53 WEATHER RECONNAISSANCE SQUADRON

MISSION

The mission of the Hurricane Hunters is to recruit, organize and train assigned personnel to perform aerial weather reconnaissance. They provide surveillance of tropical storms and hurricanes in the Atlantic, Caribbean, Gulf of Mexico and Central Pacific for the National Hurricane Center. The unit also flies winter storm missions off both coasts of the United States.

To perform their mission, the Hurricane Hunters have 10 WC-130J. These aircraft are equipped with palletized meteorological data-gathering instruments. The WC-130J is the next generation "Hurricane Hunter" designed to continue weather reconnaissance well into the 21st century.

The 53 WRS is authorized 20 aircrews. Fifty-nine unit members hold air reserve technician positions. The rest of the squadron is made up of Traditional Reservists.

WC-130Js carry a basic crew of five: pilot, co-pilot, navigator, flight meteorologist and weather reconnaissance loadmaster. The pilot, who serves as the aircraft commander, and the co-pilot man the flight controls. The navigator keeps track of the aircraft's position and movement and monitors radar to avoid tornadic activity. The flight meteorologist acts as flight director and observes and records meteorological data at flight level using a computer that encodes weather data every 30 seconds. The weather reconnaissance loadmaster collects and records vertical meteorological data using a parachute-borne sensor known as a dropsonde. It measures and encodes weather data down to the ocean surface.

Co-located with the National Hurricane Center in Miami, Fla., is a small group of Air Force Reserve civilian personnel, assigned to the 53 WRS. The supervisory meteorologist of the unit serves as Chief, Aerial Reconnaissance Coordination, All Hurricanes, better known as CARCAH.

These personnel are responsible for coordinating Department of Commerce requirements for hurricane data, tasking weather reconnaissance missions, and monitoring all data transmitted from weather reconnaissance aircraft.

LINEAGE

3 Weather Reconnaissance Squadron, Air Route, Medium constituted, 7 Aug 1944
Activated, 31 Aug 1944
Redesignated 3rd Reconnaissance Squadron, Weather, Heavy, 26 Jan 1945
Redesignated 53 Reconnaissance Squadron, Long Range, Weather, 15 Jun 1945
Redesignated 53 Reconnaissance Squadron, Very Long Range, Weather, 27 Nov 1945
Inactivated, 15 Oct 1947
Redesignated 53 Strategic Reconnaissance Squadron, Medium, Weather, 22 Jan 1951
Activated, 21 Feb 1951
Redesignated 53 Weather Reconnaissance Squadron, 15 Feb 1954
Discontinued, 18 Mar 1960
Organized, 8 Jan 1962
Inactivated, 30 Jun 1991
Activated in the Reserve, 1 Nov 1993

STATIONS

Presque Isle AAFld, ME, 31 Aug 1944
Grenier Field, NH, 9 Nov 1944
Morrison Field, FL, 8 Nov 1946-21 Jul 1947
Kindley Field, Bermuda, 17 Aug-15 Oct 1947
Kindley AFB, Bermuda, 21 Feb 1951-5 Nov 1953
Burtonwood Air Depot (later, RAF Burtonwood), England, 7 Nov 1953
RAF Alconbury, England, 25 Apr 1959
RAF Mildenhall, England, 10 Aug 1959-18 Mar 1960
Kindley AFB, Bermuda, 8 Jan 1962-1 Jul 1963
Hunter AFB, GA, 31 Aug 1963
Ramey AFB, Puerto Rico, 15 Jun 1966
Keesler AFB, MS, 1 Jul 1973-30 Jun 1991
Keesler AFB, MS, 1 Nov 1993

ASSIGNMENTS

North Atlantic Division, 31 Aug 1944
Air Transport Command, 12 Jan 1945
311 Photographic (later, 311 Reconnaissance) Wing, 15 Feb 1945
Air Transport Command, 13 Mar 1946
Air Weather Service, 20 Mar 1946-15 Oct 1947
2108 Air Weather Group, 21 Feb 1951
Air Weather Service, 2 May 1951
9 Weather Group, 20 Apr 1953
2058 Air Weather Wing, 25 Nov 1953

2 Weather Wing, 8 Feb 1954-18 Mar 1960
9 Weather Reconnaissance Group, 8 Jan 1962
9 Weather Reconnaissance Wing, 1 Jul 1965
41 Rescue and Weather Reconnaissance Wing, 1 Sep 1975
Air Rescue Service, 1 Aug 1989-30 Jun 1991
403 Operations Group, 1 Nov 1993

WEAPON SYSTEMS
RB-17, 1945-1946
TB-17, 1945-1947
B-25, 1946-1947
B-29, 1946-1947
WB-29, 1951-1956
TB-50
WB-50, 1956-1960
WB-50, 1962-1963
WB-47, 1963-1969
C-130, 1965
WC-130, 1965-1991
RC-130, 1974-1975
HC-130, 1976
WC-130, 1993

COMMANDERS
Unkn, Aug 1944-Jan 1945
Lt Col Karl T. Rauk, Feb 1945
Lt Col George L. Newton, Jr., 19 Jun 1945
Maj John N. Hawley, 12 Sep 1946
Lt Col James H. Starbuck, 16 Oct 1946
Lt Col Robert G. David, 16 Jun-15 Oct 1947
Col Stanley I. Hand, 21 Feb 1951
Lt Col Richard D. Stowell, 4 Dec 1952
Col William W. Riser, Jr., 17 May 1956
Lt Col John H. Mohn, 1 Jun 1959-18 Mar 1960
Col Arnold E. Zimmerman, 8 Jan 1962
Col Eugene C. Wernette, by Aug 1964
Lt Col Dwight W. Hartman, 15 Jun 1966
Col Robert L. Moeller, 18 Aug 1966
Col George D. Thurman, 12 Aug 1968
Col Jerrie C. Wells, 20 Feb 1970
Lt Col John T. Reeves, 7 Feb 1971
Col Keith D. Ricks, 1 Apr 1971
Lt Col Lawrence E. Pennington, 25 May 1972
Col Donald R. Gibson, 1 Apr 1974

Lt Col Albert D. Purvis, 14 Jul 1975
Lt Col John D. Laughlin, 21 Oct 1977
Lt Col Thomas L. Shera, 14 Apr 1978
Lt Col Theron J. May, 10 Oct 1980
Lt Col Donald K. Whitney, 9 Aug 1982
Lt Col Dennis D. Wood, 31 Jul 1984
Lt Col Christopher D. Mays, 28 May 1986
Lt Col James L. Donnelly, 1 Jul 1988-30 Jun 1991
Lt Col Thomas W. Fell, Jr., 1 Nov 1993
Lt Col James P. Marcotte, 26 Oct 1994
Lt Col Lamart J. Buggage, 13 Jul 1997
Lt Col Donald Ralph, 11 Sep 1999
Lt Col John Roberts, 11 Apr 2002
Lt Col James Linder, 11 Jul 2004
Lt Col Douglas Otto, 4 Jun 2006
Lt Col Jay May
Lt Col Dwayne A. Russell, 6 Apr 2019

