National Aeronautics and Space Administration

The Dryden X-PRESS

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# GRIP missions rack up

## DC-8 and Global Hawk probe new developing storm

The DC-8 flying science laboratory and the long-endurance Global Hawk returned to the skies Sept. 12 to probe a developing storm over the Caribbean Sea as part of the agency's Genesis and Rapid Intensification Processes, or GRIP, mission.

The pair of NASA aircraft gathered data during coordinated flights through unnamed tropical depression AL-92, which was developing over open waters near Trinidad south of Haiti and the Dominican Republic and north of Venezuela. The DC-8 also flew Monday to continue investigating the disturbance.

The remotely operated Global Hawk's 24-hour mission took off from an Edwards Air Force Base runway before flying to the area of the storm and back, said Global Hawk payload manager David Fratello. The aircraft left Edwards early Sept. 12 and made a pre-sunrise return Sept. 13. A large portion of the Global Hawk's flight time was in transit between its base at Dryden and the Caribbean.

Researchers wanted to have the high-altitude aircraft flying over AL-92 for at least five hours and were able to log seven hours over the storm. The science instruments performed well and scientists were pleased with the flights, Fratello said.

A Gulfstream IV operated by the National Oceanic and Atmospheric Administration coordinated with the crews of the DC-8 and Global Hawk,

**See GRIP, page 4**

**ED10 0266-08** **NASA Photo by Tom Tschida**

**Photo courtesy Jane Peterson**

***Above**, this image of the Global Hawk operations center was taken Sept. 2 during Hurricane Earl observations. The center has been busy during the GRIP – Genesis and Rapid Intensification Processes – missions.*

***At left**, the DC-8 flying laboratory crosses the eye of Hurricane Earl. Two passes through the storm were coordinated with a Global Hawk flying about 20,000 feet above the DC-8.*

# Making a safe landing

## Dryden supports flight tests of landing system of the future

**By H. Keith Henry**
Langley Research Center

NASA is developing technologies that will allow landing vehicles to automatically identify and navigate to the location of a safe landing site while detecting landing hazards during final descent to the surface. This is important because future missions to the moon, an asteroid, Mars and elsewhere will require this capability in order to land safely near specific resources located in potentially hazardous terrain.

Langley Research Center, Hampton, Va., has designed three light detection and ranging, or lidar, sensors that together can provide data necessary for achieving safe, autonomous precision landing.

One is a three-dimensional active imaging device, referred to as flash lidar, for detecting hazardous terrain features and identifying safe landing sites. The second is a Doppler lidar instrument for measuring vehicle velocity and altitude, which support landings precisely at a chosen site. The third is a high-altitude laser altimeter that provides data prior to final approach for correcting the flight trajectory toward a designated landing area.

In conjunction with laser/lidar sensor development at Langley, NASA's Jet Propulsion Laboratory, Pasadena, Calif., is developing algorithms, or mathematical procedures, for analyzing the acquired three-dimensional lidar maps and determining ideal landing sites. The resulting Doppler lidar and laser altimeter data are used in the navigation system being developed at Johnson Space Center, Houston, and Charles Draper Laboratory, Cambridge, Mass., to control the spacecraft's approach to an identified location.

These technologies have been integrated as part of NASA's Autonomous Landing and Hazard Avoidance Technology, or ALHAT, project and are currently being demonstrated in a series of flight tests.

The most recent flight tests occurred at Dryden in July.

"These were the first tests where we had all three of our laser systems on board and working together as a complete sensor suite," said Langley's Farzin Amzajerdian, technical lead for development of the sensors. "These tests are being viewed as critical by many within NASA."

"We were pleased that the flight tests we've conducted so far have resulted in better than expected performance of these sensors," added Robert Reisse, Langley project manager.

The second round of flight tests, completed in August 2008, was made to evaluate the capabilities of the Doppler lidar. This sensor provides high-reliability vehicle velocity vector, altitude and attitude data at about two orders of magnitude higher precision than radars.

