

Dryden Flight Research Center

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Dryden Flight Research Center

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Final Flight Wraps Up NASA's GloPac Science Mission**04.30.10**

NASA wrapped up the 2010 Global Hawk Pacific (GloPac) environmental science mission April 30 with a final high-altitude flight of an unmanned Global Hawk aircraft over the Pacific Ocean southwest of Baja California.

The remotely controlled aircraft touched down at Edwards Air Force Base in Southern California early Friday afternoon after completing a 9.3 hour mission over the Pacific Ocean. During the out-and-back flight to the equatorial region, the aircraft collected data on stratospheric trace gases and profiles of cloud structures. The flight was unfortunately cut short due to a loss of electrical power to the 11 science instruments on board.

The 2010 GloPac mission completed four science flights during April, including a 28.6-hour flight to the Arctic and a 24-hour flight between the Gulf of Alaska and the tropics.

"The GloPac mission showed that the Global Hawk aircraft is a revolutionary tool for Earth science research," said co-mission scientist Paul Newman from NASA's Goddard Space Flight Center in Maryland. "The Global Hawk has now proven to be a science platform that can fly to altitudes of 65,000 feet for long-duration flights approaching 30 hours."

During GloPac, mission scientists collected observations of cloud structures, Asian dust, and stratospheric air masses that had moved down from the North Pole. The Global Hawk was also able to make observations that will be used to validate atmospheric observations from the Aura and CALIPSO satellites, part of NASA's "A-train" of environmental monitoring satellites.

The ground operations and maintenance team will probe the electrical problem that forced an early end to the mission, which had been planned for at least 24 hours duration.

The Global Hawk and its array of science instruments are monitored and controlled by pilots and scientists from the Global Hawk Operations Center at NASA's Dryden Flight Research Center at Edwards. Although its flight path is pre-programmed, human pilots can override and re-direct the flight control computers at any time as needed, and did so during Friday's mission.

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The fourth and final data-collection flight in NASA's Global Hawk Pacific environmental science mission took off from Edwards Air Force Base in Southern California shortly after 4 a.m. Friday morning, April 30.

The remotely controlled unmanned aircraft was scheduled to fly a 24 to 25-hour mission to the equatorial region over the Pacific Ocean, a departure from prior flights in the series that were primarily focused on the Arctic regions. Among the objectives of Friday's high-altitude flight were to fly the Global Hawk into the coldest part of the tropical stratosphere and perform vertical profile maneuvers while flying under NASA's Aura and CALIPSO satellites, comparing atmospheric data recorded by those satellites with data recorded by the Global Hawk's own instruments.

Mission managers are assessing an electrical problem with the generator that supplies power to the 11 science instruments aboard the aircraft that may mandate a return to Edwards earlier than planned.

The Global Hawk and its array of science instruments are monitored and controlled by pilots and scientists from the Global Hawk Operations Center at NASA Dryden. Although its flight path is pre-programmed, human pilots can override and re-program the flight control computers at any time as needed.

Final NASA GloPac Science Flight Slated Friday 04.29.10

The fourth and final data-collection flight in NASA's Global Hawk Pacific environmental science mission is planned for Friday, April 30.

The remotely controlled unmanned aircraft is scheduled to depart NASA's Dryden Flight Research Center at Edwards Air Force Base about 4 a.m. PDT for a planned 25-hour mission to the equatorial region. The high-altitude flight into the coldest part of the stratosphere will underfly NASA's Aura and Calypso satellites, comparing atmospheric data recorded by those satellites with data recorded by the Global Hawk's own instruments.

The Global Hawk and its array of 11 science instruments are monitored and controlled by pilots and scientists from the Global Hawk Operations Center at NASA Dryden. Although its flight path is pre-programmed, human pilots can override and re-program the flight control computers at any time if needed.

NASA's Global Hawk Completes 28-hour GloPac Science Flight 04.24.10

NASA's Global Hawk completed its longest flight to date April 24, touching down shortly before 5 a.m. PDT at Edwards Air Force Base in Southern California after a 28-hour and 36-minute flight to the Arctic.

The high-altitude, autonomously operated aircraft flew two atmospheric data-collection passes at 85 degrees north latitude, about 340 miles from the North Pole, during the flight. That latitude is the farthest north any Global Hawk – civil or military – has ever flown. The Global Hawk cruised at altitudes up to 65,100 feet while its sensors recorded atmospheric data during the mission, well above all other air traffic.

Packed with 11 atmospheric monitoring instruments, the Global Hawk had taken off from Edwards at 12:13 a.m. April 23 and landed at 4:48 a.m. the following morning. The flight was the third data-collection flight and the fourth overall in the NASA-NOAA 2010 Global Hawk Pacific (GloPac) environmental science mission. The first flight in the series April 2 was devoted to a checkout of aircraft systems and science instruments.

