Hurricane Field Program Plan Part II

Appendix A

DECISION AND NOTIFICATION PROCESS

The decision and notification process is illustrated in Fig. A-1. This process occurs in four steps:

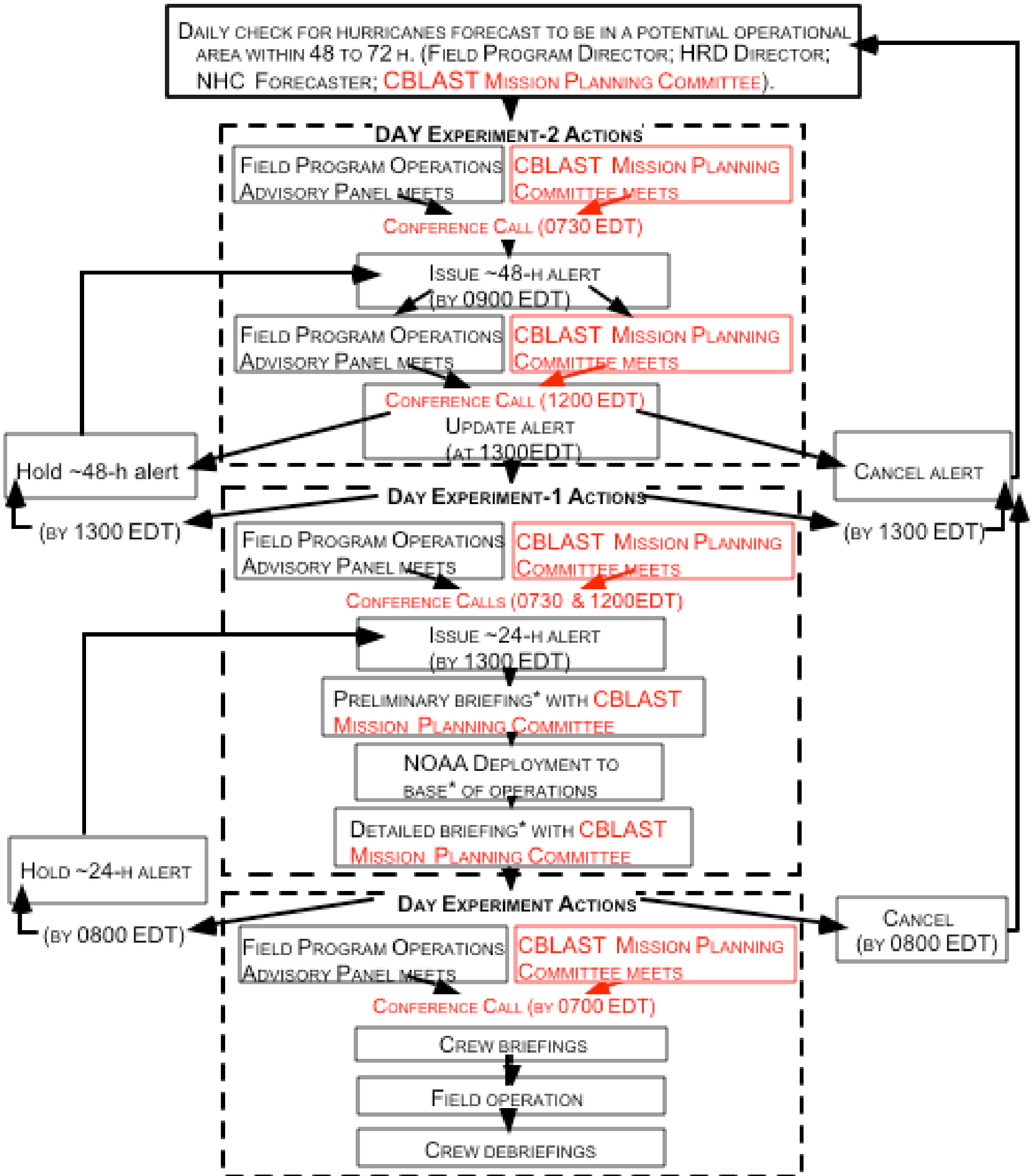
1) A research mission is determined to be probable within 72 h [field program director]. Consultation with the director of HRD, and the AOC Project Manager determines: flight platform availability, crew and equipment status, and the type of mission(s) likely to be requested.

