

U.S. Dept. of Commerce / NOAA Aircraft Operations Center		
Fit ID: 101106I	From: KTLSX	To: KACF
Fit No: 11-04	Blk In: 15582	ATA: 15482
ETD: 0800Z	Blk Out: 0741Z	ATD: 0805Z
EJE:	Blk Time: 8:17 (8.3)	Fit Time: 7:43 (7.7)
Sponsor Org: EML	Program: HURRICANE TDR	Purpose: # TOMAS TS

AOC Personnel	
AC: HALVERSON	Sys Eng: SMITH
CP: NELSON/SWEENEY	Data Sys: NAEHER
Nav: SLOAN	Radar: PAUL
FE: FLOYD/DARBY	GPS/BT: MASCARO
FD: DAMIANO	Cid Phys ROTTEVEEL
Avionics:	

Participating Scientists / Visitors / AOC		
Name (Last, First)	Activity on Aircraft	Affiliation
ABERSON	PI	HRD
GRAMACHE	RADAR	↓ NASA
VUKICEVIC	WORKSTATION	
LATHAM	CCN	

Proposed/Actual Mission Remarks (Recco, Fixes, Storm, PENET, NHOP #)

AF 0531Z
21°18' 992m
71°51'
AF 0650Z
21°33' 993s
71°40' 260/12
2146' 0756Z
71°30' 993s

T/O delayed due to APU door not closing; so had to shut down #1+2 to resolve problem
NO King LWC

2121A TOMAS NOAA43
0944Z
22°08' 992s 10K
71°10'
22°22' E992 10K
71°01' 1050Z
22°35' 1202Z at 5K
70°53' 990s
22°48' 1310Z 10K
70°41' 993s

U.S. Dept. of Commerce / NOAA / Aircraft Operations Center

Accw-2

File ID: 1011061 Time Off: 0805Z Time On: 1548Z

A/C (Take Off) 1007.3 Wx Station (Take Off) 29.84 A/C (Land) 1023.3 Wx Station (Land) 30.24

Pressure 1007.3 29.84 / 1007.3 1023.3 30.24 / 1023.1

Number Data Disposition / Date / Quality 16/3

Flt Lvl Tapes 2

Radar Tapes 1

Cloud Physics Tapes

Video Tapes

AXBT

AXCP

AXCTD

Dropsondes 15 14 good; 2 bad; 14 tempdrop messenger sent to NHC

Forward Left Side Right Side Down Remarks

Time On

Time Off

Rate

Remarks 27/24 TFSK

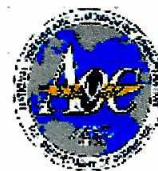
1024.3

30

24
32
56
(2)



**NOAA P-3 N43RF
ERROR SUMMARY
HURRICANE 2010**



Flight ID: 101106I

TS TOMAS

Sensor or system	Number or Name
INE (for wind derivation)	INE1
Accelerometer	ACC1
Temperature Probe	TT1
Dew Point Probe	TDM2 (EdgeTech)
Altitude (for vertical wind)	ALTI1 (GPS)
Static Pressure	PSF
Dynamic Pressure	PQF1
Time Source	Micro 99
Constants File	n43_hur10v3.adc
Project Directory	/acdata/2010/MET

Notes:

There were no time/data gaps.

Dewpoint sensor #2 (TDM2...EdgeTech) values were replaced with dewpoint sensor #3 (TDM3...Maycomm TDL) values from 080201Z – 132821Z using the equation,

$$\text{TDM2} = \text{TDM3} - 1.50$$

Also TDM2 values were replace with TDM3 values from 153631Z - 155100Z. The replacement of TDM2 values with TDM3 values was done via direct substitution,

$$\text{TDM2} = \text{TDM3}$$

Post-flight analysis showed that all three (3) dewpoint sensors behaved erratically at various times throughout the flight. Also during the flight there were instances where dewpoint temperature values exceeded derived ambient temperature values resulting in relative humidity values above 100%. These situations occurred during heavy precipitation events.

The King Liquid Water sensor was not operating during the flight.

All other instruments worked optimally during the flight.

Fifteen (15) dropsondes were deployed with 14 being good and one (1) bad. Fourteen (14) tempdrop messages were sent to NHC.

SPECIAL NOTE!!! The variable names dpj_wgs, dpj_was and dpj_wz in the netCDF file represent vertical ground speeds , vertical air speeds and vertical wind speeds, respectively, computed using Dave Jorgensen's vertical wind algorithm. It is recommended that these values be used for vertical wind analysis.