Mission managers are hopeful that a final long-duration flight can occur prior to May 1, the date the mission is due to conclude.



NASA's Global Hawk and its array of science instruments are being monitored and controlled by pilots and scientists from the Global Hawk Operations Center at NASA Dryden. Although its flight path is pre-programmed, human pilots can override and re-program the flight control computers at any time if needed. (NASA Photo)

NASA's Global Hawk Goes Aloft on 28-Hour Arctic Flight 04.23.10

NASA's long-winged Global Hawk aircraft took to the skies shortly after midnight Friday morning April 23 on what could be a record-setting flight for the high-altitude, autonomously operated aircraft.

The blue-and-white unmanned craft departed NASA's Dryden Flight Research Center at Edwards Air Force Base in Southern California at 12:13 a.m., on what was planned to be a 28-hour mission. It was due to return shortly before sunrise on Saturday morning, April 24. The fourth of five planned flights in NASA's Global Hawk Pacific environmental science campaign, it would be the NASA Global Hawk's longest flight to date.

NASA Dryden's Global Hawk project manager Chris Naftel said Friday's flight will take the Global Hawk over Alaska and the Arctic Ocean as far north as 85 degrees north latitude – the farthest north that a Global Hawk has ever flown – while its sensors record atmospheric data.

"The goal is to take measurements over Alaska and the Arctic regions and demonstrate that Global Hawk can fly this type of mission," Naftel said. "A Global Hawk has never [previously] gone beyond 70 degrees north latitude."

The Global Hawk and its array of science instruments are being monitored and controlled by pilots and scientists from the Global Hawk Operations Center at NASA Dryden. Although its flight path is pre-programmed, human pilots can override and re-program the flight control computers at any time if needed.



NOAA's Laurel Watts and NASA Dryden's Dennis Pitts install NOAA's Ozone instrument on NASA's Global Hawk. (NASA Photo / Tom Tschida)

NASA's Global Hawk Completes Second GloPac Science Flight 04.14.10

NASA's Global Hawk environmental science aircraft took to the skies again April 13 on the second flight in the 2010 Global Hawk Pacific (GloPac) atmospheric sampling mission. Lasting more than 24 hours and covering almost 9,000 miles, the flight left NASA's Dryden Flight Research Center at Edwards Air Force Base shortly before 7 a.m. Tuesday and returned at 7:12 a.m. Wednesday morning April 14.

According to NASA Dryden's Global Hawk project manager Chris Naftel, the second data-collection flight in the series took the autonomously operated aircraft along a pre-programmed flight path over the Pacific Ocean to just south of Alaska, then southward to just east of Hawaii to about 15 degrees north latitude, and then eastward back to North America with a final northbound leg back to Edwards in Southern California. The mission reached a maximum altitude of 62,000 feet and included two planned data-collection descents from 59,000 to 43,000 feet as it explored the atmosphere at latitudes between 52 degrees north in the Arctic and 12 degrees north in the tropics.

GloPac researchers are measuring and sampling greenhouse gases, ozone-depleting substances, aerosols, and constituents of air quality in the upper troposphere and lower stratosphere. Because of the Global Hawk's long endurance, the GloPac measurements cover longer time periods and greater geographic distances than can be achieved with any other science aircraft.

During the long southbound leg over the Pacific, the Global Hawk flew under the tracks of two of NASA's "A-train" satellites – Aura and CALIPSO – while a Gulfstream V aircraft operated by the National Center for Atmospheric Research flew the same track at a much lower altitude. All three air- or space-borne platforms collected data at the same time, with data from the science instruments aboard the aircraft used to verify data obtained by the satellites.

Atmospheric physicist Paul Newman, co-mission scientist for GloPac, said one of the goals of the flight was to obtain air samples from fragments of the polar vortex as the dominant wintertime weather and wind pattern in the Arctic starts to break up during spring. Newman said mission scientists also hoped to obtain samples of a large dust plume coming across Pacific from Asia.

On the eastbound leg along the 15-degree latitude, scientists sampled very cold air at temperatures as low as minus 100 degrees Celsius in the stratosphere above the tropics.

The first science data-collection flight in the GloPac mission April 7 took NASA's Global Hawk over the Pacific Ocean and then up toward the Aleutians before it turned back. That 14-hour flight, covering more than 4,500 nautical miles at altitudes up to 61,000 feet, was the first of five scheduled for the GloPac mission to study atmospheric science over the Pacific and Arctic oceans.



