U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.1 OAOWF1 FILE

FLT ID: 970112H	FM: EINN	TO: EINN
FLT NO: 97-017	BLK IN: 2053	ATA: 2042
ETD: 1200	BLK OUT: 1555	ATD: 1205
ETE: 2100	BLK TIME: 9.0	FLT TIME:
SPONSOR ORG: NOAA	PROGRAM: FASTEX	PURPOSE: M-4 Cold Frontal Rainband

OAO PERSONNEL IOP2

AC ~~KENNEDY, P~~ ✓	SYS ENG ~~TORRE~~ LYNCH, T ✓
CP KENUL, P ✓	DATA SYS MCMILLAN, S ✓
NAV ~~KORAK, S~~ ✓	RADAR BARR, J ✓
FE MOORE, B ✓	DT/ODW CARPENTER, ✓
RADIO ROGERS, M ✓	CLD PHYS
FD WHITE, S ✓	DOPPLER

PARTICIPATING SCIENTIST/VISITORS/OAO

	LAST, FIRST NAME	ACTIVITY ON A/C	AFFILIATION
#10	JORGENSON, D	SCIENTIST	NSSL
	SHEPHERD, T		NSSL
	LEMAITE, YVON		CETP
B	GRIFFITHS, MORWENNA		JCMM
	MONTMERLE, T		CETP
B	MASCART, P		METEO FRANCE
B	DEGRACE, J		METEO FRANCE
B	DAUGHERTY, J		NSSL

PROPOSED/ACTUAL MISSION/REMARKS (RECCO, FIXES, STORM, PENET, NHOP #)

27,17 ~ 1015.6 180/5 ↑ FL180

C-BAND SCAT ↓ 1240Z

29.94 ~ 1013.5

U.S. DEPT. COMM./NOAA/OAD - DATA SECTION WORK FORM NO.2 OAOWF2 FI

FLT ID: 970112H TIME OFF: 1205 TIME ON: 2047

	A/C T/O	WX STN	A/C LAND	WX STN
PRESSURE	1013.9	1014.7	1013.4	1013.5

	NO	DATA DISPOSITION/DATE/QUALITY
1/SEC FLT LVL TAPES	Y	
FAST FLT LVL TAPES	Y	
RADAR TAPES	Y	
DOPPLER TAPES	Y	
~~ODW~~ CASSETTES	N	
HARD COPIES	Y	305 1840-1920:30
AXBT		
AXCP		
ODW		

PHOTOGRAPHY

	FWD	LS	RS	VERT
ON	11562	→		→
OFF				
RATE	124			

REMARKS

Time	LA	LO	TA	TD	WD	WS	Remarks					
1151							ENG	58.3R				
1155							TAXI					
1205	LA	LO	TA	TD	WD	WS	TOFF					
					190	27						
1226	52 11.9	1024.8	5.3	-19.8	233	60.9	LEVEL 14G					
1309	51 1.1	1335.9	-3.7	-24.1	213	56	BOUY 62081	↓ 5K				
1418	51 39.6	1927.7	1.6	(1.6)	248	35.5	notice	DW	max. out			
1427	51 58.4	1955.5	2.8	0.5	240	42.8						
1444	52 1.2	1801.9	5.0	5.0	220	57.4	turn					
1505							turn					
1511	51 1.4	1855.4	3.2	4.0	230	31.9	start	NE	radar tgts			
							start	SW	radar tgts			
1609	51 42	1815	-2.0	-3.8	213	58.8	start	NE	radar tgts	@ 9k		
1635	5327.9	1240.1	-3.0	-4.0	201	47.6	start	SW	radar tgts	@ 9k		
1701	5225	1723	8.4	2.1	222	29.5	start	NE	"	"	@ 5k	
1730	54 2.4	1650.2	2.0	1.1	237	31.3	start	SW	"	"		
1807	52.5	17.0	2.8	0.9	238	41.8	start	NE	"	"	"	"
1903	5549.0	1520	4.3	3.2	207	41.0	Run	S/SW				
1938	53 55.9	1601.4	2.7	0.2	216	28.1	END	RUN				
2017							END					
2053							RUN					

FASTEX FLIGHT #2

FLIGHT #02 H970112

TYPE OF DATA	SENSOR OR OPTION
INE	1
Accelerometer	1
Temperature probe	1
Altitude change option (for vertical winds)	RA159
Static pressure	Rosemount fuselage
Dynamic pressure	Rosemount fuselage
Time source	Micro 99
Constants file	CO2971.CON

Notes:

There were no time/data gaps.