2) The Field Program Advisory Panel [Director, HRD, P. Black, M. Black Cione, Dodge, Dunion, Gamache, Kaplan, Landsea, Murillo, Rogers, Uhlhorn and McFadden (or AOC designee) meets to discuss possible missions and operational modes. Probable mission determination and approval to proceed is given by the HRD director (or designee).

3) Primary personnel are notified by the field program director [P. Black].

4) Secondary personnel are notified by their primary affiliate (Table A-2).

General information, including updates of program status, are provided continuously by tape. Call (305) 221-3679 to listen to the recorded message. During normal business hours, callers should use (305) 361-4400 for other official inquiries and contacts. During operational periods, an MGOC team member is available by phone at (305) 229-4407 or (305) 221-4381. MGOC team leader, and the HRD field program director.



* Time of briefings and deployments are dictated by the crew, scientist, aircraft and storm locations and conditions.

Fig. A-1. Decision and notification process.

Appendix B: Calibration; Scientific Crew Lists; Data Buoys

B.1 En-Route Calibration of Aircraft Systems

Instrument calibrations are checked by flying aircraft intercomparison patterns whenever possible during the hurricane field program or when the need for calibration checks is suggested by a review of the data. In addition, an over flight of a surface pressure reference is advisable en route or while on station when practicable. Finally, all flights enroute to and from the storm are required to execute a true airspeed (TAS) calibration pattern. This pattern is illustrated in Fig. B-1.

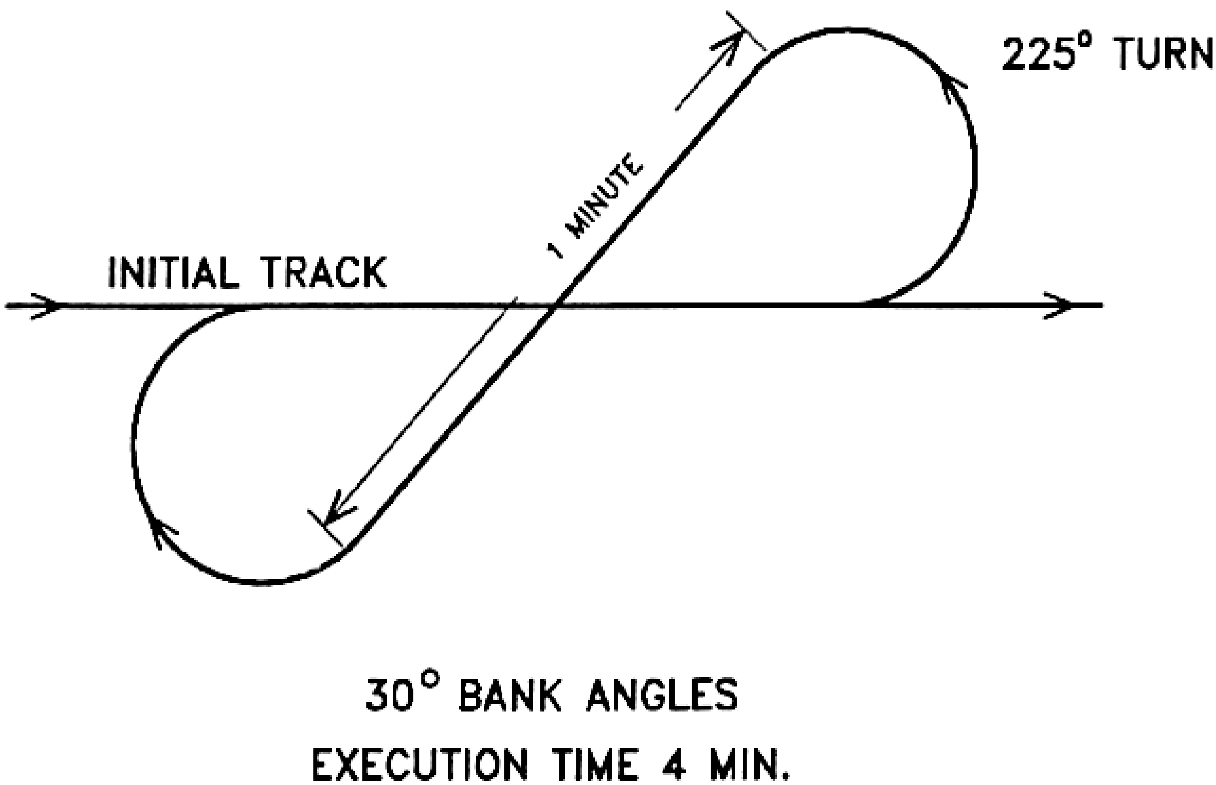


Fig. B-1 En-Route TAS calibration pattern.