	Takeoff (0805Z)	Landing (1548Z)
Aircraft Static Pressure	1007.3 mb	1023.3 mb
Corrected Tower Pressure	1007.3mb	1023.1 mb
Flight Director:	A. Barry Damiano (813) 828-3310 ext. 3073	

DATE		SCHEDULED RX TIME	AIRCRAFT NUMBER	FLIGHT DIRECTOR
WX MISSION IDENTIFIER				OB NUMBER
VORTEX DATA MESSAGE				
A	06 / 0944 Z		DATE and TIME of FIX	
B	22 DEG 08 MIN N S		LATITUDE of FIX	
	71 DEG 10 MIN W E		LONGITUDE of FIX	
C	700 MB 3021 M		MINIMUM HEIGHT of STANDARD LEVEL	
D	48 KT		ESTIMATE of MAXIMUM SURFACE WIND OBSERVED	
E	134 DEG 16 NM		BEARING and RANGE FROM CENTER of MAXIMUM SURFACE WIND	
F	223 DEG 65 KT		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER	
G	135 DEG 25 NM		BEARING and RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND	
H	992 MB		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.	
I	10 C / 3056 M		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE OUTSIDE EYE	
J	13 C / 3063 M		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE INSIDE EYE	
K	10 C / WA C		DEWPOINT TEMP / SEA SURFACE TEMP INSIDE EYE	
L	NA		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.	
M	NA		EYE SHAPE/ORIENTATION/DIAMETER: Code eye shape as: C - Circular; CO - Concentric; E - Elliptical. Transmit orientation of the major axis in tens of degrees, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. Examples: C8= Circular eye 8 miles in diameter. E09/15/5=Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5 NM. CO8-14=Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.	
N	1345/7		FIX DETERMINED BY / FIX LEVEL. FIX DETERMINED BY: 1-Penetration; 2-Radar; 3-Wind; 4-Pressure; 5-Temperature. FIX LEVEL (Indicate surface center if visible; indicate both surface and flight level centers ONLY when same): 0-Surface; 1-1500 ft; 9-925mb; 8-850mb; 7-700mb; 5-500mb; 4-400mb; 3-300mb; 2-200mb; NA-Other	
O	1 / 1 NM		NAVIGATION FIX ACCURACY / METEOROLOGICAL ACCURACY	
P	REMARKS			
MAX FL WIND 65 KT SE QUAD 0938 Z 990 MAX OUTBOUND FL WIND 32 NW QUAD 0951 Z 213/12				

INSTRUCTIONS: Items A thru G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available for scheduled fixes and at the Flight Director's discretion for unscheduled (intermediate) fixes.

DATE		SCHEDULED RX TIME	AIRCRAFT NUMBER	FLIGHT DIRECTOR
WX MISSION IDENTIFIER				OB NUMBER <u>9</u>
VORTEX DATA MESSAGE				
A	<u>6 / 1050 Z</u>		DATE and TIME of FIX	
B	<u>22 DEG 22 MIN N S</u>		LATITUDE of FIX	
	<u>71 DEG 01 MIN W E</u>		LONGITUDE of FIX	
C	<u>700MB 3623 M</u>		MINIMUM HEIGHT of STANDARD LEVEL	
D	<u>42</u> KT		ESTIMATE of MAXIMUM SURFACE WIND OBSERVED	
E	<u>239 DEG 11</u> NM		BEARING and RANGE FROM CENTER of MAXIMUM SURFACE WIND	
F	<u>308 DEG 44</u> KT		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER	
G	<u>239 DEG 19</u> NM		BEARING and RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND	
H	<u>EXTRAP 992</u> MB		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.	
I	<u>11 C / 3045 M</u>		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE OUTSIDE EYE	
J	<u>14 C / 3048 M</u>		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE INSIDE EYE	
K	<u>9 C / NA C</u>		DEWPOINT TEMP / SEA SURFACE TEMP INSIDE EYE	
L	<u>NA</u>		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.	
M	<u>NA</u>		EYE SHAPE/ORIENTATION/DIAMETER: Code eye shape as: C - Circular; CO - Concentric; E - Elliptical. Transmit orientation of the major axis in tens of degrees, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. Examples: C8= Circular eye 8 miles in diameter. E09/15/5=Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5 NM. CO8-14=Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.	
N	<u>1345/7</u> <u>A</u>		FIX DETERMINED BY / FIX LEVEL. FIX DETERMINED BY: 1-Penetration; 2-Radar; 3-Wind; 4-Pressure; 5-Temperature. FIX LEVEL (Indicate surface center if visible; indicate both surface and flight level centers ONLY when same): 0-Surface; 1-1500 ft; 9-925mb; 8-850mb; 7-700mb; 5-500mb; 4-400mb; 3-300mb; 2-200mb; NA-Other	
O	<u>1 / 1</u> NM		NAVIGATION FIX ACCURACY / METEOROLOGICAL ACCURACY	
P	REMARKS <div style="text-align: center;"> <u>NE</u> <u>1056</u> MAX FL WIND <u>69</u> KT <u>69</u> QUAD <u>NE</u> <u>Z</u> <u>OUTBOUND AND</u> </div>			