Radar Altitude (APN-159) patched from 1222:01 - 1225:00.

There was no J-W liquid water data for the entire flight.

Downward spikes in radar altimeter data are a result of overflying land.

The aircraft INE positions were renavigated with respect to GPS.

SPECIAL NOTE!!! Locations 80, 81 and 82 of record five on the standard tape contain vertical ground, vertical air and vertical speeds, respectively, computed using Dave Jorgensen's vertical wind algorithm. It is recommended that these values be used for vertical wind analysis.

	Takeoff	Landing
Aircraft static pressure	1013.9 mb	1013.4 mb
Corrected tower pressure	1014.7 mb	1013.5 mb

Flight Meteorologist: Sean White, (813) 828-3310 ext. 3072

CI>

970112H

START: 1200:01
END: 2050:00

120031	~~+0.1~~	0
130000	+0.5	+0.1
140000	+0.6	+0.1
150000	+0.6	(-)0.1
160000	+0.7	+0.5
170000	+0.4	0
180000	(-)$0.8	+0.5
190000	(-)$0.9	+0.9
200000	(-)$1.1	+0.8
205000	(-)$2.1	+3.8

FLIGHT_TRK

5
300
1800

RA159

1205:01-1206:00
2046:01-2050:00

~~BPF 1221-1222~~ ok
~~RA159 1222-1224~~ ok
122201-122500
set 4333

```
TITLE (MAX 21 CHARACTERS) -- EX  HURRICANE PAINE
FASTEX IOP2 RAINBANDS
YYMMDDL  FLT I.D.
970112H
HHMMSS START TIME    -99999 DEFAULT TO START OF DATA FOR PRINTOUT ONLY
120001
HHMMSS END TIME      999999 DEFAULT TO END OF DATA FOR PRINTOUT ONLY
205000
HHMMSS TAKE OFF TIME
120500
* NUMBER OF TAPES (I2) ...FOR STANDARD TAPE OUTPUT ONLY
04
* -------LOGICAL UNIT OF INPUT DATA (I1)  5, 8 OR 9 FOR TAPE DRIVE
9
* -------LOGICAL UNIT OF OUTPUT TAPE DRIVE (I1) [FOR STANDARD TAPE ONLY]
9
* -------LOGICAL UNIT OF PRINTER (I1)
6
* -------DATE OF PROGRAM (MMDDY)
06094
* -------STATIC PRESSURE PROBE (I1)
* 1 = PSW (WINGTIP)
* 2 = PSF (CO-PILOT/FUSELAGE)
* 3 = FUTURE USE
2
* -------DYNAMIC PRESSURE PROBE (I1)
* 0 = PQW(WINGTIP)
* 1 = PQF1 (FUSELAGE 1281)
* 2 = PQF2 (FUSELAGE 1221)
* 3 =FUTURE US
1
* ---------INE SELECTION  (I1)
* 1 = INE 1
* 2 = INE 2
1
* ---------ACCELEROMETER (I1) - USUALLY THE SAME AS YOUR INE SELECTION
1
* --------- TOTAL TEMPERATURE PROBE (I1) [1 OR 2]
1
* --------- DEWPOINT TEMPERATURE PROBE (I1) [1 OR 2]
1
* ---------ALTIMETER OPTION (I1) - FOR VERTICAL WIND COMPUTATION
* 0 = PRESSURE ALTITUDE (OVER LAND)
* 1 = RADAR ALTITUDE APN-159 (OVER WATER)
* 2 = RADAR ALTITUDE APN-232 (OVER WATER)
1
* ---------PRINTOUT RATE  SECONDS (I2)
30
* ---------WINDSPEED/DIRECTION RUNNING AVERAGE TIME, SECONDS (I2)
10                                  ! FOR STANDARD TAPE OUTPUT ONLY
* ---------TIME OPTION (I1)
* 1 = MICRO 29
* 2 = TIME BASED GENERATOR #1
* 3 = TIME BASED GENEATOR #2
1
* ---------NAME OF CONSTANTS FILE EX CO3863.CON
CO2971.CON
*****************************************************************
CI>
```

DATE : 12 JAN 1997

TO : Chief, AOC Flight Operations

FROM : Pilot/Flight Director, Aircraft ON 2053 BLOCKTIME

OFF 1155 9.0

SUBJECT: Hazardous Duty

PURPOSE OF FLIGHT: COLD FRONTAL CONVECTION

Hazardous Duty Pay is required for flight made on 12 JAN 97 (DATE)