HONORS
Service Streamers
World War II American Theater

Campaign Streamers

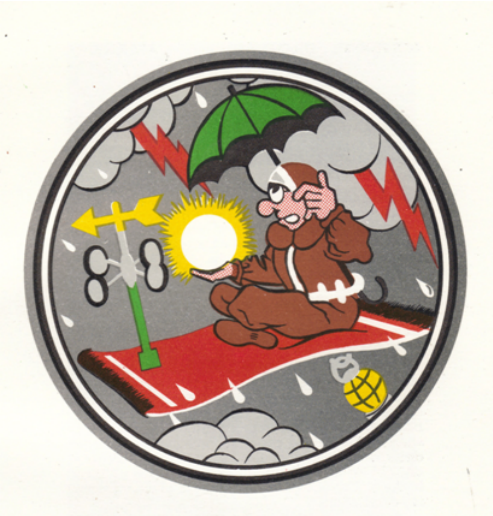
Armed Forces Expeditionary Streamers

Decorations
Army Meritorious Unit Commendation
23 May-31 Oct 1945

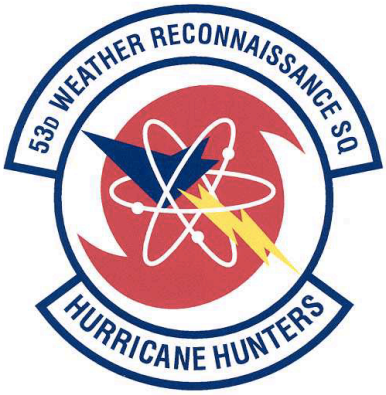
Air Force Outstanding Unit Awards
1 Dec 1958-30 Sep 1959
1 Jul 1967-30 Jun 1968
1 Jan-31 Dec 1971
1 Sep 1975-1 May 1977
16 Jul 1977-16 Jul 1979
17 Jul 1979-15 Jun 1981
1 Apr 1984-31 Mar 1986
1 Apr 1986-31 Mar 1988
[1 Nov 1993]-30 Apr 1994
1 May 1994-30 Apr 1996
1 May 1996-31 Aug 1997
1 Jan 2004-31 Dec 2005

1 Oct 2008-30 Sep 2010

EMBLEM

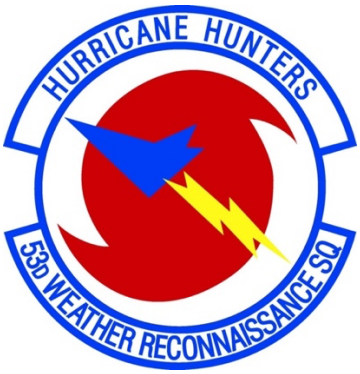


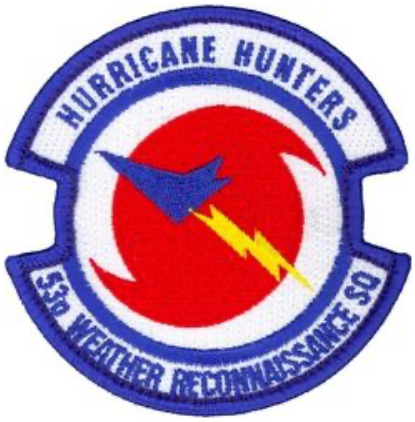
Squadron's original emblem On a light turquoise blue disc, edged black border black and white, a caricatured figure in yellow orange flight suite, seated beneath a green umbrella on a red magic carpet with anemometer and wind vane affixed to front and a lantern at the back, in flight toward dexter, while holding a white crystal ball with yellow glow in the right hand and scratching his head with the left hand, all between dark gray clouds in chief dripping rain and having red lightning bolts issuing there form and gray and white cloud in base approved, 15 Nov 1948 for 53 Reconnaissance Squadron (Long Range) Weather.

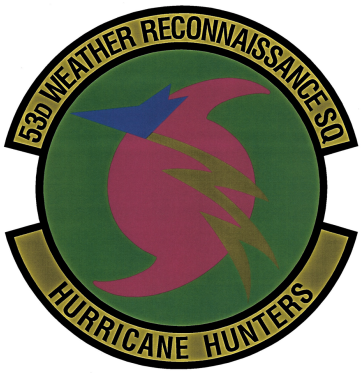


On a white disc bordered Air Force blue, a red hurricane symbol surmounted bendwise by an Air Force blue flight vehicle in advance of an Air Force golden yellow lightning bolt, the forward tip of the lightning bolt surmounting the tail of the flight vehicle, both encircled by a symbol of three molecules in orbit, white. **SIGNIFICANCE:** The emblem is symbolic of the squadron and its mission. The central figure of the insignia, the hurricane symbol, which is used by meteorologists to indicate hurricanes on weather charts, represents one of the important and perhaps the most well-known aspects of the unit's mission, that of serial weather

reconnaissance of tropical storms and hurricanes. The flight vehicle over the hurricane symbol indicates aerial weather reconnaissance; the flight vehicle penetrating the molecular symbol is symbolic of our atmospheric sampling mission; the yellow lightning bolt, also a symbol of weather, represents by its trailing of the flight vehicle the support rendered by the unit to other agencies; and is further representative of the dynamic, prompt, and timely execution of mission responsibilities. The emblem bears the Air Force colors, ultramarine blue and golden yellow, and the national colors, red, white, and blue. (Approved, 11 April 1963)







On a disc Argent, a hurricane icon surmounted by a flight symbol ascending to dexter chief Azure, emitting a contrail of lightning bendwise to sinister base Or, all within a narrow border Blue. Attached above the disc, a White scroll edged with a narrow Blue border and inscribed "HURRICANE HUNTERS" in Blue letters. Attached below the disc, a White scroll edged with a narrow Blue border and inscribed "53 WEATHER RECONNAISSANCE SQ" in Blue letters. **SIGNIFICANCE:** Ultramarine blue and Air Force yellow are the Air Force colors. Blue alludes to the sky, the primary theater of Air Force operations. Yellow refers to the sun and the excellence required of Air Force personnel. The hurricane icon denotes the aerial weather reconnaissance of tropical storms and hurricanes. The flight symbol is representative of the Squadron's atmospheric sampling missions. The lightning bolt alludes to the support rendered by the unit to other agencies. (Approved, 23 Jan 2002)

53 Weather Reconnaissance Squadron emblem: the central figure of the insignia, the hurricane

symbol, which is used by meteorologists to indicate hurricanes on weather charts, represents one of the important and perhaps most well known aspects of the unit's mission, that of aerial weather reconnaissance of tropical storms and hurricanes. The flight vehicle over the hurricane symbol indicates aerial weather reconnaissance; the flight vehicle penetrating the molecular symbol is symbolic of the atmospheric sampling mission; the yellow lightning bolt, also a symbol of weather, represents by its trailing of the flight vehicle the support rendered by the unit to other agencies, and is further representative of the dynamic, prompt, and timely execution of mission responsibilities. The emblem bears the Air Force colors of ultramarine blue and golden yellow, and the national colors of red, white and blue.