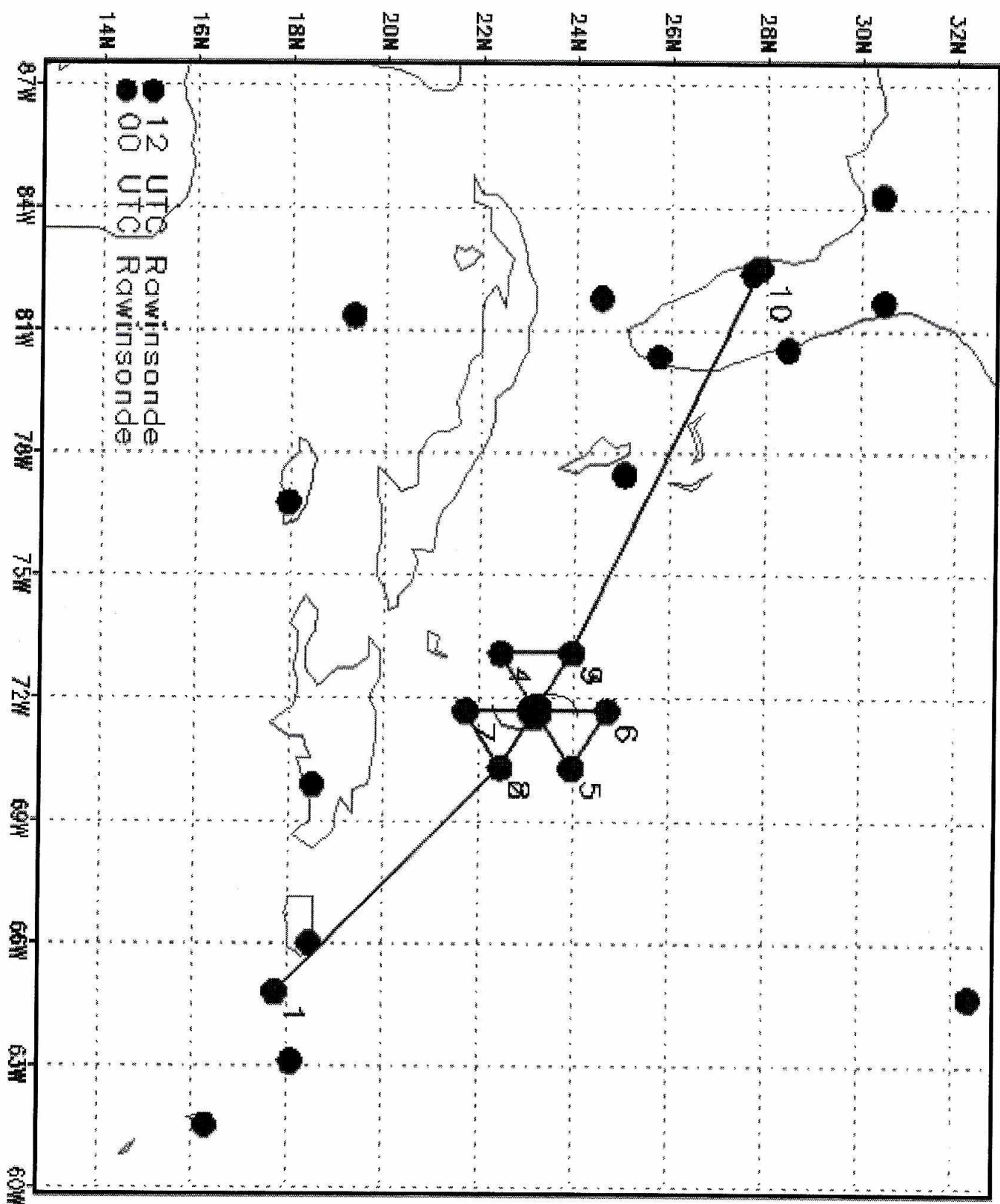
INSTRUCTIONS: Items A thru G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available for scheduled fixes and at the Flight Director's discretion for unscheduled (intermediate) fixes.