Request based on SEVERE CONVECTIVE FLYING IN/AROUND THUNDERSTORMS

Personnel on board authorized Hazard Pay:

MOORE, B	
ROGERS, M	
LYNCH, T	
McMICCAN, S	
BARR, J	
CARPENTER, D	

PILOT/FLIGHT DIRECTOR: LCDR S. R. WHITE, NOAA

APPROVED: _____ DISAPPROVED: _____

CHIEF, AOC FLIGHT OPERATIONS: _____

c:\fastex\970112h.wpd
FASTEX AIRCRAFT CHIEF SCIENTIST EVENT LOG

Flight Number: 970112H1 Page 1 of
Date: January 12, 1997 Aircraft ID: 42 Scientist: Jorgensen

Event Log

Time (UTC)	Approx. Location (Lat, Lon)	Event & Comments
11:50:20	52.694 -8.926	Engine Start
11:55:56		Blockout
12:04:40		Takeoff
12:07:44	52.647 -9.107	Broken clouds base ~1300 m sun is shining through!!
12:15:35		METMAN reports trouble with LORAN signals
12:17:43	52.407 -9.810	Radar recorders up and running - both radars working great
12:41:31	51.783 -11.589	Some radar returns on LF at 175 na mi ahead - probably prefrontal rainbands oriented NE-SW from about 55N 13W to about 52N 16W
12:55:54		Scatterometer finally came up
13:00:40	51.254 -13.018	~30 dBZ contours in that rainband north of our position. Pretty respectable given the range ~180 na mi!
13:08:29	51.024 -13.574	at buoy - turn to west and descend to 5,000 ft
13:17:38	51.043 -14.423	at 5kft just about the stratocumulus layer
13:23:29	51.041 -14.927	Strongest part of line appears to be near 51 10 and 18 30, 30-35 dBZ
13:34:55	51.053 -15.927	rainband now about 100 nm to our NW
13:49:05	51.045 -17.175	rainband edge now about 50 km ahead - not showing much on the nose radar max dBZ about 30 on LF. Leading edge is sharp on the east side and rather diffuse on the west side. Oriented NE-SW.
13:57:35	51.021 -17.917	TA beginning to see some echo above
14:04:15	51.009 -18.482	At IP turning to track NW. IP is near center of band max dBZ is about 35. Band is very stratiform and only about 5 km deep
14:08:09	51.192 -18.753	Very smooth going through the band
14:09:18	51.247 -18.834	Small embedded convective looking cells on the TA
14:10:52		secondary band perhaps 10 mi behind - much weaker reflectivities
14:17:30	51.621 -19.400	Can see sea sfc below - much calmer seas that in front of the band
14:21:44	51.805 -19.669	Contact with 308D - described line and suggested turning just short of IP and proceeding NW parallel to the line.
14:30:13	52.051 -19.599	End of leg turn to track back to the line trk 090

14:39:32			308 due at IP and 1452 we'll get there 1508 or so
14:39:40			Some turbulence going through secondary band (front?) - 308D will turn short of band and proceed NE. We'll turn back west at the IP and proceed up the back side.
14:43:54	52.020	-18.034	At end of leg turn to track south back to IP
14:50:02			First line for 308D based on LF radar is: 50 56 18 18W trk 025 52 32N 17 20W
14:52:12			2nd 308D line: 52 40 18W 51N 19W
14:52:20	51.648	-18.181	we will focus on secondary band, 308 on primary band
15:00:57	51.251	-18.387	Interesting sloping convergence signature on the westernmost band
15:03			1517 is the eta for 308D to the end of their first leg
15:03			At the IP again, turn west to get into the slot between the bands
15:10:56	50.998	-18.944	At the SE corner point - turn to track 020 in the slot between the bands
15:17:59	51.454	-18.740	only light precip at flight level 30-35 dBZ evident in the east band
15:22:39	51.768	-18.559	Bands seem to get weaker as we go northeast
15:30:30	52.273	-18.262	Should have passed directly over the Electra on a reciprocol track
15:36:23	52.667	-18.032	End of leg turn to NW
15:39:57	52.740	-18.327	Shift box 50 nm to the NE as line appears to die south of 51 45N 18 30W
15:43:06	52.797	-18.600	at NW point turn to track 200 to the SW
15:58:53	52.023	-19.157	end of leg turn to 120 and climb to 9kft. Very little precip at this end of the box
16:02:26			Will extend this cross band leg an additional 10 miles to account for band motion to the east
16:08:28	51.717	-18.271	at new SE corner, turn to track 020 in between the two bands at 9kft
16:13:16	52.046	-18.000	nice LF presentation of the easternmost band
16:23:35	52.854	-17.480	large aggregates on the PMS display (>3-4 mm), occasional stellar shapes
16:29:22	53.307	-17.180	end of the leg - turn to track nw about 20 miles
16:34:55	53.469	-17.685	end of cross band run turn to track to the SW
16:44:43			cutting off box at 52 30N and shift it 50 miles farther to the north
16:52:38	52.531	-18.240	end of leg descend to 5kft and track back to east
16:56:15	52.447	-17.874	at 5kft trk 103
17:00:09	52.399	-17.403	at SE turn point turn to trk 022
17:08:09	52.891	-17.092	bands now looking pretty diffuse - band motion eastward at ~10 mi/hr
17:13:13	53.226	-16.875	308D tracking farther NE along rainband - we'll follow
17:19:53	53.676	-16.579	308D turning NW at 53.96 - they report end of the line