The third flight test campaign was conducted in June 2009. In this series, the flash lidar and laser altimeter were integrated and flown

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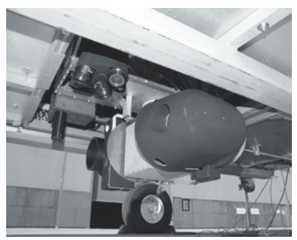
ED10 0190-034 NASA Photos by Tony Landis



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***Above**, an S-64 heavy-lift helicopter operated by Erickson Air-Crane carried the ALHAT lidar equipment during recent flight tests at Dryden.*

**At left**, *the sensors' development is to help assure safe landings of future manned and robotic spacecraft on extraterrestrial bodies.*

# NSSC calendar tracks key NASA events

The NASA Shared Services Center Web-based agency calendar is making it easier to track significant events agency-wide. The calendar has been well received and the calendar Web page currently registers over 800 visits per month. Some NASA centers have begun using the calendar source code to create center-wide calendars of their own.

Currently, over 30 sponsoring organizations can add an event in a matter of minutes, and all updates are instantly available to users across the agency. Points of contact at every sponsor location are responsible for posting events to the agency calendar. Most have already added events; over 200 events have been added for fiscal year 2010.

The success of the calendar is due in part to the intuitive design and functionality that mimics the look and feel of a standard Microsoft Outlook calendar. Users can also download events of interest to personal Microsoft Outlook calendars. Current events include, for example, upcoming launches as well as planning, programming, budgeting and execution events. A wide variety of events is represented and visitors can sort events by category or view the calendar by month, day or week.

Please take an opportunity soon to visit the agency calendar online and view what is happening around NASA. The calendar is available on the NASA network at http://aci.nssc.nasa.gov/.

Questions or issues regarding the new agency calendar may be directed to the NSSC customer contact center via e-mail at nssc-contactcenter@nasa.gov or by phone, 877-677-2123. Events that might be of interest to Headquarters or other NASA centers may be added through center points of contact.

Concept illustration courtesy The Boeing Company

# Green Aviation

*The Boeing Company's sub-scale X-48B and X-48C blended wing body flight demonstrators were topics of interest at the Green Aviation Summit held Sept. 8-9 at Ames Research Center, Moffett Field, Calif. The X-48C, shown in an artist's conception superimposed over a photo of Edwards Air Force Base, and the X-48B predecessor that is being flight tested at Dryden, are considered ideal for validating advanced green-aviation airframe concepts for reducing noise, fuel burn and emissions. For more on the X-48 blended wing body and NASA's environmental aviation initiatives, read Gray Creech's blogs from the summit at http://blogs.nasa.gov/cm/newui/blog/viewpostlist.jsp?blogname=Dryden.*

# ARES top sub of the year

The ARES Corp. has been named Dryden's Small Business Subcontractor of the Year. The award, presented by each of NASA's 10 field centers, recognizes companies who "provide value-added and outstanding support – on schedule and within cost – and innovative solutions to problems/issues that arise in the execution of [a] contract."

Nominated for work performed in support of the successful Orion launch abort system pad abort demonstration and for development of NASA's flight test safety database, ARES personnel at Dryden provide systems engineering, safety and information

**See Ares, page 4**

## Volleyball sign-ups scheduled

Dryden employees who would like to play volleyball on Palmdale City Parks and Recreation Department co-ed or men's teams can sign up prior to the Sept. 21 start of competition.

Co-ed volleyball is scheduled on Tuesday or Thursday nights and men's team play is set for Monday night. Cost for participation is $25 and the season ends Nov. 21.

For more information call John Payne at ext. 2903.

## Lakebed Legacies

**Sept. 11, 1952** – The Douglas X-3 arrived at Edwards.

**Sept. 27, 1959** – The High Speed Flight Station was renamed the Flight Research Center.

**Sept. 8, 1999** – The Helios Prototype solar-powered flying wing made its first flight.

## -Passings-

Arcata Associates employee and NASA switchboard operator **Annette Pitre**, 58, lost her battle with cancer and died at home Aug. 19. She is survived by her husband John, who is also an Arcata employee, three children and two grandchildren. Condolences and photos may be posted at http://www.hompalmdale.com/obituaries/tribute.html?url=http://stei-23715.tributes.com/show/Annette-Pitre-89190771.

# News at NASA

## Scholarships being offered

NASA's Aeronautics Research Mission Directorate is accepting scholarship applications for the 2011 academic year. The application deadline is Jan. 17, 2011.

NASA expects to award 20 undergraduate and five graduate scholarships to students in aeronautics or related fields. Undergraduate students entering their second year of study will receive up to $15,000 per year for two years and the opportunity to receive a $10,000 stipend by interning at a NASA research center during the summer.