MOTTO
HURRICANE HUNTERS

OPERATIONS
Weather reconnaissance overseas adjacent to the United States, 1945-1947.

In September 1945, a crew from the 53rd was the first to fly into a hurricane.

Flew into tropical storms and hurricanes in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea to provide atmospheric data to the US Weather Service, 1946-1947, 1951-1960.

The 53 was one of seven USAF Weather Recce squadrons stationed in various parts of the world. The track of the first meteorological flights flown in England was Falcon Golf and lay mainly over the Atlantic. The WB-29s were replaced with WB-50s and extended tracks known as Falcon Delta were started on a daily basis. In addition to these daily flights, Falcon Alfa was flown every third day and occasionally Falcon Special was added, to gain special data on a specific system or as a replacement for a mission which had to turn back.

Delta missions left Burtonwood every day at 0700 hrs GMT. The track was 3,686 miles long and extended from Liverpool to a point 250 miles North of the Azores, swung around along the 30th meridian to a point 420 miles south of Greenland, and then turned east towards Burtonwood. The first leg was flown at 10,000 feet, the second at 18,000 feet and the third at 30,000 feet. Average time taken was 15 hours. Weather observations were made at fixed points 150 nautical miles apart. The weatherman, seated in the nose of the aircraft, recorded wind speed and direction, pressure, humidity, temperature, cloud conditions, visibility, surface winds and pack ice conditions (if any). Since the aircraft was unable to maintain direct radio contact with Burtonwood, the information gathered was coded by the radio operator and sent to Croughton radio station in Oxfordshire. From there the information was transmitted to the 53's weather monitor at Burtonwood, where it was decoded and carefully checked for transmission errors before being sent by direct teletype to the Central Weather station at High Wycombe.

Similar observations were made on the Falcon Echo Flight. This track ran down to the Maderia Islands, then swings northward to a point on the 26 deg West meridian near the Azores, then almost due north-east back to England. Falcon Alfa, flown on every third day with a date

divisible by three. This track extends up the coast of Norway into the Polar regions and back to Iceland and down the west coast of Scotland — again out at 18,000 feet and back at 30,000 feet. This flight achieved fame in the National Press at Christmas, when it became known that the crew released letters from local Children over the North Pole addressed to Father Christmas.

25 October 1955 Boeing WB-29A 44-61600 experiences multiple problems including failed fuel feed pump, head winds, while returning from "Falcon" mission to polar region; pilot orders bail out of crew shortly before midnight as fuel exhaustion becomes critical, all eleven survive, with only one minor injury. Aircraft comes down near Kirby Lonsdale, Lancashire, England, burns, only rear fuselage and tail remaining intact. 1,300 miles from home over Greenland developed engine trouble. At 10,000 feet No 3 fuel tank booster pump became inoperative, the aircraft turned back and came down to 9,000 feet to conserve fuel and give maximum performance. They covered 1,100 miles to a point North of Prestwick but communications difficulties made it impossible to make an instrument approach at Prestwick. The pilot had the choice of trying to land or return to Burtonwood and he chose the latter. 40 miles south of Prestwick No 1 engine had to be shut down, No 2 developed similar fuel flow difficulties and No 4 gave indications of the same thing happening. At 23.30 the order to abandon the aircraft was given, all eleven parachuting safely to ground but the aircraft was written off in the resultant crash. The aircraft was pointed out to sea but turned after the pilot jumped and crashed at Lupton Fell, near Kendal.

During 1957 30,000 letters were dropped over the North Pole being from local children addressed to Father Christmas.

In June of 1991, the 53 WRS was inactivated, and all weather reconnaissance responsibility fell to the Air Force Reserve's 815th Weather Squadron, which had existed concurrently with the 53 since 1976. Then on Nov. 1, 1993, the 53 WRS was reactivated and assigned to the Air Force Reserve, replacing the 815th WS.

Keesler’s first C-130Js arrived at the 53 Weather Reconnaissance Squadron on 17-18 February 1999, and the operational test and evaluation process began in the fall.

In September of 1999, the 53 WRS received its first of 10 WC-130Js. While in conversion to the new airframe, the unit continued its mission of aerial weather reconnaissance and added a new weather-related mission in 2003, using the WC-130Js to drop buoys ahead of impending tropical storms.

In 2004, the unit started training to support tactical airlift missions in addition to the unit's weather mission.

The recent hurricanes hammering the Southeast Coast brought damage and the opportunity to test the improved low-power color weather radar in the new WC-130J Weatherbird. A team from the Air Force Flight Test Center at Edwards AFB, California, joined Air Force Reserve

Command's 53 Weather Reconnaissance Squadron at Keesler AFB, Mississippi, to battle 155-mph winds and penetrate hurricanes Ivan and Jeanne fifteen times on six flights to collect performance data on the radar. The WC-130J not only will provide 53 WRS crews a more reliable aircraft but will also increase mission effectiveness. The WC-130Js are expected to be in service during the 2005 hurricane season. 2004

5/23/2005 The first storm of the 2005 hurricane season came a little early this year appearing in the Pacific off the coast of Central America. Hurricane Adrian also marked the beginning of a new era in weather reconnaissance for the 53 Weather Reconnaissance Squadron's "Hurricane Hunters" here. When thunderous winds threatening El Salvador formed Tropical Storm Adrian in the Pacific recently, the National Hurricane Center called on Air Force Reserve Command's hurricane hunters to get a fix on the storm's location.

This mission was the first operational tasking in which the crew flew a WC-130J Hercules into an active hurricane. The unit has been converting to the new airframe for the past few seasons, ensuring it is a stable platform to conduct weather reconnaissance. During previous seasons, the unit has flown the J-model into storms for training and evaluation, but has never before fulfilled such a tasking from the hurricane center in the J-model.

While Hurricane Hunters were determining the location of Tropical Storm Adrian, it was immediately upgraded to a hurricane during the first leg of their reconnaissance mission. During the 11-hour flight, winds reached 105 mph at flight-level and eventually forced up to 20,000 residents to flee their homes before weakening as it moved inland. The crew said the aircraft allowed significant improvements in their operational awareness during the mission. The J-model features a "glass" cockpit packed with the latest in computer-assisted flight and navigational controls allowing crews to focus on their in-flight tasks.

"The plane performed very well. The biggest difference was our increased situational awareness," said Lt. Col. Dave Borsi, aircraft commander. "Because of the new computer system, we were better able to see where we were in the storm. While we were there, data we provided led to the (hurricane center) upgrading it to a hurricane, giving the people along the coast a more accurate picture of what to expect." "The WC-130J and the 403rd (Wing) team were vital in our ability to provide the people of El Salvador and Honduras advanced warning of Adrian's landfall and potential impacts in El Salvador and neighboring countries," said Max Mayfield, National Hurricane Center director. "El Salvador's president, Antonio Saca, interrupted a national press conference to advise his nation of this latest data, including information from the aircraft."