			and we're going to follow
17:24:25	53.977	-16.380	end of the north run - turn to track 17 miles NW
17:28:28			Radar data system crashed
17:28:51	54.064	-16.775	end of the NW track - turn to track back to the SW trk - 204
17:35:38			308D is interested in some small band near 53.33 16.45 - we'll provide larger scale data surrounding that point
17:59:30	52.532	-17.880	end of southbound leg - turning to 097 for SE cross band track
18:11:43	52.809	-16.896	METMAN still tracking north to 55N 21 40W and from there back to Lyname using up all their LORAN sondes - end of eastbound track - turn to NE end of cross band leg - turn to track 020 back to NE
18:24:26	53.662	-16.434	308D on last leg ETA to Shannon 1920
18:32:41			we will continue to track northward along 020 to at least 56N to map extent of the frontal band
18:33:54	54.298	-16.054	Band weakens north of here
18:58:41	55.995	-15.025	end of leg turn to track to 54N 16W
19:08:21	55.573	-15.169	radar shows clear of precip
19:40:40	53.952	-15.806	at end of pattern - ferry back to Shannon - light stratiform precip evident on the TA
20:22:16			Radar system secured
20:46:29	52.715	-8.897	land
20:52:19	52.695	-8.925	BlockIn

MSA Coordinator Summary Report

970112H IOP2 on Low 11/12a
Summary Description of Mission:

The planned primary mission was the cold frontal rainband study on an active portion of the cold front extending from an open wave that is being tracked as Low 11. The approach of Low 12 from the west is expected to lead to the further development of the cyclone, but after the aircraft mission. The initial P-3 altitude was 5,000 feet, the UK C-130 at 26,000 feet, and the Electra at or below 3,000 feet. The UK C-130 departed Lynehame at 10 UTC, followed by the P-2 at 12 UTC, and the Electra at 13 UTC. All aircraft departed on schedule. The P-3 overflew the buoy at 51.05N, 13.33W, to calibrate its scatterometer and SFMR on the way to its intial point (IP) at 51.0N, 18.5W. The initial point was chosen to coincide with the forecasted precipitation maximum from the UKMO LAM at 15 UTC. A cold frontal rainband was found by LF radar as the P-3 approached its IP. Coordinated patterns were set up via the VHF radio with the C-130 and the Electra. There were two rainbands evident on the LF: an easternmost one associated with a pre-frontal line, and a westernmost one about 25 nm to the west that was apparently associated with the surface position of the front. The width of each line varied from very thin (>5 nm) to

~20 nm. The P-3 executed a short "survey" of the region west and north of the IP to insure that that IP region was the location of the strongest band. Based on that survey the C-130 track was set up (the planned flight track was not changed), and the Electra was vectored to the correct position to begin the extensive investigation. The P-3 focused its patterns on the westernmost band, while the Electra focused on the pre-frontal band. Each aircraft flew a "box" pattern centered on its respective band. Band orientation was about 020. Each box was 25 nm by 100 nm. The westernmost north-south leg of Electra was coincident with the easternmost P-3 north-south leg, so there was nearly continuous Doppler data throughout the 200 nm domain. As the bands dissipated on the southern side and propagated east at near 10 miles per hour the boxes were progressively shifted further north and east. The P-3 accomplished 4 complete boxes. The Electra also completed at least 4 of the boxes followed by a series of smaller boxes centered on a small part of the band that exhibited the most linear character. Following the departure of the Electra, the P-3 executed a "survey" pattern to the north (to 56N, 15W), then back to 54N, 16W to map the northern extent of the frontal band. The band seemed to weaken north of about 54.5N, so it appears that the aircraft worked the best target.

