Global Hawk #872 09/14/12 - 09/15/12

Aircraft:
Global Hawk - AFRC #872 (See full schedule)

Flight Number:
872-0098

Payload Configuration:
HS3 - TN872 2012 config

Nav Data Collected:
No

Total Flight Time:
22.4 hours

Submitted by:
Chris Naftel on 09/18/12

Flight Segments:

<table>
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<th>From</th>
<th>To</th>
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<th>Finish: 09/15/12 12:21 Z</th>
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<td>Flight Time: 22.4 hours</td>
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Log Number: 12H002
PI: Marilyn Vasques

Funding Source:
Hal Maring - NASA - SMD - ESD Radiation Science Program

Purpose of Flight:
Science

Comments:
The science target was Tropical Storm Nadine, which became Hurricane Nadine while TN872 was over the storm in the Atlantic. 70 sondes were deployed during the mission, including at least one drop into the eye. SHIS and CPL operated nominally.

Flight Hour Summary:

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13H008 Flight Reports

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Source URL: https://espo.nasa.gov/glopac/flight_reports/Global_Hawk_872_09_14_12_-_09_15_12

Page Last Updated: April 22, 2017

Page Editor: Dan Chirica

NASA Official: Marilyn Vasques

Related Science Report:

HS3 - Global Hawk #872 09/14/12 - 09/15/12 Science Report

Mission:
Hurricane and Severe Storm Sentinel (HS3) Mission

2012-09-14 Flight Report

This was the 2nd full science flight for HS3. The mission was designed to sample TS Nadine using a basic east-to-west lawnmower pattern. The aircraft took off 2012-09-14 at 13:57 Z (9:57 AM EDT) and landed 2012-09-15 at 12:23 Z (8:23 AM EDT). Takeoff was delayed a bit because of aircraft issues, and landing was a bit early because of cross-wind limits on the airfield. The GH passed over a front on the transit to Nadine. Satellite observations indicated some extremely cold cloud tops (~90?C) over Nadine that led to a diversion on the 3rd W-E leg of the flight in order to avoid passing over deep convective systems. A very cold cirrus shield spread over a vast region near the core of Nadine that had wide-spread cloud top temperatures of about -70?C. These very high cirrus clouds (~15 km) were observed by CPL over large areas. The dropsonde system showed minimum temperatures near the tropopause of about -70?C. At 2300 PM EDT, Nadine was upgraded to a hurricane by the NHC. The final E-W track was shortened in order to return early to WFF to avoid the high cross winds for landing. The GH turned northward at 06:22 Z in order to intercept the core of the storm. At 07:19 UTC we began a series of dropsondes in order to measure the eye-wall and eye (although obscured by cirrus in the GOES IR imagery). During this rapid drop phase (~30?N), the GH veered east to offset the flight track 15 miles to the east. This south-to-north leg was completed at about 07:30, and the plane turned WNW for home. A final drop was made on a spiral band along this transit track. A total of 71 drops were made during the flight, and CPL and SHIS worked over the entire course of the flight.

Flight Scientists:

Shift 1 (1600-0100 UT): Scott Braun and Ed Zipser
Shift 2 (0000-0900 UT): Bob Houze, Deanna Hence
Shift 3 (0800-1600 UT): Paul A. Newman, Chris Thorncroft, Steve Guimond
Shift 4 (0800-1230 UT): Jim Doyle, Jerry Heymsfield, Pete Black

Missions: Flight 2 into TS Nadine (Sept. 14-15). Nadine is moving northward and showing an excellent pattern of outflow. It has been struggling to intensify due to shear. At takeoff, it shows a significant convective burst with brightness temperatures <-70C near the core. The flight pattern consists of a north-to-south oriented lawnmower with 6 legs oriented west-to-east. The storm is currently approaching the center of the box near takeoff time. Takeoff was delayed by ~2 hours because of problems loading encryption keys into the aircraft.

Takeoff at 1357 UTC

1440 UTC Leaving Test Track C
Nadine is well centered within the flight plan area at takeoff time.

GOES winds at 12UTC relative to the flight pattern. Flight will sample the outflow of the storm very well.
Convection associated with a frontal wave to the west of Nadine at 1506 UTC. Cloud tops are around 35kft along the flight route, up to 40kft further south.

1635 No dropsonde yet. Communication error. Skipped first drop point. Approx position at 1635 below:
1701 Drop 2 launched at NW corner of the pattern. See below. Note high cloud tops near the center of the pattern in the image below.

