science, technology, engineering and math) education, which is one of the agency's primary missions.

The event was by invitation only and was produced and directed by the internationally acclaimed Don Mischer Productions. Presentations were pro-



Above left photo: Recipients of the Breakthrough Prize. Top right photo: Christina Aguilera performing during the ceremony. Lower right photo: guests at the ceremony.

vided from supporters and key members of the technology and sciences community. There also was recognition of the great work being done in the life science and physics community both around the world, at NASA and at Ames highlighted throughout the evening. BPLS produced a television broadcast of the awards ceremony promoting life sciences, physics and other STEM-related fields, that aired on the Discovery Channel and Sci-

ence Channel Nov. 15, 2014 and globally the weekend of Nov. 22, 2014, on BBC World News.

Ames is honored to be a part of this much needed recognition for work being done for all of humanity in life sciences, physics and mathematics. And more importantly, proud to have hosted this at Ames Research Center where the work in this and other STEM fields sets the standard.

Inventors for Cube Quest Challenge hosted at Ames

continued from front page

It isn't just a one-way street, though; NASA is increasingly reaching out to individuals and organizations outside of the agency to seek inventive initiatives to further technology needs that will execute NASA's goals in space exploration and aeronautics.

In order to accomplish great things, NASA has always needed partners in industry and academia. But notable accomplishments do not only come

nization to issue a challenge to the nation to incentivize development of CubeSat capabilities. On Jan. 7 and 8, 2015, Ames hosted a competition called the Cube Quest Challenge under the agency's series of Centennial Challenges.

The Centennial Challenges program drives innovations in aerospace technology through collaborative teams of citizen-inventors, universities and industry participation; increases

Cube Quest Challenge administrator James Cockrell of Ames.

With a chance to win up to \$5 million, the competition requirements are difficult. Teams will have to compete to demonstrate technical excellence and acceptance for safety and interface requirements if they want a ride on NASA's maiden voyage of the Space Launch System rocket. Teams can arrange their own launch if they choose, but teams will still compete for naviga-



NASA photos by Dominic Hart

Participants and guests at the recent Cube Quest Challenge Summit hosted at Ames.

from big moonshots and Mars landings. Some amazing technology developments can be found in very small packages, like projects from NASA Ames including PhoneSat and the upcoming Edison Demonstration of Smallsat Networks missions, in which engineers use commercial off-the-shelf smartphones as the "motherboard" to operate mini cube-shaped research satellites or CubeSats.

Each single CubeSat is approximately four inches in length, width and height, and weighs three pounds. Small satellites are an interesting development in space exploration because of their low cost and relatively easy access to space. Typically, CubeSats hitch a ride on launches that have some leftover weight and volume capacity in addition to the primary payload flying.

Ames is recognized as a major contributor to the small satellite community through projects like PhoneSat. As such, Ames was a natural orga-

communication through public forum and results-oriented competitions; and fosters economic productivity and opportunity through new or expanded business development. There have been 24 Centennial Challenges events since 2005. NASA has awarded more than \$6 million to 16 challenge-winning teams in competitions such as the Sample Return Robot Challenge, the Strong Tether Challenge and the Moon ROx Challenge.

For the Cube Quest Challenge, teams must design, develop and deliver a small spacecraft the volume of six combined single CubeSat units that can catch a ride to lunar orbit or further in deep space, and then rapidly transfer large data volumes from itself to Earth, while surviving the extended duration in space.

"CubeSats have yet to prove their capabilities for extended missions at large distances in deep space, so we are really looking forward to the innovations teams bring to the table," said

tion, communications and longevity achievements.

"We really want to provide an environment for teams to self organize, discuss and network prospective partners with launch service brokers, ground station operators, test labs, subsystem providers and system integrators among others," said Cockrell. "This also will be their opportunity to meet NASA leaders and the challenge judges, learn details about Cube Quest rules and constraints and learn a wealth of information from safety qualifications, radio licensing and policies for flying spacecraft to the moon."