Graduate students will receive up to $35,000 per year for up to three years, with an opportunity to receive a $10,000 stipend interning at a NASA research center for up to two consecutive summers.

Students who have not committed to a specific academic institution or program still may apply. However, if accepted, they must be admitted by fall 2011 into a suitable aeronautical engineering program or related field of study at an accredited U.S. university. All applicants must be U.S. citizens. Scholarship money may be used for tuition and other school-related expenses.

NASA's Aeronautics Research Mission Directorate conducts fundamental and integrated systems research in traditional and emerging disciplines. Specific goals include improving airspace capacity and flexibility; aviation safety and aircraft performance; and reducing overall noise, engine emissions and fuel usage.

Details about the scholarship program, including how to apply, are available at http://nasa.asee.org/.

ED10 0160-04 NASA Photo by Tom Tschida

*Chris Naftel, Global Hawk project manager, talks to media representatives during an Aug. 31 media event at Dryden. The Global Hawk team has played a key role in the Genesis and Rapid Intensification Processes, or GRIP, mission, which is expected to continue through Sept. 25.*

## GRIP... from page 1

as it was flying in the same area.

DC-8 mission manager Bob Curry said the DC-8 departed from its deployment base at Fort Lauderdale, Fla., Sunday afternoon to survey the storm system. The aircraft is routinely based at the Dryden Aircraft Operations Facility in Palmdale, Calif., but is deployed to Florida for this mission.

The GRIP mission, which will continue through Sept. 25, is designed to help improve understanding of how hurricanes form and intensify rapidly.

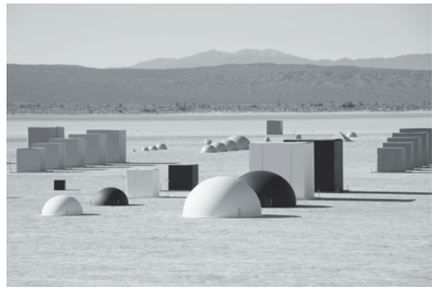
During the recent Hurricane Earl, an Aug. 31 media day at Dryden featured a look into the operations center from which NASA Global Hawk missions are flown. The control room includes an area for mission managers and pilots separated by large glass windows. Behind the windows are researchers monitoring how science instruments on board the Global Hawk are functioning.

NASA's WB-57 aircraft, based at Johnson Space Center, Houston, also is being used for several GRIP missions. Media days highlighting the DC-8 and WB-57 have been held to give people across the nation glimpses into the work NASA is doing to accumulate information about hurricane formation and intensification.

## Landing... from page 2

aboard a fixed-wing aircraft to assess its performance for terrain-relative navigation and altimetry functions.

Several flights were performed in areas of Death Valley, Calif., and over the Nevada Test Site with various flight profiles and altitudes reaching more than five miles above ground level. Locations were selected primarily because of topographical similarities with lunar terrain.



ED10 0190-131 NASA Photo by Tony Landis

*The sensor suite was flown over these objects on Rogers Dry Lake to test the system's ability to detect potentially hazardous objects on a landing surface.*

For the most recent field test, a Sikorsky S-64 helicopter carried all three lidar systems in a pod along with support instruments. The flash lidar was mounted on a gimbal controlled by the ALHAT processor box that incorporated a navigation filter built specifically for ALHAT by Draper Labs and a human interface module built at Johnson Space Center. The processor box also included a 3-D elevation map generator developed at JPL.

The eight-year ALHAT task, begun in early 2006, is led by Johnson Space Center for NASA's Exploration Technology Development program. Support is also provided by Draper Labs and the Johns Hopkins Applied Physics Laboratory, Baltimore.

## Ares... from page 3

technology support.

"This award is a testament to the hard work and dedication of our team at Dryden," said Capt. Robert Curbeam (USN, Ret.), senior vice president of the ARES aerospace and defense division. "ARES personnel provide cost-effective, innovative solutions on projects across NASA, and I am proud that we have been recognized in this way."

ARES Corp. is a global technology company in the aerospace, defense, energy, construction, metals and mining, and oil and gas industries. Clients include government agencies, government contractors and Fortune 1000 companies. The company has more than 700 employees in more than 20 offices worldwide.

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