Aerial reconnaissance weather officers, who collect and transmit information from the aircraft directly to the hurricane center, said it has taken some time and patience to develop software and to adapt computer systems to the unique needs of the storm reconnaissance mission.

"It has taken six years to create the best system possible to produce the most accurate data for the meteorological analyses during flight," said Lt. Col. Steve Renwick, the mission's weather officer instructor. "Our first evaluation occurred during Hurricane Lenny six summers ago. We've come a long way since.

The new weather console is significantly improved from its predecessor's configuration -- the WC-130H. The weather officer can now see simultaneous displays of the weather data as well as instruments monitored by other crewmembers that are vital to performing the job.

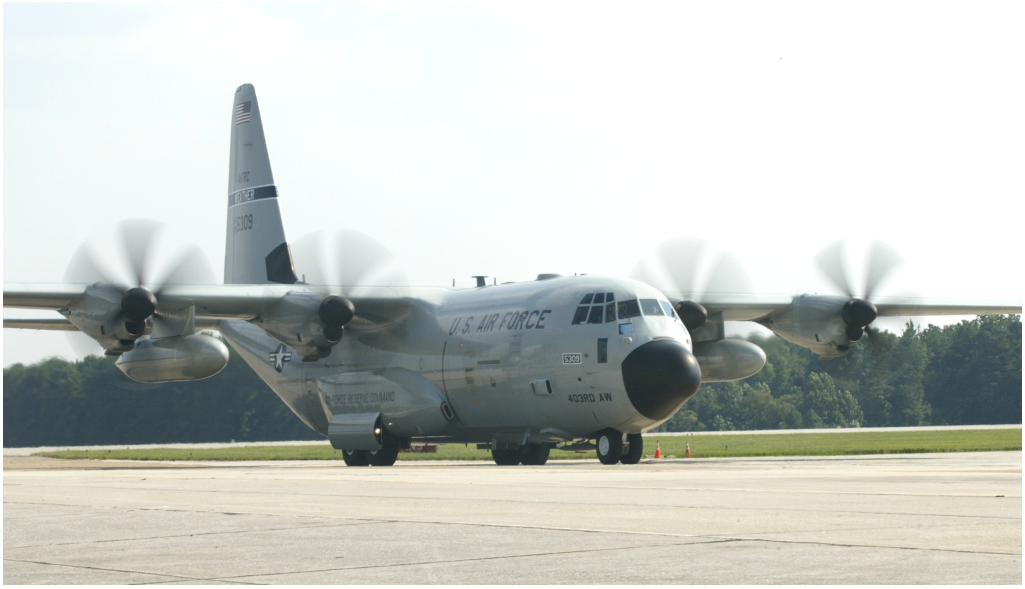
"In the H-model, we had to look over the navigator's shoulder to see the basic radar pattern," Colonel Renwick said.

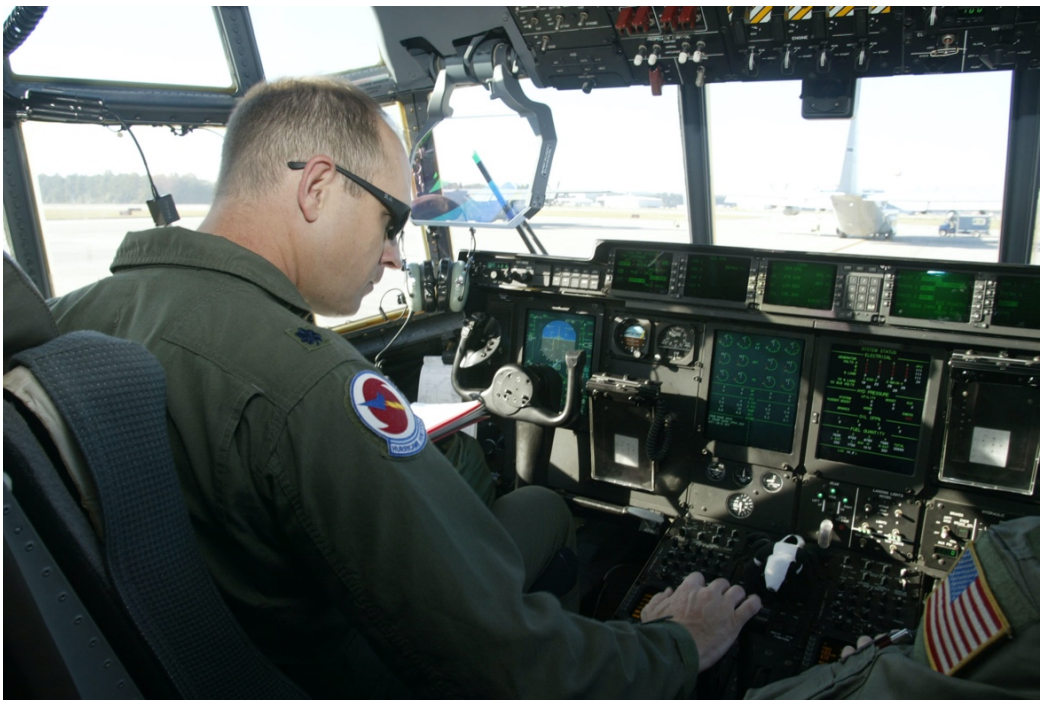
The new system places the weather officer in the cargo area rather than on the flight deck allowing immediate observation of sea-surface winds, a critical part of storm assessment Changes to the way the data is collected and delivered to the hurricane center have also been improved to reduce confusion, center officials said. "All the software and hardware worked as advertised," said Lt. Col. Jon Talbot, also an aerial reconnaissance weather officer. "Situational awareness is much improved over the H-model." Maintainers recovering the aircraft also reported that the aircraft held up well under the stresses of a storm environment.