Advancements in small spacecraft capabilities will provide benefits to future missions and also may enable entirely new mission scenarios, including future investigations of near-Earth asteroids. Together, these competitions, through knowledge sharing, partnering and innovation, are steps to opening deep space exploration to non-government spacecraft.

Dolgov of Google discusses history and future of self-driving cars

NASA photo by Dominic Hart



In November 2014, Dmitri Dolgov of Google presented a NARI Technical Seminar for the Safe and Autonomous System Operations (SASO) Project entitled, "Research, Technology and Challenges for Safe Self-Driving Car Operations." Self-driving cars will transform mobility by making transportation safer and more efficient, and by giving people back the time currently wasted on the manual operation of vehicles. In 2009, Google started a self-driving-car program to rapidly advance autonomous-driving technology. Building on previous work in the field, Google has developed a small fleet of vehicles that to date have autonomously driven over a million kilometers in complex real-world conditions. In this talk, Dolgov described the history of the project, discussed the research and technology that leads to safe self-driving operations and spoke about the challenges that lie ahead and the future of autonomous driving. Dolgov leads the software team on the Google self-driving-car project. Prior to that, he worked on self-driving cars at Toyota and at Stanford as part of Stanford's DARPA Urban Challenge team.

Rover searches desert for water to simulate future lunar missions

continued from page 13

tributions in the Mojave with a rover in order to learn how to study water distributions on the moon with a rover," said Jennifer Heldmann, principal investigator for MVP at NASA Ames.

K-REX will be equipped with specialized prospecting instruments to help with the science. The rover includes a camera and lamp underneath the rover so scientists can collect data and see the soil. The Neutron Spectrometer senses the hydrogen in water to gauge soil and rock moisture. The Near-Infrared Volatile Spectrometer Systems (NIRVSS), which utilizes heritage technology from NASA's Ames Lunar CRater Observation and Sensing Satellite mission to the moon, will measure light reflections from the soil and identify levels of hydration and specific mineralogy in the differing surface and subsurface.

For example, one of the MVP testing sites exhibits a geological feature called "desert pavement."

"These desert pavements consist of a nearly-flat surface of rocks that almost seem to be closely fitted together

like puzzle pieces. In fact, they resemble road surfaces in many ways," said Rick Elphic, principal investigator of the Neutron Spectrometer at NASA Ames. "Pavements can consist of small rocks all fitted together, or larger ones, or rocks with a lot of space between them and soil poking through."

The team will look at the distinctions between the different pavement types and loose soil underneath, identifying the varied abundance and distribution of water. Meanwhile, as the rover explores the desert, the science team will be 440 miles away at an operations center inside the Ames campus. The decision to be remote is another key component of the project. Through an Ames-developed software system called Exploration Ground Data System (xGDS), the team will communicate with the distant rover, whether in a different state county or on the moon.

xGDS is used in all phases of a mission from planning rover traverses, in conjunction with satellite images, to conducting real-time operations, and post-mission science analysis. Us-

ing the software and instruments, the team will interactively operate K-REX, continuously analyze the data, and make decisions based off the data in a matter of seconds, as opposed to days.

"MVP is different from other NASA robot missions because it emphasizes 'high-tempo' science operations," said Terry Fong, director of the Intelligent Robotics Group at Ames, "which is different than NASA's Mars Exploration rovers."

The K-REX planetary rover is a four-wheel drive, all-wheel steering, electric-powered mobile robot. Designed for autonomous movement, the K-REX travels at slow speeds, between 0.25 and 3.22 miles per hour, over 12 inch obstacles and 30 degree slopes in natural terrain and supports a wide range of fieldwork including scouting, mapping, site preparation, sampling and prospecting. K-REX is comparable in size to NASA's Mars Exploration Rovers Spirit and Opportunity.