B.2 Aircraft Scientific Crew Lists

Table B-2.1 Hurricane Air-Sea Interaction (ASI) Experiment (dual-aircraft mission)

Position	N42RF	N43RF
Lead Project Scientist	P. Chang	J. Cione/M. Black
Cloud Physics Scientist	R. Black	(radar scientist)
Radar Scientist	J. Gamache	P. Dodge
Dropsonde Scientist	(radar scientist)	AOC
Workstation Scientist	P. Leighton	-----------
IWRAP/USFMR/SRA Scientist	J. Carswell	E. Walsh
Observer/AXCP-AXCTD Scientist	NESDIS	S. Guhin, E. Uhlhorn

Table B-2.2 Track-dependent SST module (ASI experiment, single or dual plane mission)

Position	N42RF	N43RF
Lead Project Scientist	P. Chang	J. Cione/M. Black
Cloud Physics Scientist	-----------	(radar scientist)
Radar Scientist	J. Gamache	P. Dodge
Dropsonde Scientist	(radar scientist)	AOC
Workstation Scientist	P. Leighton	-----------
IWRAP/USFMR/SRA Scientist	J. Carswell	E. Walsh, E. Uhlhorn
Observer/AXCP-AXCTD Scientist	NESDIS	S. Guhin

Table B-2.3 Coupled Boundary Layer Air-Sea Transfer (CBLAST) Experiment (dual-aircraft mission)

Position	N42RF	N43RF
Lead Project Scientist	P. Chang	M. Black
Cloud Physics Scientist	R. Black	C. Fairall
Radar Scientist	J. Gamache	P. Dodge
Dropsonde Scientist	(radar scientist)	AOC
Workstation Scientist	P. Leighton	-----------
IWRAP/USFMR/SRA Scientist	J. Carswell	E. Walsh
Observer/AXBT Scientist	NESDIS	E. Uhlhorn
Turbulence Scientist	------------	J. French
MOSS/altimeter Scientist	------------	J. Laswell

Table B-2.4 Tropical Cyclone Wind fields Near Landfall Experiment (dual-option, single-aircraft mission)

Position	N42RF or N43RF
Lead Project Scientist	P. Dodge or F. Marks
Cloud Physics Scientist	(radar scientist)
Radar Scientist	J. Gamache
Dropsonde Scientist	C. Landsea
Workstation Scientist	P. Leighton
Ku/C-SCAT/SFMR/SRA Scientist	P. Chang or E. Walsh

Table B-2.5 Extratropical Transition Experiment

Position	N42RF	N43RF	G-IV
Lead Project Scientist	S. Aberson	F. Marks	S. Goldenberg
Cloud Physics Scientist	(radar scientist)	(radar scientist)	-----------
Radar Scientist	P. Dodge	P. Leighton	-----------
Dropsonde Scientist	C. Landsea	R. Rogers	J. Kaplan
Workstation Scientist	(dropsonde scientist)	(dropsonde scientist)	-----------
Ku/C-SCAT/SFMR/SRA Scientist	J. Carswell	P. Chang or E. Walsh	-----------

Table B-2.6 Saharan Air Layer Experiment: (single-option, single or dual-aircraft mission)

Position	N42RF	N43RF
Lead Project Scientist	J. Dunion	C. Landsea
Cloud Physics Scientist	(radar scientist)	(radar scientist)
Radar Scientist	P. Dodge	M. Black
Dropsonde Scientist	S. Aberson	J. Cione
Workstation Scientist	P. Leighton	R. Rogers
Ku/C-SCAT/SFMR and SRA Scientists	J. Carswell	E. Walsh

Table B-2.7 Tropical Cyclogenesis Experiment: (single-option, single or dual-aircraft mission)

Position	N42RF	N43RF
Lead Project Scientist	F. Marks	R. Rogers
Cloud Physics Scientist	R. Black	(radar scientist)
Radar Scientist	N. Dorst	J. Gamache
Dropsonde Scientists	M. Black	S. Murillo
Workstation Scientist	P. Leighton	P. Dodge
Ku/C-SCAT/SFMR/SRA Scientist	J. Carswell	E. Walsh