DATE		SCHEDULED RX TIME	AIRCRAFT NUMBER	FLIGHT DIRECTOR
WX MISSION IDENTIFIER				OB NUMBER 13
VORTEX DATA MESSAGE				
A	6 / 1202Z		DATE and TIME of FIX	
B	22 DEG 35 MIN N		LATITUDE of FIX	
	70 DEG 53 MIN W		LONGITUDE of FIX	
C	850 MB 1363 M		MINIMUM HEIGHT of STANDARD LEVEL	
D	42 KT		ESTIMATE of MAXIMUM SURFACE WIND OBSERVED	
E	352 DEG 13 NM		BEARING and RANGE FROM CENTER of MAXIMUM SURFACE WIND	
F	78 DEG 50 KT		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER	
G	354 DEG 19 NM		BEARING and RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND	
H	990 MB		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.	
I	18 C / 1464 M		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE OUTSIDE EYE	
J	20 C / 1576 M		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE INSIDE EYE	
K	14 C / NA C		DEWPOINT TEMP / SEA SURFACE TEMP INSIDE EYE	
L	NA		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.	
M	NA		EYE SHAPE/ORIENTATION/DIAMETER: Code eye shape as: C - Circular; CO - Concentric; E - Elliptical. Transmit orientation of the major axis in tens of degrees, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. Examples: C8= Circular eye 8 miles in diameter. E09/15/5=Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5 NM. CO8-14=Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.	
N	1345/8		FIX DETERMINED BY / FIX LEVEL. FIX DETERMINED BY: 1-Penetration; 2-Radar; 3-Wind; 4-Pressure; 5-Temperature. FIX LEVEL (Indicate surface center if visible; indicate both surface and flight level centers ONLY when same): 0-Surface; 1-1500 ft; 9-925mb; 8-850mb; 7-700mb; 5-500mb; 4-400mb; 3-300mb; 2-200mb; NA-Other	
O	/ NM		NAVIGATION FIX ACCURACY / METEOROLOGICAL ACCURACY	
P	REMARKS			
<p>MAX FL WIND 69 KT NE QUAD 1056 Z</p> <p>no response banding to NA</p> <p>NAW-SW</p> <p>MAX OUTBOUND FL WIND 40 S QUAD AT 1209Z</p>				

INSTRUCTIONS: Items A thru G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available for scheduled fixes and at the Flight Director's discretion for unscheduled (intermediate) fixes.

DATE		SCHEDULED RX TIME		AIRCRAFT NUMBER		FLIGHT DIRECTOR	
WX MISSION IDENTIFIER						OB NUMBER 21	
VORTEX DATA MESSAGE							
A	6 / 13 10 Z		DATE and TIME of FIX				
B	22 DEG 48 MIN (N) S		LATITUDE of FIX				
	70 DEG 41 MIN (W) E		LONGITUDE of FIX				
C	700 MB 3031 M		MINIMUM HEIGHT of STANDARD LEVEL				
D	54 KT		ESTIMATE of MAXIMUM SURFACE WIND OBSERVED				
E	116 DEG 14 NM		BEARING and RANGE FROM CENTER of MAXIMUM SURFACE WIND				
F	203 DEG 69 KT		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER				
G	117 DEG 18 NM		BEARING and RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND				
H	993 MB		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.				
I	10 C / 3069 M		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE OUTSIDE EYE				
J	14 C / 3051 M		MAXIMUM FLIGHT LEVEL TEMP / PRESSURE ALTITUDE INSIDE EYE				
K	5 C / NA C		DEWPOINT TEMP / SEA SURFACE TEMP INSIDE EYE				
L	WA		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.				
M	NA		EYE SHAPE/ORIENTATION/DIAMETER: Code eye shape as: C - Circular; CO - Concentric; E - Elliptical. Transmit orientation of the major axis in tens of degrees, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. Examples: C8= Circular eye 8 miles in diameter. E09/15/5=Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5 NM. CO8-14=Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.				
N	1345/7		FIX DETERMINED BY / FIX LEVEL. FIX DETERMINED BY: 1-Penetration; 2-Radar; 3-Wind; 4-Pressure; 5-Temperature. FIX LEVEL (Indicate surface center if visible; indicate both surface and flight level centers ONLY when same): 0-Surface; 1-1500 ft; 9-925mb; 8-850mb; 7-700mb; 5-500mb; 4-400mb; 3-300mb; 2-200mb; NA-Other				
O	1 / 1 NM		NAVIGATION FIX ACCURACY / METEOROLOGICAL ACCURACY				
P	REMARKS						
<p>MAX FL WIND 69 KT SE QUAD 1305 Z</p> <p>Dropsonde wind 112/23 at splash</p> <p>Ragged band SW-SE</p> <p style="text-align: right;">2332 7206</p> <p style="text-align: right;">112/23</p>							

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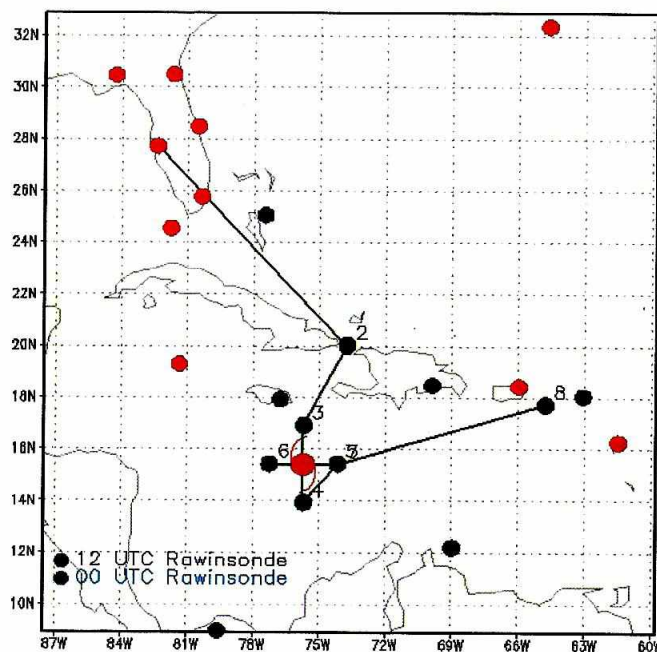
Flt Dir: DAMIANO