Foreign dignitaries visit Ames, explore the center



NASA photos by Dominic Hart

HRH Prince Frederik of Denmark visited and toured the center last summer. He's seen here in one of Ames' many simulators.



Naoki Okumura, president, Japan Aerospace Exploration Agency (JAXA) toured Ames towards the end of last year.



Prime Minister of Italy Matteo Renzi addressing Ames employee questions in the ballroom of Building 3 at Ames.

Employees enjoy seventh annual holiday festival



Employees and their family and friends were invited to attend the 7th Annual Ames Holiday Festival Dec. 6, 2014, in the NASA Ames Conference Center. There were holiday food items, non-alcoholic beverages and live entertainment including music, dancers, a magician and a face painter.



NASA photos by Dominic Hart

First annual ugly holiday sweater contest brings the smiles



photo by Jonas Dino

The NASA Ames Exchange invited employees to participate in its First Annual Ugly Holiday Sweater Contest in the Mega Bites Café in December. The two categories were Authentic Ugliness (store bought without modifications) and Most Crafty (for those who went all out and crafted their own or modified an existing sweater). Individuals didn't disappoint, wearing some interesting concoctions of uniquely designed holiday garb. The Exchange also provided complimentary cake during the event to help celebrate the 75th anniversary of the center.

Ames ongoing monthly events calendar

African American Advisory Group (AAAG) Mtg., last Tuesday of each month, 12 - 1 p.m., Bldg. N-255, Rm. 101C. POC: AAAG Chair, Aisha Bowe, ext. 4-1016 and AAAG Vice Chair, Porsche Parker, ext. 4-0044.

Moffett Aikido Club, Monday and Wednesday evenings, 6:30 p.m., Bldg. 944. Aikido is a non-competitive, defensive martial art known as the "Way of Harmony." POC: Diane Pereda (650) 575-9070 or Robert Dean (650) 787-1007, email: mfaikido@aol.com

Ames Amateur Radio Club, third Thursday of each month, noon, N-T28 (across from N-255). POC: George Tucker, at ext. 4-2200.

Ames Bluegrass Club, every Tuesday from 11:30 a.m. to 1 p.m. in Bldg. 944. Players of all instruments and all levels are welcome, but we are particularly interested in experienced players willing to help improve the group's musical skills. POC: Bob Haberle at ext. 4-5494 or email: robert.m.haberle@nasa.gov

Ames Bocce Ball Club, Ames' newest Exchange-sponsored club is seeking members. POC: Mike Lindsay email: michael.c.lindsay@nasa.gov

Ames Bowling League, at Fourth Street Bowl in San Jose. Looking for teams of four for start of season, Sept. 4. Need regular and substitute bowlers. Thursdays starting at 6:15 p.m. For sign up questions: Michael Hom at ext. 4-0302 or Mina Cappuccio at ext. 4-1313.

Ames Contractor Council Mtg., first Wednesday of each month, 11 a.m., Bldg. N-200, Committee Room. POC: Herb Finger at ext. 4-6598.

Ames Federal Employees Union (AFEU) Mtg., third Wednesday of each month, noon. Bldg. N-204, Rm. 101. Guests welcome. Check for schedule changes at: <http://www.afeu.org>. POC: Paul K. Davis, ext. 4-5916.

Ames Golf Club, Members have the opportunity to play approximately 13 tournaments per year at a variety of 18-hole golf courses in the Bay and Monterey Area. POC: Barry Sullivan: Barry.T.Sullivan@nasa.gov.

Ames Green Team (formerly the Green Ames Working Group) meetings are held the first Tuesday of each month in Bldg. N-237, Rm. 101, from 10 - 11 a.m. Ames Environmental Management Division, ext. 4-5660. Web: <http://environmentalmanagement.arc.nasa.gov/reports/eo-13514.html>

The Hispanic Advisory Committee for Excellence (HACE) Mtg., first Thursday of each month, 11:30 a.m. - 12:30 p.m., Bldg. N-255, Rm. 101C. POC: Jeanette Zamora, jeanette.zamora-ortega-1@nasa.gov.