1715 Drop 3 launched

1728 Drop 4 launched
1743 Drop 5 launched
1756 Drop 6 launched
1809 Drop 7 launched

1824 Drop 8 launched
1833 Drop 9 launched
1848 Drop 10 launched
1901 Drop 11 launched at NE corner
1915 Thought: This storm is acting like it's going through ET

1921 Drop 12 launched. A/C turning westbound at 32N

1934 Drop 13 launched

1946 Drop 14 launched

2003 Drop 15 launched
2018 Drop 16 launched
2032 Drop 17 launched

Image below shows lightning along 30 deg track at about 2040
2045 Drop 18
2058 Drop 19
2113, 2126, 2146 Drops 20, 21 & 22

NOTES FOR THE RECORD: Based on the large area of high cloud tops between 28 and 31 N and lightning along the 30 N planned track, we revised the flight track to divert around the main convective area. This change had to be made with sufficient lead time to allow the pilots to file for the new point.

2200 Drop 23
New flight track and cloud tops at about 2200
LESSONS LEARNED:

1. Need to post key phone numbers prominently at the Mission Scientist station (Paul, Scott,
2. 2 mission scientists need to be on duty so one can go back to the hangar and work on revising flight
tracks
3. A person able to make revised flight tracks need to be on duty at all times during flights to determine new
points and post the new track in Mission Tools
4. A protocol needs to be in place for whom the Mission Scientist should call in case of flight revisions
5. Need clearer rules regarding when to make flight track revisions (aggressive vs conservative)
6. Need email list for emailing new flight coordinates (who should get it and who should not get it)
7. Need to be prepared to act quickly with sufficient lead time for pilots to refile. (Today the pilots needed to
refile 40 min in advance of the diversion.)
8. Needs to be understood that Mission Scientists are not ?forecasters.? We are assessing situations
based on old information.

2211, 2228, 2241, 2256, 2328, 2339, Drops 24-29

15 September 2012

0000 UTC, P27 looks good in lightning!
0000, 0015 0050 0104 Drops 30, 31, 32, 33, 34,
Chris Thorncroft signing in 0111Z
0117 Drop 35
0130 Drop 36
Drop 36 dropped into a drier inflow region to the storm ? see fig below

0145 Drop 37
This drop was back in the cloudier region ? see fig below
Very high cloud tops and very optically thick for most of this recent sequence

0159 Drop 38

0212 Drop 39

0227 Drop 40: Moving out into the clear air now

0241 Drop 41: GH has now passed into an area with relatively clear skies and scattered clouds below 2km. Both CPL and SHIS show almost nothing below us.

0255 Drop 42

As of 11pm AST Nadine was classified a hurricane by NHC
Estimates from forecasters: S-N track should be between 51 and 52W, but closer to 52W
0316 Drop 43
0332 Drop 44
0346 Drop 45
0401 Drop 46 still on the dry and mostly cloud-free side of the storm, SW of storm center
0415 Drop 47
0430 Drop 48
0447 Drop 49
0458 Drop 50
0502 Drop 51
0518 Drop 52
Decision is to fly North on 52N but if convection gets too high we will veer to east of it.
Drop 53 will be made before the turn
0537 Drop 53

Lowest brightness temperatures are starting to ?swing around? eastwards on the southern side of the coldest cloud tops ? towards 52W longitude.

MS is working with AVAPS to have a period of quick-released drops close to the center of the storm. We hope to release 5 or 6 in quick succession.
0556 UTC Drop 54
06011 UTC Drop 55
Next drop after turn north
0622 UTC Drop 56
Heading for the ?eye?!
Will start rapid dropping at 29.8 degrees N

0633 UTC Drop 57
0645 UTC Drop 58
0656 UTC Drop 59
0708 UTC Drop 60
0719 UTC Drop 61 approaching edge of convection (JDD edit on time release from 0718)

Have requested that plane veers to east after 30N, to take 30deg heading, to offset path 15 miles to east
0721 UTC Drop 62
0723 UTC Drop 63
0724 UTC Drop 64
0725 UTC Drop 65
0728 UTC Drop 66
0729 UTC Drop 67

CT ? comment ? I may have too many drops counted ? need to confirm with AVAPS

After the rapid drop we returned back to the original flight path on 52N. At the same time new convection appeared to our east! See figure below:
0745 UTC Drop 67
0807 UTC Drop 68
0819 UTC Drop 69
0829 UTC

JDD ? Last drop was near the edge of the brighter band in the IR (drop 69), on the Ferry Leg back. This was an additional drop added. (above)
0843 UTC IR. Nadine has made a sharp turn to the east in the last hour

0853 UTC Cloud top heights are relatively low in the trough, however, pilots were concerned because of the lightning.
0917 UTC: Lightning and convective cloud tops (NRL). The amount of lightning in the trough has decreased with time.

0937 UTC: Dropsondes have gotten into the ECMWF and Navy data assimilation systems.

1223 UTC: Landing

18z coverage from yesterday
00Z coverage from last night

18Z observation coverage from Navy
00Z coverage from Navy

Images:

1 - 1245 UTC

1330 UTC

1506 UTC
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Flight Reports began being entered into this system as of 2012 flights. If there were flights flown under an earlier log number the flight reports are not available online.

### 12H002 Flight Reports

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