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Mission Summary
20101104I1 Aircraft 43RF
TDR Mission Summary
Tropical Storm Tomas

Aircraft Crew (43RF)	
Aircraft Commander	Mark Nelson
Co-pilot	Harris Halverson
Co-pilot	Mark Sweeny
Flight Engineer	Dewie Floyd
Flight Engineer	Paul Darby
Navigator	Chris Sloan
Flight Director	Barry Damiano
System Engineer	Dana Naehner
Data Technician	Mike Mascaro
Dropsonde Operator	Jeff Smith
Crew Chief	Kevin Rotteveel

Scientific Crew (43RF)	
Lead Scientist	Sim Aberson
Radar Scientist	John Gamache
Dropsonde Scientist	Tomislava Vukicevic
Cloud Physics Scientist	Terry Latham (GeorgiaTech)



GrADS: COLA/IGES

2010-11-02-09:57

Mission Plan :

N43RF is scheduled to fly an EMC-tasked Tail Doppler Radar mission into Tropical Storm Tomas in the Central Caribbean Sea. Takeoff at 0800 UTC 04 November from MacDill. The plan is to go around the east side of Cuba and approach Tomas from the north. A figure-4 with 90-nm legs will be performed, leaving the aircraft on the west side of the storm. A final pass through the center from west to east is performed before recovery in St. Croix.

Mission Summary :

Take off		Landing	
MacDill AFB, FL	04/08:00UTC	St. Croix, USVI	04/15:30 UTC

101104I TOMAS at 0.5 km (m/s)