Ames Jazz Band Club, Bldg. 944, 5:30 p.m. - 7 p.m. POC: Ralph Bach, email: ralph.e.bach@nasa.gov

Jetstream Toastmasters, Mondays, 12 p.m. - 1 p.m., Bldg. N-269, Rm.179. POC: Tim Steiger, ext. 4-0195, tim.steiger@nasa.gov. Web: <http://jetstream.freetoasthost.com>

Ames Nimble Knitters Club, every Monday at 11:30 a.m., Bldg. N-210, Rm. 141. POC: Diane Alexander at ext. 4-3140 or email diane.alexander-1@nasa.gov. All knitters and crocheters are welcome to attend and participate in our charity projects.

Ames Roller Hockey Club, meets daily from noon to 1 p.m. at rink on north end of the 80-foot-by-120-foot wind tunnel. Players should have experience skating and must wear protective equipment. POC: James Prunty, james.a.prunty@nasa.gov

Ames Safety Committee, third Thursday of each month, 10 a.m. - 11 a.m., Bldg. N-237, Rm. 200. POC: John Livacich, jlivacich@mail.arc.nasa.gov, ext. 4-3243.

Women's Influence Network (WIN), first Wednesday of each month, Bldg. N-232, Rm. 227, noon - 1:00 p.m., POC: Wendy Holforty, wendy.l.holforty@nasa.gov

Exchange Information

Information about products, services and opportunities provided to the employee and contractor community by the Ames Exchange Council. Visit our web site at: <http://exchange.arc.nasa.gov>

Beyond Galileo Gift Shop N-235 in the cafeteria, 8 a.m. - 2 p.m., ext. 4-6873

Visitor Center Gift Shop (Exploration Center), Tues-Fri, 10 a.m. - 4 p.m., Sat. - Sun, 12 - 4 p.m., ext. 4-5412

Remember to purchase your baby shower, birthday and holiday gifts at Ames' two gift shops!

Mega Bites Cafeteria N-235, 6 a.m. - 2 p.m., ext. 4-5969/Catering ext. 4-2161

Barcelona Café, Bldg. 3, 6:30 a.m. - 2 p.m., ext. 4-4948/Catering ext. 4-4948

See daily menus at: <http://exchange.arc.nasa.gov/cafe/menu.html>

Moffett Field Golf Club with 'Tee Minus One' Grill and Sports Bar. Catering available. Call (650) 603-8026. Extended Happy Hour Thursdays, \$5 and \$6 pitchers of beer starting at 4 p.m. - 8:30 p.m.

RV lots available. Call to reserve a space at (650) 254-1808.

Civilian/Contractors, \$50/mo; military \$25/mo

NASA Lodge (Bldg. 19) (650) 603-7100
Where to stay when you're too tired to drive home? What about the lodge?! Two types of rooms: Bldg. 19 (43 rooms), rate: \$65/night (\$5 ea add'l adult); Bldg. 583 A&B (150 rooms), rate: \$55/night (\$5 ea. add'l adult); B547 rate \$60/night (for large groups)

Ames Swim Center (N-109) (650) 603-8025

The swimming pool is now open. Hours of operation are as follows (lap swim only):

MWF 10 a.m. - 1 p.m.

MWF 3 p.m. - 6 p.m.

TTH 10 a.m. - 1 p.m.

TTH 4 p.m. - 7 p.m.

The pool is heated year round. The pool normally is available for lap swim, pool parties and special events. POC: Ryan Storms, pool manager (650) 603-8025. Memberships: single memberships: \$60/yr. Family memberships: \$80/yr. After purchasing a membership, there is an entrance fee: daily entrance fee - \$3/day or lap pass fee - \$50 for 20 uses. Platinum membership - \$380/yr. (no daily fee). Special events include military training, swim team events, kayak role practice, etc. The cost for special events is \$75/hr, or \$50/hr for military.