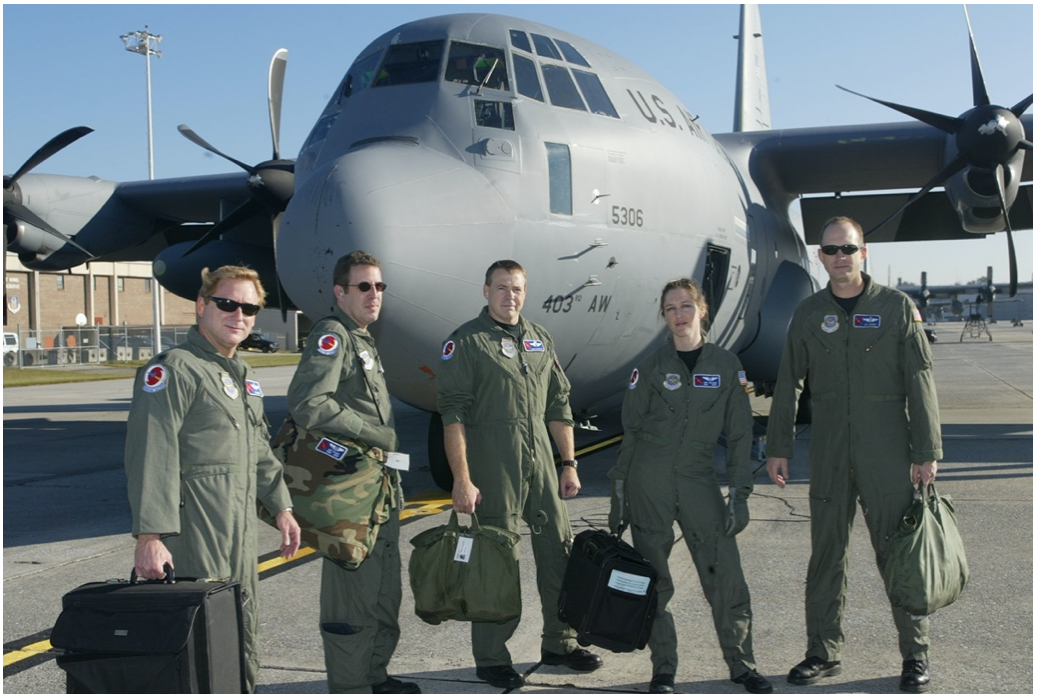
"We haven't found any problems with the propellers," said Maj. Kelvin McElroy, 403rd Maintenance Squadron commander. The propellers on the J-model are six-bladed and are made of a composite material, as opposed to the four-blade configuration of the H-models. Maintainers found a few routine indications that are typical after any storm, but were able to quickly assess them using a computerized diagnostic system. This is a marked change from the recovery process of the older aircraft that included many analog systems and instruments. Today, crew chiefs plug in a portable computer that pinpoints any concerns and tells them what is needed to make corrections.

The Hurricane Hunters are ready to complete the transition to the new aircraft this season, said Brig. Gen. Richard Moss, 403rd Wing commander. "This mission is the culmination of a lot of work (allowing) the WC-130J to perform its mission," he said. "Increased situational awareness of the crew and the increased safety of the J-model's performance enhance the unit's ability to locate and pinpoint these dangerous storms. These same capabilities also allowed the unit's sister squadron to recently complete a highly successful tour in Southwest Asia. This simply goes to show that the C-130J will be a great asset to the Air Force."

In September 2005, the unit completed conversion to the J-model a month ahead of schedule, flying absolutely no hurricane taskings in the older WC-130Hs during the 2005 Hurricane Season. Despite heavy damage to their home station caused by Hurricane Katrina, the unit continued its weather reconnaissance mission without missing a single tasking.






5306
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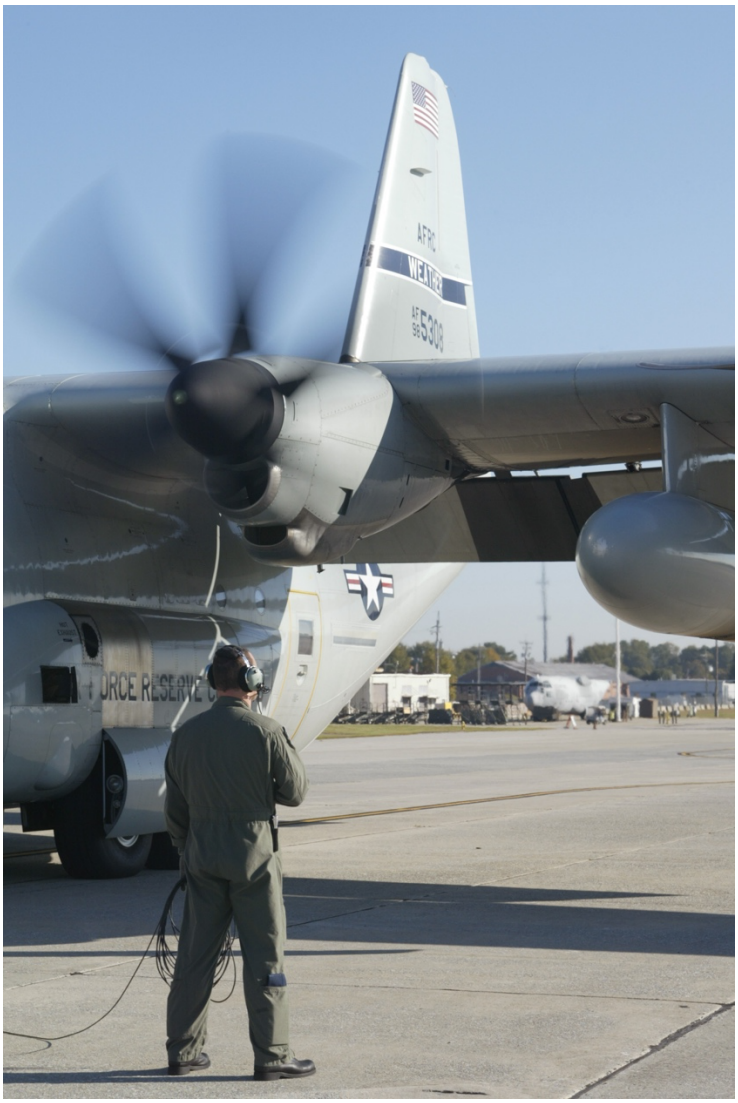
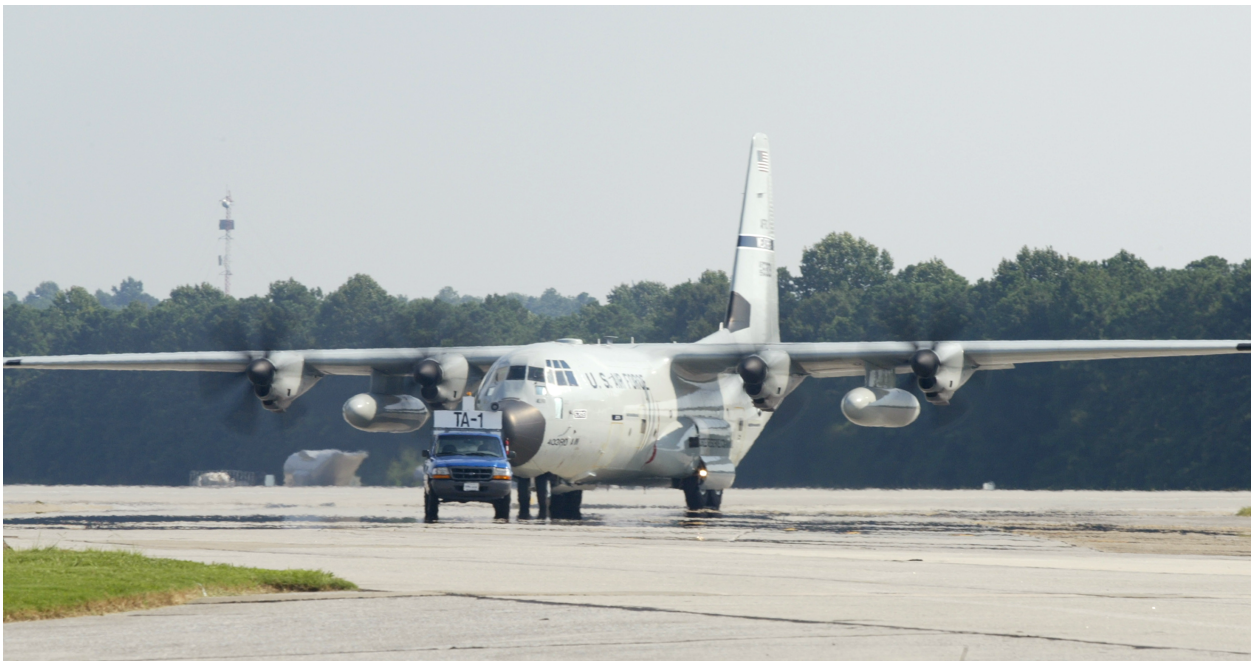