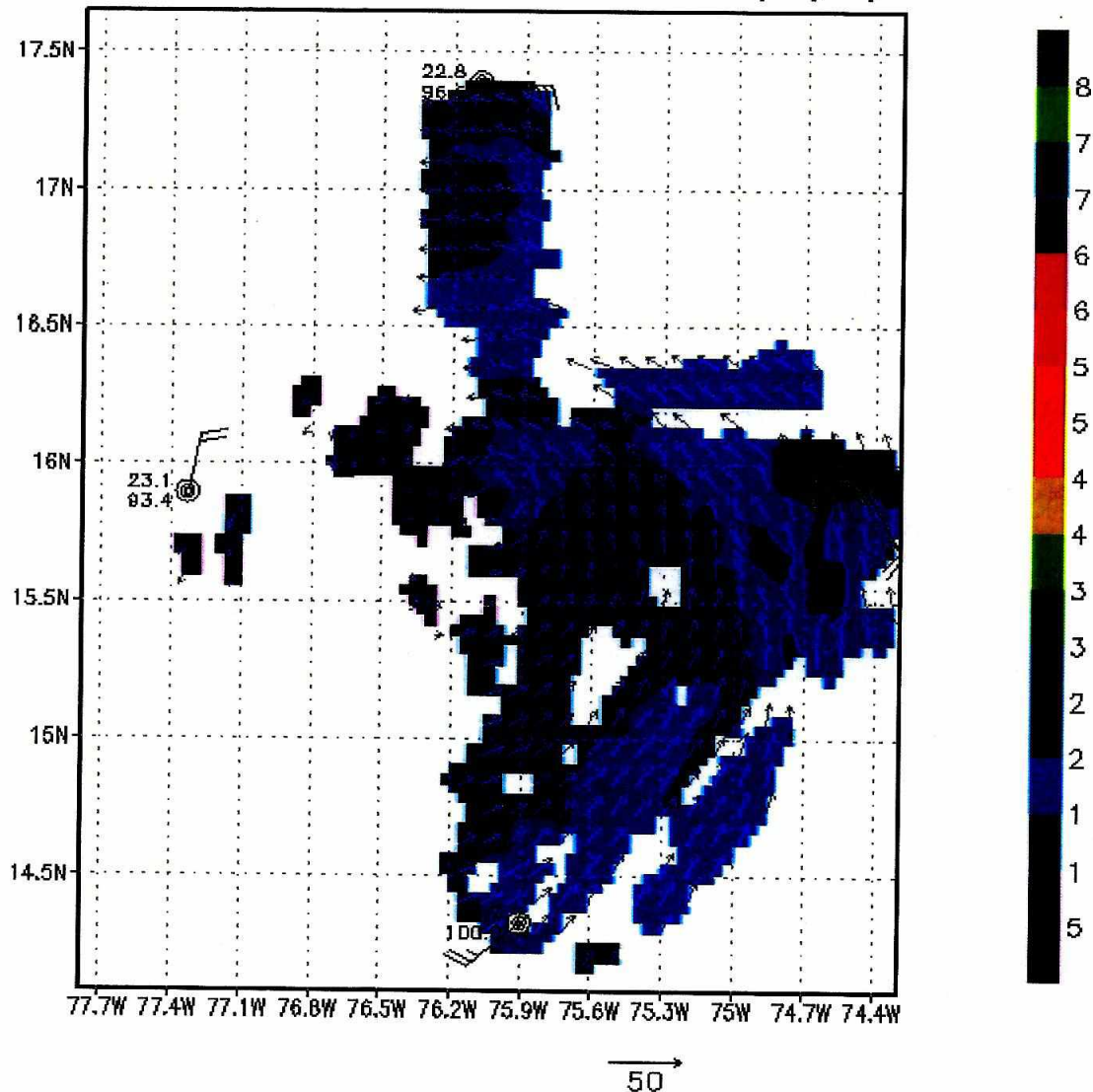
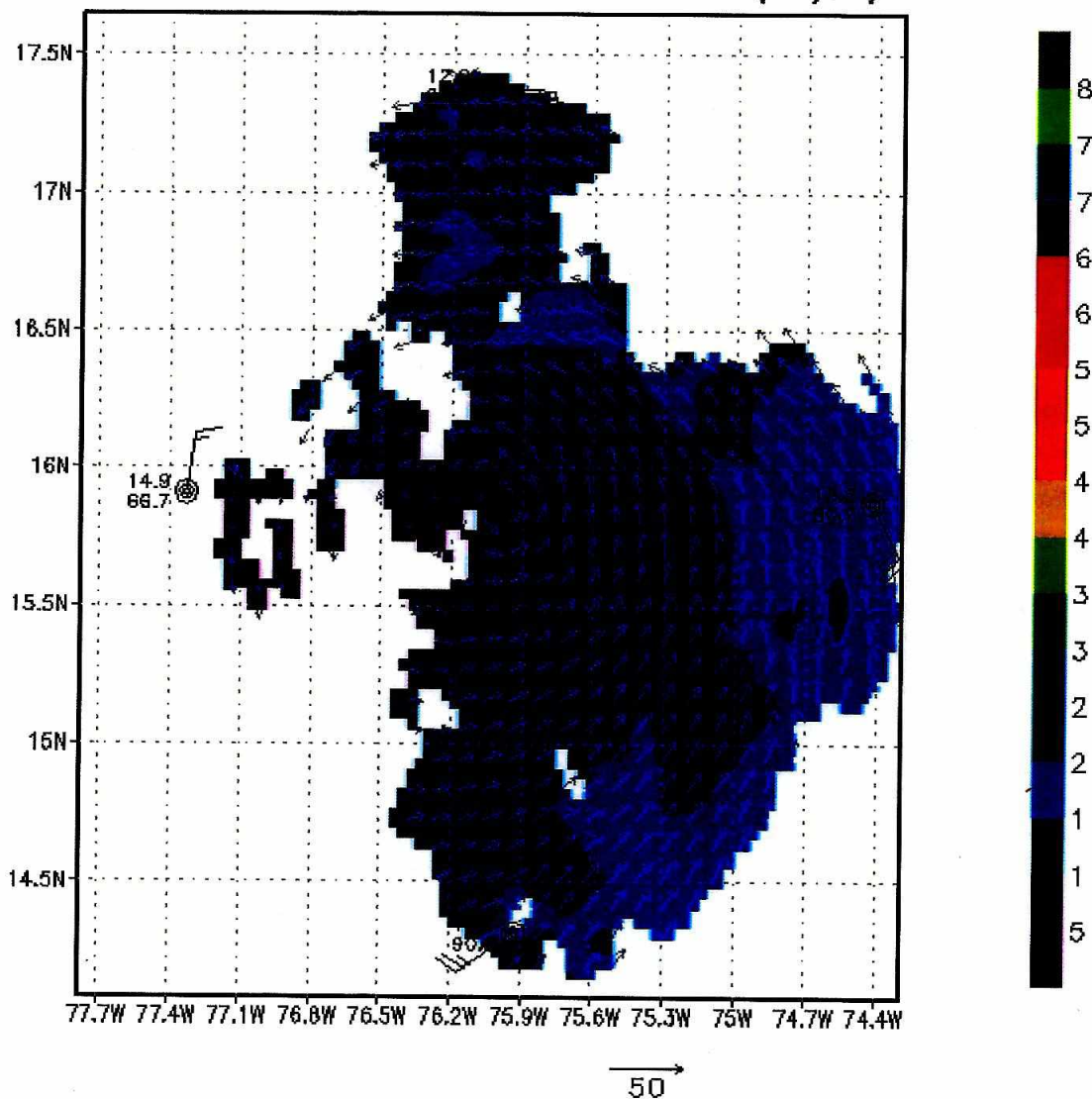


Figure 1. Dropwindsonde/Doppler radar composite at 0.5 km altitude from 20101104I1 flight into Tomas.