Time Warner Cable SoCal News' Cody Urban and Keli Moore interview NASA atmospheric physicist Paul Newman, co-mission scientist for the Global Hawk Pacific (GloPac) environmental science mission, beside a NASA Global Hawk aircraft at NASA's Dryden Flight Research Center. (NASA photo / Tom Tschida)



The initial flight path of NASA's Global Hawk on its first data-collection flight in the Global Hawk Pacific (GloPac) environmental science mission April 7, 2010 is marked in red overlaid on a Google Earth image of the Southern California coast. After departing Edwards Air Force Base, the remotely operated aircraft followed zig-zag pattern to avoid populated areas until reaching the Pacific Ocean. (NASA Image)

NASA's Global Hawk Goes Aloft for Checkout Flight 04.02.10

NASA's Global Hawk unmanned science aircraft went aloft Friday, April 2, on a 6 ½-hour checkout flight over the Southern California high desert aimed at verifying the operation of the various science instruments that will be flown on the coming Global Hawk Pacific (GloPac) environmental science mission.

The slender-winged autonomously operated aircraft took off from Edwards Air Force Base just before 7 a.m. PDT Friday, and landed at 1:18 p.m. to avoid potentially troublesome ground-level crosswinds that were expected Friday afternoon.

Chris Naftel, Global Hawk project manager at NASA's Dryden Flight Research Center, said the blue-and-white aircraft flew at various altitudes while project scientists checked out the operation of each of the 11 science instruments installed on the aircraft over the past two weeks for the GloPac mission. The flight plan called for the Global Hawk to fly for an extended period at 60,000 feet altitude to verify the instruments' ability to function properly in the extreme cold at higher altitudes.



One of NASA's Global Hawk high-altitude Earth science aircraft is shown shortly after takeoff from Edwards Air Force Base on a prior checkout flight. The aircraft is scheduled to begin its first long-duration environmental science mission, Global Hawk Pacific 2010 or GloPac, later this month. (NASA Photo / Tony Landis)

A second long-duration instrument payload checkout flight is planned for no earlier than April 7 over the Pacific Ocean to verify that good data can be transmitted via satellite communications links from the aircraft back to the Global Hawk Operations Center at NASA Dryden.

NASA's Global Hawk Pacific, or GloPac, campaign is the first Earth science mission to be conducted on the aircraft. The Global Hawk's ability to autonomously fly long distances and remain aloft for extended periods at high altitudes brings a new capability to the science community for measuring and observing large areas of the Earth. The 10 specialized instruments installed in the aircraft will explore trace gases, aerosols, and dynamics of the upper troposphere and lower stratosphere and also validate sensors aboard NASA's Aura Earth-monitoring satellite.

For more on the GloPac campaign, visit:

[GloPac Blog](#)
[GloPac Mission Page](#)
[Global Hawk Photos](#)
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NASA's Global Hawk Completes 11-hour GloPac Check Flight 02.11.10

A NASA Global Hawk aircraft soared aloft from Edwards Air Force Base March 11 on a long-endurance checkout flight in preparation for the Global Hawk Pacific environmental science mission – GloPac for short – this spring.

The autonomously operated aircraft was aloft for almost 11 hours Thursday within the Edwards' flight test range over Southern California's high desert, lifting off the Edwards runway before 7:30 a.m. Pacific time and not returning until well after 6 p.m. The check flight was monitored and controlled remotely by engineers and pilots working two shifts from the Global Hawk Operations Center at NASA's Dryden Flight Research Center on Edwards.

Thursday's flight was primarily oriented toward a functional checkout of aircraft systems. As a precaution, the flight was shortened by a couple of hours after an issue was identified with the aircraft navigation system, which has since been resolved. Thursday's flight was the eighth test flight of the unmanned aircraft since NASA began flight operations.

GloPac will consist of four or five science flights in late March and April that will take NASA's Global Hawk over the Pacific Ocean and Arctic regions. The plane will carry 10 science instruments that will sample the chemical composition of stratospheric and tropospheric air and observe cloud and particle distributions in the troposphere.

The next milestone for the GloPac mission will be the first flight with all the instruments installed on the aircraft. To be flown within the Edwards test range, the next flight's objective is to verify operation of the instruments at very high altitudes and demonstrate the functionality of the payload data telemetry system.

Several of the research scientists who will be operating science instruments on the Global Hawk during the GloPac campaign have already arrived at NASA Dryden, and the remainder were scheduled to be on site by the week of March 15 to install and check out their instruments.



The Global Hawk is controlled by a pilot and engineers from the flight operations section of the Global Hawk Operations Center at NASA's Dryden Flight Research Center. (NASA photo / Tony Landis)

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