AFRC
95-5308



53 WRS WC-130 at Dobbins ARB, GA.

A tropical wave formed in the far eastern Atlantic Ocean on 13 August. The next day it turned into Tropical Storm Dean, the fourth named storm for 2007. The Hurricane Hunters deployed three aircraft, three crews, and a cadre of forty maintainers and support staff to their forward operating location in St. Croix, US Virgin Islands, to be closer to the storm as it intensified. "If there is a storm out there, we have an aircraft airborne," notes Harder. "We'll keep flying until the hurricane dies or makes landfall." The deployed home of the Hurricane Hunters is a warehouse at Henry E. Rohlsen International Airport. The unit flies a war readiness spares kit, complete with a replacement propeller, to St. Croix every May in preparation for hurricane season, which runs from 1 June to 30 November. A pair of modular buildings inside the facility serves as the operations and maintenance ready rooms. Whenever a storm brews in this part of the Atlantic, the members of 53 WRS arrive, turn on the lights, and start flying.

The Hurricane Hunters were flying three missions a day as Dean became a hurricane on 16 August. The hurricane continued to strengthen as it moved closer to the Lesser Antilles islands. Storms are categorized using the Safir-Simpson Hurricane Scale, which gives an estimate of the potential property damage and flooding expected along the coastline from a hurricane landfall. After Dean became a hurricane (winds above seventy-five mph), it quickly intensified from a Category 2 hurricane (ninety-six to 110 mph winds) to a Category 3 storm (111 to 130 mph). It reached Category 4 status (131 to 155 mph) on 18 August. Dean was a Category 5 storm (more than 155 mph) when it hit Mexico's Yucatan Peninsula two days later. This storm finally dissipated in the Mexican mountains on 23 August. Hurricane Dean was responsible for forty deaths and millions of dollars in damages across the Caribbean and Mexico. But the damage and loss of life could have been worse.

"Same briefing, same mission, different day," joked pilot Lt. Col. John Loughery as the seven aircrew members gathered for the day sortie on 18 August. Getting down to business, the outbound crew received information about Dean's winds (144 mph) as well as its barometric

pressure, size, location, and predicted track from the National Hurricane Center in Miami. The crew on the night flight had run into some heavy lightning as well as hail, which had taken the paint off their aircraft in a couple of places. Hail damaging the composite propellers, initially an issue with the WC-130J, was resolved in 2004 with the addition of a taco shell-shaped composite shield on each propeller blade shank. "On the road, we try to stay with the same crew," notes Harder. "We are a Reserve unit, so some people can stay only two weeks, while some can stay three, depending on their civilian jobs. With three crews on a deployment, we fly a continuous cycle. One crew goes into crew rest at the same time that another gets ready to fly." Hurricane Dean's proximity to St, Croix on 18 August meant that flight time to the storm that morning was only thirty minutes. Harder ran the storm pre-entry checklist almost immediately after takeoff. On the flight deck, the pilot calls up engine data and the radar display on his color multifunction displays, or MFDs. The co-pilot works the radios and coordinates with air traffic control, and calls up the moving map display and the radar on his MFDs. The radar picture is also brought up on the navigator's MFD, as well as at the station of the aerial reconnaissance weather officer, or ARWO, and on the loadmaster's station in the aircraft's cargo hold. The importance of the radar for this mission cannot be underestimated. "The radar in the C-130J is great for weather avoidance, but that's not what we do," notes Maj. Greg Lufkin, one of the squadron's senior navigators. "Normally, the knowledge that there is a storm at a particular spot is enough, and the crew can steer around it. But we need to see exactly how bad the storm is and, just as importantly, what is beyond it."

Before the Hurricane Hunters could fly into storms, the Northrop Grumman AN/APN-241 low-power color radar, standard in all C-130Js, had to be modified. Development and testing of a major software change to the radar took time, but it was worth the wait because the radar can now look through the storm cells to measure winds and determine the intensity of the rainfall more accurately. "The pilots look at the radar and ask me to plot a course around the worst weather," adds Lufkin. "They couldn't do that in the H-model aircraft." The crew flies what is known as an alpha pattern into and around the storm. Starting at 105 miles out from the eye a standard reference points the crew takes a wind measurement. As the WC-130J goes through the eye, the ARWO directs the flight. The crew then continues on the same course and flies 105 miles out the other side of the storm to take another wind measurement. On this particular mission, the crew entered the storm from the northeast and flew to the southwest. At the 105-mile point, the navigator set course to the east to fly with the counter-clockwise wind motion of the storm. For the second penetration, the crew flew southeast to northwest, followed by a crosswind leg to the south. On a normal mission, the crew makes four passes through the eye. The flights are planned so that after the last pass, the crew comes out on the side of the storm closest to base so that the crew can fly a direct route home. "The crosswind legs average about 150 miles," notes Lufkin. "Kids sometimes ask me why they need to learn math. Well, the storm is moving at twenty or twenty-five knots, so the alpha pattern is not just a big X on a stationary target. We have to figure out approximately where the eye will be when we get there. Trigonometry works well for us."