The strength of the bands was relatively weak (30-35 dBZ) but the linear character and their persistence made them easy to set up patterns and coordinate the changes required by the continued decay on the southern end and the eastward propagation. The precipitation pattern and location of precipitation was nearly exactly as forecasted by the mid-day run of the UKMO and HirLAM limited area models. No change was necessary to the IP or the pre-determined C-130 tracks. The C-130 executed a series of 4 legs centered on the IP and spaced every 25 nm, dropping 5 sondes per leg.

Communications:

1. VHF comms between the aircraft was nearly perfect, even in the static charging region with the precipitation.
2. HF comms worked intermittently to ATC and virtually not at all to the Ops Center. The C-130 apparently had better HF comms and often would relay information from the other aircraft to ATC.

P-3 Equipment Problems Encountered:

1. The scatterometer continues to have its problems. It went totally out after about an hour of the mission. Apparently the same problem as the last flight. Also took about 20 minutes after take-off to get the antenna to spin.

Coordination Problems

1. Only coordination problem of note was the C-130 tracks were identified differently than the original plan prepared at the Ops Center. Took a little while to understand the new nominclature.

Recommendations & Evaluation:

1. Very good mission from an execution point of view. Rainband was well organized, albeit a little weaker in reflectivity that we expected. Perhaps the weakness is a trait of FASTEX cold frontal bands.. The model guidance continues to direct the aircraft to good locations with excellent timing.
2. Need to work a bit on standardizing the flight leg identifications for the C-130.

--Dave Jorgensen & Yvon Lemaitre

5140 1815 5320 1710 135.6 132.15 5616 P 8864S 205/119 54N/2130W

MISSION LOG

PAGE ___ OF ___

CLEARANCES			
FREQ	ALT	HDG	OTHER

0435

POSITION REPORT

1. POSITION
2. TIME
3. ALTITUDE
4. NEXT POSITION
5. ETA
6. NEXT POSITION

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	VHF/VOICE	MF/VOICE	HF/CW	MF/CW
243.0	121.5	2182 KHZ	8364 KHZ	500 KHZ

MAYDAY, MAYDAY, MAYDAY
THIS IS NOAA ______, NOAA ______, NOAA ______

- POSITION ______________ N/S E/W AT ________Z
- 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	MH	VAR +E==>	TH	DR +R==>	TRK	GS	WD	WS	ALT	TAS	NEXT PT	DIST	TIME	ETA	REMARKS
1149	V,S	5241.6N 0855.5W	✓ ✓		✓ ✓			Enb													Chocks/Blocks
1155		Taxi																			Taxi
1205		TOFF																			
1219	GPS	5222.4N 0954.5W	5222.1N 0954.6W	+.3 -.1	5222.2N 0954.4W	+.2 +.1			240	0	240	167	238	62	14K	226					Level off
1308	GPS	5102.0N 1333.4W	5101.4N 1333.3W	+.6 +.1	5100.9N 1333.8W	+1.1 -.4			235	0	235	197	212	56	14K	249					MET Buoy 62081
1408	GPS	5114.0N 1848.8W	5113.5N 1848.6W	+.5 +.2	5112.2N 1848.7W	+1.8 +.1			303	14R	317	228	217	61	5K	226					Post
1510	GPS	5100.0N 1851.1W	5059.4N 1851.3W	+.6 -.2	5056.0N 1851.2W	+4.0 -.1			264	5R	209	210	215	30	5K	228					Posit
1615	GPS	5210.4N 1755.3W	5210.2 1755.4	+.2 -.1	5204.4N 1758.1W	+6.0 -2.8			018	2R	020	303	213	65	9K	240					Post
1714	GPS	5316.7N 1650.5W	5316.4N 1650.3W	+.3 +.2	5306.7N 1655.7W	+10.0 -5.2			019	2R	021	257	213	35	5K	223					Posit
1831	GPS	5405.2N 1611.5W	5405.3N 1611.5W	-.1 0	5354.2N 1621.3W	+11.0 -9.8			016	4R	020	268	230	42	5K	228					
1937	GPS	5405.2N 1558.5W	5406.5W 1557.3W	-1.3 +1.2	5352.9N 1612.3W	+12.4 -13.8			202	4L	198	199	227	30	5K	227					
2047		LAND	EINN																		
20		5241.6N 0855.5W	5243.8N 0851.8W	-2.2 +3.7	5230.1N 0913.7W	-11.5 -18.2															chocks