The mission was fully successful with 7 dropwindsondes released at the endpoints and in the center, and three radar analyses sent. Also very successful was a test of getting the radar data sent directly from the aircraft to NCEP/NCO. The satellite presentation of Tomas was not improving, but the pressure was dropping slowly before and during the flight. Tomas remained a weak tropical storm under low shear, but was not strengthening as expected. Radar composites showed an interesting structure at low levels (Fig. 1), with a very small core with a radius of maximum wind speeds of about 20 km, and an outer core with stronger winds extending more than 150 km away from the center. Strongest winds at the lowest level were in the 40-50-kt range suggesting that the initial intensity of 45 kt from NHC was a little high.

101104I TOMAS at 2.5 km (m/s)



GrADS: COLA/IGES

Figure 2: As in Fig. 1, but at 2.5 km altitude.

The inner wind speed maximum disappeared by 2.5 km altitude (Fig. 2), and the well-defined wind center disappeared by 4 km altitude (Fig. 3). All levels showed the convective asymmetry of the storm, with nearly all reflectors on the east side. No large shear was evident in the Doppler.

101104I TOMAS at 4 km (m/s)

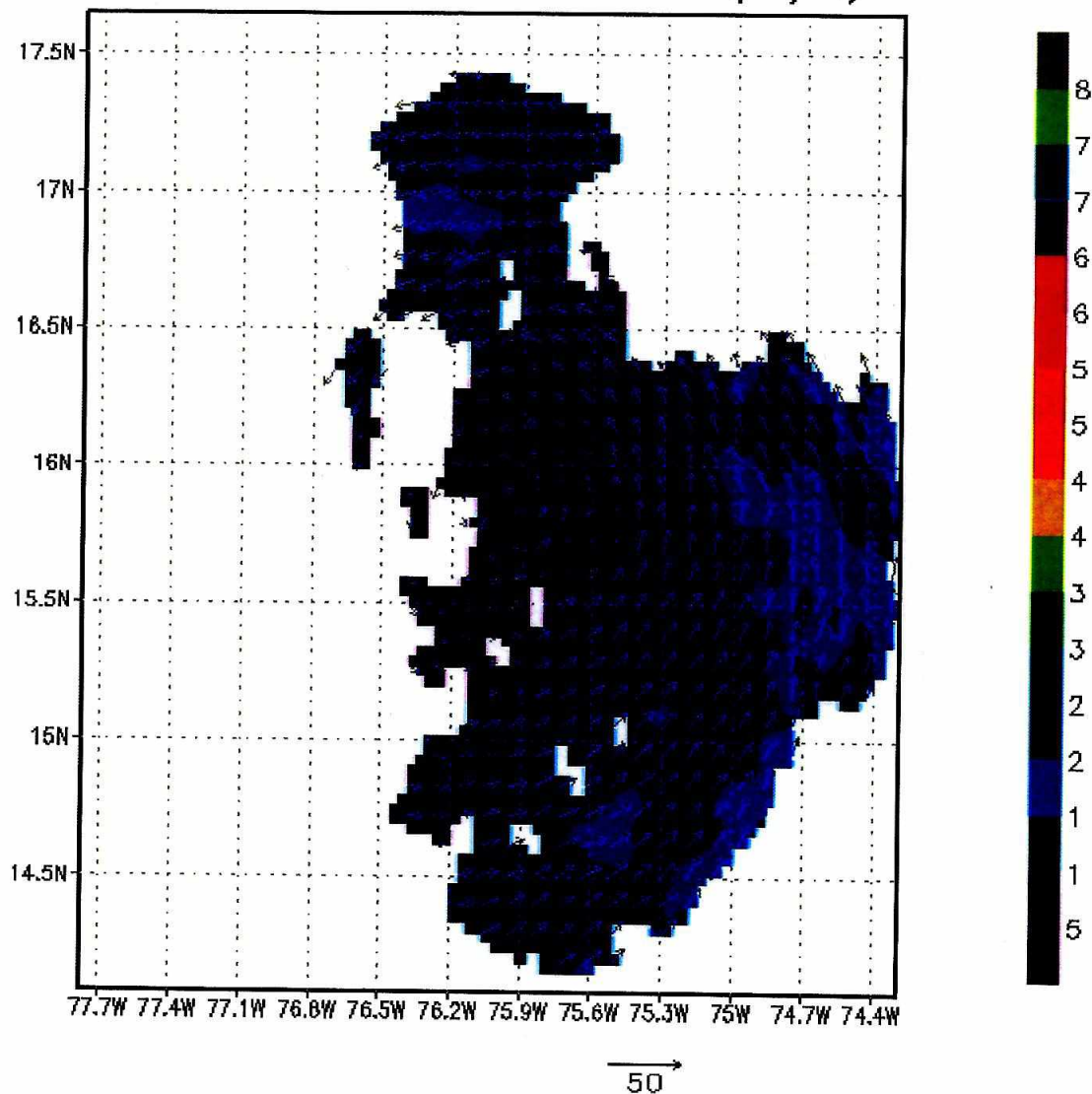


Figure 3: As in Fig. 1, but at 4 km altitude.