Ironically, the more organized and intense the storm is, the smoother the ride. A Category 3 or 4 storm is often less bumpy than a more disorganized Category 2. Notes Lufkin, "The storms are given individual names for a reason. Every storm has a unique personality." The turbulence on this day's flight is not bad. During a flight into Hurricane Felix, a Category 5 storm in early

September, the bumps were so severe that the flight through the eye had to be terminated early. "Nine times out of ten, the flights are not as bad as you might think," notes Loughery. "That tenth one sometimes causes us to question our career choice." For consistency of the measurements, the crew has to fly at a pressure altitude of 10,000 feet through the eye. The crew enters the eye at 10,000 feet, but is descending. At the center of the storm—the point of lowest pressure—the WC-130J crew members could find themselves only 8,000 feet above the water and need to climb and accelerate in preparation to exit the other side of the eye. "The WC-130J has a lot more power than an E- or an H-model, which is critical for us." notes Harder. "It can also fly faster." The ARWO and loadmaster are busiest when flying into the eye. "In the eye, the ARWO, a professional, college-degreed meteorologist, acts as the mission director," explains Lt. Col. Jonathan Talbot, the chief meteorologist for the 53 WRS. "We pass data to the National Hurricane Center and tell the meteorologists there what we are seeing. We make sure they get the best data so they can build a better forecast." By actually flying in a storm to collect data, the Hurricane Hunters increase the accuracy of the National Hurricane Center's forecast by roughly thirty percent. The ARWO operates the computerized weather reconnaissance equipment from a palletized station on the left front side of the cargo compartment, just behind the flight deck bulkhead near the crew entrance door on the WC-130J. Both the ARWO and the weather reconnaissance loadmaster, whose console is on the right side of the cargo hold, can sec outside through thirty by twenty-four inch windows installed in the aircraft's emergency exit door. "The location of the two consoles leaves room in the aircraft for additional cargo," says CMSgt. Robert E. Lee, one of the loadmasters. "Now, we can self-deploy."

"We collect raw data every second and compile it every ten seconds," notes Talbot. "We get a lot of information from the aircraft sensors and the data bus. We use software to build the mission plot. The computer auto-generates messages and sends them to the National Hurricane Center via SATCOM radio every ten minutes so the Center forecasters know our exact location." A new piece of equipment for the Hurricane Hunters this season is the Stepped-Frequency Microwave Radiometer, or SFMR. This instrument, mounted in a pod under the aircraft's right wing, continuously measures winds at the ocean's surface directly below the aircraft. The SFMR, known as "smurf," senses microwave radiation naturally emitted from foam created on the sea surface to determine wind speed. In the past, the ARWO would have to estimate winds by looking at the sea surface and use data extrapolated from dropsondes released into the storm.

Dropsondes, or sondes, are eighteen-inch reinforced cardboard tubes that contain weather reporting instruments that measure conditions from the aircraft to the surface of the ocean. The sondes measure temperature, relative humidity, wind speed, and duration. The loadmaster uses a spring-loaded launcher to eject the dropsondes from the bottom of the aircraft. During their descent, the sondes are slowed by a ballute—a cross between a parachute and a balloon. "We get data from the dropsondes for about four minutes. Then they hit the water and short out," says Lee, who is no relation to his famous namesake. "I used to spend about fifteen minutes to dredge the data down and build a wind chart. Now, the process is automated, and I can send the data in about seventy seconds." Lee started with the Hurricane Hunters in 1983 and will retire this fall. This flight through Dean was his 319th pass through the eye of a hurricane. The first dropsonde is released at the eye wall. The ARWO then tries to fix the exact

center of the storm where the second dropsonde is released. The third sonde is released as the WC-130J penetrates the outer wall and back into the clouds and rain. On this mission, Talbot is training 1st Lt. Doug Gautrau, a new ARWO making his third flight in a storm. Gautrau, running the weather console, hit the bull's-eye on his second pass into Dean's eleven-mile wide eye. Where the sonde was dropped, the recorded winds were two mph. An ARWO has to make ten flights and accumulate about 100 hours in storms to be fully qualified. At the National Hurricane Center, Talbot and Gautrau are in constant contact with a small group of Air Force Reserve civilian personnel assigned to the 53 WRS. These civilians are the interface between the Hurricane Hunters and the Hurricane Center forecasters.

After the third pass on this day's mission, the Center's meteorologists note a slight change in the storm's track. One of the flight's crosswind legs was cut short, and the crew made an immediate north-to-south pass through the storm, then an immediate southeast to northeast pass, essentially flying a giant K-shaped pattern. This sent the crew through the strongest part of the storm cells, but the data was needed. "And we were getting along so well with the forecasters today, too," Harder quipped. After the fifth pass through the eye, the crew was pointed in the right direction for a quick flight straight to St. Croix. "People who live on the coast tell us what we do means a lot to them," observes Harder, who has been flying into storms for twenty-one years. Harder was one of the many people at Keesler whose life was disrupted by Hurricane Katrina in 2005. "The accuracy of the National Hurricane Center's forecast is critical. A difference in twenty miles in landfall is the difference between a hurricane hitting Fort Lauderdale or Miami. Thai information is important to emergency crews. Evacuating an area costs roughly a million dollars a mile. So the better the predictions are, the more efficiently and effectively the right people can be helped. What we do is important.

The Air Force Reserve “Hurricane Hunters” are tasked by the National Weather Service to fly their first winter storm of the season on the East Coast starting Friday. The 53 Weather Reconnaissance Squadron “Hurricane Hunters” assigned to the 403rd Wing, Keesler Air Force Base, Miss., are perhaps best known for their primary mission: to collect weather data during tropical storms, enabling forecasters to make more accurate predictions. “We help save lives,” said Tech. Sgt. Troy Bickman, dropsonde system operator and weather reconnaissance loadmaster. “The National Hurricane Center can only get so much information by satellite. You have to have the aircraft go into that storm to get information that they can’t retrieve by looking at it.” To the people waiting for the forecast, the information the Hurricane Hunters collect can mean the difference between spending hundreds of thousands in preparing for the weather rather than millions of dollars reacting to it. “We don’t make predictions,” said Sergeant Bickman. “But the information we receive and send allows forecasters to make a more accurate forecast. And it helps in making evacuation decisions for the city that the storm may hit.” Between hurricane seasons, the Hurricane Hunters have a lesser known, but equally important role: collecting weather data during winter storms. Each year, the Hurricane Hunters collect storm data in the Pacific, Atlantic and Gulf of Mexico said Lt. Col. Jon Talbot, aerial reconnaissance weather officer since 1992. The idea is to fly winter storms before they happen to make the forecast better for the entire Northeastern community, he said. The return of investment for flying winter storms and collecting data is an estimated 15 percent greater accuracy in weather forecasting. “There are some 5,000 salt trucks in New York City alone,” said

Colonel Talbot. “The increase in forecasting accuracy directly impacts emergency management capabilities by reducing the unnecessary dispatch of resources, which can be costly.” The Hurricane Hunters fly WC-130Js at high altitudes, typically 5-10,000 feet above their normal range, and drop small weather canisters, or dropsondes, designed to collect weather data in key locations of high weather activity. Weather information collected from the dropsondes is then transmitted to the NWS and is ultimately used by forecasters to assess weather patterns enabling them to forecast more accurately. “When you fly a hurricane mission, you know you’re making a difference,” said Colonel Talbot. “With this mission, we know there are people waiting for the information we give to make the best possible forecast.” 12/18/2009

Airmen and WC-130Js from Air Force Reserve Command's 53 Weather Reconnaissance Squadron at Keesler AFB, Miss., are operating out of JB Elmendorf, Alaska, collecting data on winter storms heading towards the US mainland from the Pacific Ocean. Known as the Hurricane Hunters for monitoring the powerful storms in the Gulf of Mexico and over the Atlantic Ocean during the warner weather months, these Reservists and their specially modified C-130s, now flying over the Pacific Ocean, are helping National Oceanographic and Atmospheric Administration officials generate more accurate forecasting models on the winter storms. "That [information] can be crucial for residents living in harm's way," said Lt. Col. Roy Deatherage, aerial reconnaissance weather officer with the squadron. He added, "These forecasts provide people in the path of the storms with warnings that can save lives." The Hurricane Hunters will fly the winter storm-watch missions through April 30. 2011