Exchange basketball gym is now open, Bldg. 2 (650) 603-9717

Hours of operation:

M-F 11 a.m. - 1:30 p.m.

M-F 4 p.m. - 7 p.m.

Chase Park reservations, call ext. 4-4948

NACA Park reservations, call ext. 4-4948

Ames Cat Network

The Ames Cat Network needs help finding homes for cats trapped at Moffett. They range from feral to abandoned/lost pets. They are tested, altered and inoculated. Call Iris at ext. 4-5824 if you or someone you know are interested in fostering or adopting a cat.

Ames emergency announcements

To hear the centerwide status recording, call (650) 604-9999 for information announcements and emergency instructions for Ames employees. You also may listen to 1700 KHz AM radio for the same information.

Ames celebrates its history: atmospheric science research



photo by USGS

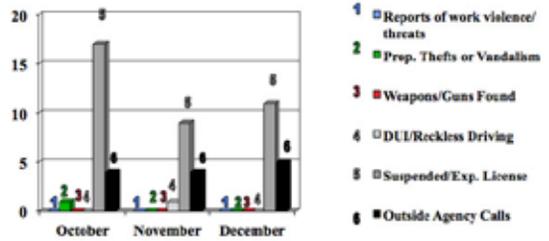
By 1978, Ames had the agency's first climate office, where Ames scientists would become part of an expedition to study the 1980 Mount St. Helens eruption in Washington, one of the most catastrophic eruptions in modern time.

Atmospheric science research and airborne science campaigns have been strengths of NASA Ames, nearly since its inception in 1939. The prospect of war was the driving force for Ames' first research authorization, a study to protect airplanes from the hazards of icing while flying. In 1941, Ames researchers flew a Curtiss C-46 as a flying de-icing research laboratory to study atmospheric conditions, including liquid-water content, temperature and drop size. Other historical factors also would change NASA's course as well. For full story, see: <http://www.nasa.gov/ames/nasa-ames-celebrates-its-history-atmospheric-science-research/>

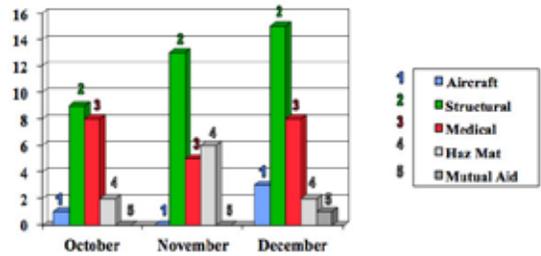
Protective Services monthly activity

A statistical summary of activities of the Protective Service Division's Security/Law Enforcement and Fire Protection Services units for the three-month period ending December 2014 is shown below.

Protective Services Office – Activities
Security/Law Enforcement Monthly Activity Report



Protective Services Office – Activities
Fire Protection Services



ASTROGRAM
National Aeronautics and Space Administration
Ames Research Center
Moffett Field, CA 94035-1000



FIRST-CLASS
U.S. POSTAGE
PAID
PERMIT NO. 85
MOUNTAIN VIEW, CA

Astrogram NP-2015-01-01-ARC

ASTROGRAM

The Ames Astrogram is an official publication of Ames Research Center, National Aeronautics and Space Administration.
Managing Editor.....Daniel Carpenter
Editor, Layout and Design.....Astrid Albaugh
Employees can reach the Astrogram Office via email at: astrogram@mail.arc.nasa.gov or by phone at ext. 4-3347. For downloadable pdf copies of each issue, visit the Astrogram website at: <http://www.nasa.gov/ames/astrogram>

PLEASE RECYCLE
Printed on recycled and recyclable paper with vegetable-based ink.