Problems :

There were some radar problems early in the flight that the engineers were able to fix. Otherwise, the flight was uneventful.

Mission Data :

[LPS forms](#) | [Radar forms](#) | [Dropsonde forms](#)
[Serial data](#) | [SFMR \(NetCDF\) data](#) |

22H 07120W

21322H 7146W 0650Z

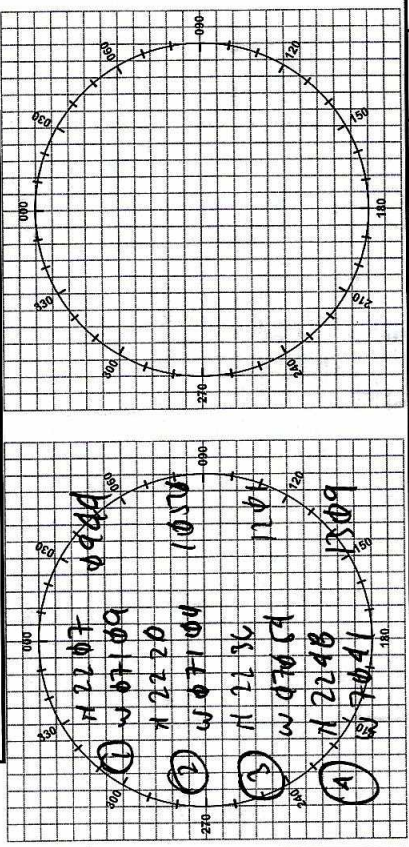
21322H 7146W 0650Z

21322H 7146W 0650Z

CLEARANCES			
FREQ	ALT	HDG	OTHER
108.15	19K		TSX KMCF VIA DCHAKA
			PAHMO UTAH) MARI) COUNY -
			BERGO BRIL 2FP 1RT
			V492 GIBBS KMCF
			10K 270
			120.65 4772 08152
			DD SHPO DD AIOX SSCIR

MISSION LOG

POSITION REPORT



EMERGENCY MESSAGE

TRANSMIT THE FOLLOWING MESSAGE TO ANY AGENCY ON THE AIR-GROUND FREQUENCY IN USE. IF UNABLE TO ESTABLISH COMMS, ATTEMPT CONTACT ON ANY OF THE FOLLOWING EMERGENCY FREQUENCIES:

UHF/VOICE 121.5 2182 KHZ 8364 KHZ 500 KHZ
HF/VOICE 243.0
MAYDAY, MAYDAY, MAYDAY
THIS IS NOAA, NOAA, NOAA
- POSITION _____ N / S
- HEADING _____ TRUE/MAG
- AT _____ KTS TRUE/INDICATED
- FLIGHT LEVEL OR ALTITUDE _____
- WE ARE A P-3 AIRCRAFT WITH _____ SOULS ON BOARD
- NATURE OF EMERGENCY _____
- ASSISTANCE DESIRED _____
- PILOT INTENTIONS _____
- WE HAVE _____ ENDURANCE REMAINING

TIME	FIX TYPE	POSITION	INS 1 POSITION	K ERR	INS 2 POSITION	K ERR	VAR +E=>	TH	DR +R=>	TRK	GS	WD	WS	ALT	TAS	NEXT PT	DIST	TIME	ETA	REMARKS
0735	SMPT	1742 6440																		67H 09X/114.2
742	TRK																			
0755	IV																			
805	TI0																			
	IV																			
	II																			
029	△	1846 6602	1846 6602	0	1846 6602	0	319 -13	306	0	306	302	165	17	146	207	SMPO	167	133	902	
0740	△	2058 6853	2058 6853	0	2058 6853	0	297 -11	286	-2	284				10K						W/TH 07H12 TO 1000W 10K DUE TO TEM 71
950	0	2221 7134					327 -11	316	-16	300	250	35	26	10K	246					
1009	△	2239 7025	2239 7025	0	2242 7024	0	095 -11	04	-17	061	203	167	56	10K	248					
1106	△	2255 7055	2255 7055	-	2258 7054	-	091 -11	180	-3	177	216	100	16	5K	227					
1215	△	2258 7102	2259 7103	-1	2259 7103	-1	308 -11	317	-15	302	257	044	07	10K	243					