The Air Force is upgrading its WC-130J Hurricane Hunter fleet with satellite telephones to give aircrew an unbroken communication link flying through storms and at low altitudes. "We tend to fly fairly low and a lot of times we're not in [air traffic control's] radar coverage" or able to communicate via radio, said 53 Weather Reconnaissance Squadron chief meteorologist Lt. Col. Jon Talbot. "We're too low and all this stuff is line of sight," he explained in a May 20 release. Technicians have installed commercial Iridium satphones on five of the 10-strong WC-130J fleet and the phones "worked perfectly," said Talbot. "We now have a capability to call the National Hurricane Center and give them updates and discuss the data we are seeing during a storm," he said. System installation should be completed on the entire fleet by July, according to the release. 2014

Airmen with the Air Force Reserve's 53 Weather Reconnaissance Squadron at Keesler AFB, Miss., completed their first storm mission of the 2015 season. Although storm season typically runs June 1-Nov. 30, the Hurricane Hunters began tracking what would become Tropical Storm Ana over the Caribbean on May 7. The storm hit the US on May 11, making landfall in Myrtle Beach, S.C., with maximum sustained winds of 45 miles per hour, according to a release. It was downgraded to a tropical depression as it moved inland. Aircrews from the 53 flew a total of six sorties, averaging six- to eight-hours each, aboard their WC-130J, flying right into the bad weather where they dropped airborne vertical atmospheric profiling systems (AVAPS), commonly known as dropsondes. The devices measure things like wind, temperature, and humidity and relay the information to the National Oceanic and Atmospheric Administration's National Hurricane Center, which both provides the 53 WRS its taskings and uses the data it

receives every 10 minutes from the dropsondes to improve its own storm tracking models. "There have been tropical storms every month of the year throughout history," said Maj. Doug Gautrau, an aerial reconnaissance weather officer with the 53 WRS. "But we're [always] prepped and ready to get into the game." 2015

The Air Force Reserve's "Hurricane Hunters" have deployed to Joint Base Pearl Harbor-Hickam, Hawaii, flying missions to collect data on Hurricane Guillermo. The specially equipped WC-130J and crew from the 53 Weather Reconnaissance Squadron from Keesler Air Force Base, Miss., began flying data-gathering flights on Sunday, Aug. 9. The hurricane became a Category 2 storm on Aug. 7, with winds of up to 105 miles per hour. The storm is expected to pass north of Hawaii; although a tropical storm warning has been issued for the Eastern Islands, with the lower half of the storm forecast to pass nearby. The crew will fly about every 12 hours, passing through the eye of the storm four to six times, according to USAF officials. The aircraft will deploy a meteorological instrument called a dropsonde to collect temperature, wind speed, wind direction, humidity and barometric pressure data. The squadron flew its first mission in May, when it conducted flights to track Tropical Storm Ana off the southeastern coast of the US. 2015

The Air Force Reserve's 53 Weather Reconnaissance Squadron has been conducting around-the-clock operations flying into Hurricane Matthew to collect critical weather data for the National Hurricane Center in Miami to improve the center's computer models that forecast movement and intensity. The squadron, part of the 403rd Wing and better known as the Hurricane Hunters, has been flying the storm since Sept. 26. They started flying the storm from the Henry Rohlsen Airport, St. Croix, U.S. Virgin Islands, and moved operations to Keesler Air Force Base Oct. 5. Hurricane Matthew formed off the coast of Africa in late September, became a hurricane Sept. 29 and rapidly intensified to Category 5. It hit Haiti Oct. 4, the Bahamas Oct. 6, and made its way up the Florida coastline Oct. 7 as a Category 2 storm.

First Lt. J. Kelsie Carpenter was the aerial reconnaissance weather officer on a flight that left at 4 a.m. Oct. 7 and returned at 2 p.m. In addition to the aerial reconnaissance weather officer, the crew consists of a pilot, co-pilot, navigator and a weather loadmaster. They work together to collect vital data on a storm's intensity and direction that assists the NHC with their forecasts and storm warnings. "We got a lot of good information and data today," Carpenter said. "We learned it's a strong storm; it's slowly weakening, but its proximity to coast is why it's important and why we are flying it around the clock."

To gather this data, the aircrew flew through the eye of Hurricane Matthew six times to locate the low-pressure center and circulation of the storm. During each pass through the eye, they released a dropsonde, which collects weather data on its descent to the ocean surface, measuring wind speed and direction, temperature, dew point and pressure. During storm flights, the aircrews transmit weather data via satellite communication every 10 minutes to the NHC. On Oct. 7, the Hurricane Hunters found winds up to 120 mph at an elevation of 10,000 feet and 110 mph at the surface, said Carpenter.

"With this kind of storm, where it's so close to the East Coast, any variation or diversion in track, whether that's five or 10 miles, can mean a lot to those people who live in those impacted areas. The more accurate information we get the more they can fine tune the

forecast and keep people safe," Carpenter said. The storm currently has taken more than 800 lives and left thousands without power. Capt. Lucas Caulder, a 53 WRS pilot who has flown through the eye of Matthew 27 times, stressed the importance of heeding storm warnings and evacuation orders. He said he is proud of the mission and service the Hurricane Hunters provide to the people in the community and the U.S. "This way people can make an informed decision on whether to hunker down or get out of town," he said.

In January 2021, the 53 WRS kicked off its winter storm flying campaign and conducted aerial weather reconnaissance threw winter storms in the Atlantic and Pacific Ocean Basins. Additionally, in February Airmen began conducting aerial weather reconnaissance for Atmospheric Rivers in the Pacific Northwest. Airmen partnered with scientists from SCRIPPS Institution of Oceanography, and the partnership has become a stable feature of the winter storm flying season since 2016 when the partnership first began.

Approximately 44 personnel and two WC-130J aircraft deployed to Reno-Tahoe International Airport to conduct the first missions in February, with multiple crew changes occurring over the next two months. Airmen were tasked with three missions and flew approximately 10.5 hours in February, with inclement weather and aircraft maintenance causing delays and hindering mission success. Mission taskings intensified in March and the squadron was tasked with 12 missions, of which only two met full criteria for success. Airmen flew approximately 10 total missions and logged 105.9 flight hours. The Atmospheric Rivers campaign concluded by the end of March as SCRIPPS scientists did not track any further storm activity in which to conduct reconnaissance. Airmen subsequently returned to Keesler AFB. In total, Airmen completed 25 out of 26 winter storm taskings and achieved a mission success rate of 69%. With Atmospheric Rivers missions included, Airmen flew approximately 406.7 hours during the campaign. 2021

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