Table B-2.8 CBLAST Rainband Test: (single-option, single or dual-aircraft mission)

Position	N42RF	N43RF
Lead Project Scientist	P. Chang	S. Chen
Cloud Physics Scientist	(radar scientist)	(radar scientist)
Radar Scientist	P. Dodge	W.–C. Lee
Dropsonde Scientists	P. Leighton	M. Black
Workstation Scientist	(dropsonde scientist)	(dropsonde scientist)
Ku/C-SCAT/SFMR/SRA Scientist	J. Carswell	-----------

B.3 Buoy/Platform Over flight Locations[1]

Table B-3.1 Moored Buoys

Station Identifier	Type of Station[2]		Location Lat. (N)	Location Lon (W)	Area	Special Obs/ Comments[4]
44036	2D		45.20	66.02	SAINT JOHN (K0102)	GoMOOS
44035	2D		44.89	67.02	COBSCOOK BAY (J0201)	GoMOOS
44027	3D	/A	44.27	67.31	JONESPORT	--
44034	2D		44.11	68.11	E. MAINE SHELF (I0103)	GoMOOS
44033	2D		44.06	69.00	W. PENOBSCOT BAY (F0103)	GoMOOS
44032	2D		43.72	69.36	CENTRAL MAINE SHELF (E0104)	GoMOOS
44038	2D		43.62	66.55	SCOTIAN SHELF	GoMOOS
44031	2D		43.57	70.06	CASO BAY (C0201)	GoMOOS
44007*	3D	/V	43.53	70.14	PORTLAND	A
44005*[3]	6N	/D	43.19	69.18	GULF OF MAINE	A
44030	2D		43.18	70.43	W. MAINE SHELF	GoMOOS
44013*	3D	/D	42.35	70.69	BOSTON	--
44011*[3]	6N	/D	41.11	66.62	GEORGES BANK	A
44039	2.4D		41.14	72.66	CENTRAL LONG ISLAND SND	MYSound
44018*	3D	/A	41.26	69.30	S.E. CAPE COD	--
44040			40.96	73.58	W. LONG ISLAND SOUNDS	MYSound
44017*	3D	/A	40.70	72.00	MONTAUK POINT	--
44008*[3]	3D	/V	40.50	69.43	NANTUCKET	A
44025*	3D	/D	40.25	73.17	LONG ISLAND	DW
44004*[3]	6N	/D	38.50	70.47	HOTEL	--
44009*[3]	3D	/V	38.46	74.70	DELAWARE BAY	--
44014	3D	/D	36.61	74.84	VIRGINIA BEACH	DW
41025*	3D	/D	35.15	75.29	DIAMOND SHOALS (RED BUOY)	--
41001*	6N	/D	34.68	72.66	E. HATTERAS	A
41013	3D	/D	33.48	77.58	FRYING PAN SHOALS,NC	--
41004*	3D	/V	32.50	79.10	EDISTO	DW
41002*	6N	/V	32.36	75.46	S. HATTERAS	--
41008*	3D	/A	31.40	80.87	GRAYS REEF	--
42007*	3D	/D	30.09	88.77	BOLOXI	A
41012	3D	/A	30.04	80.55	ST. AUGUSTINE	A, CSI

1 Tables B-3.1 and B-3.2 were updated with information from the **Data Platform Status Report (April 22, 2004)**, NOAA/National Data Buoy Center (NDBC), Stennis Space Center, MS 39529-6000, for the period **April 15 – April 22, 2004**. (Also, the NDBC report lists the location of drifting buoys o/a **April 15 – April 22, 2004**). See subsequent editions of this weekly NDBC report for later information. Tables B-3.2, and B-3.3 were updated with information from **National Weather Service Offices and Stations** (April 2004).

2 Hull Type — Anemometer Height

Hull Type			Anemometer Height
10D	-	10-m discus buoy	10.0 m
6N	-	6-m NOMAD buoy	5.0 m
3D	-	3-m discus buoy	5.0 m

Payload types: /A = ARES; /D = DACT; /V = VEEP; /M = MARS.

3 Note remarks section of NDBC report (**April 22, 2004**); see latest edition of NDBC **Data Platform Status Report** for current status.

4 A = 10-min data (continuous); R = rainfall; DW = directional wave spectra; CSI = Coastal storm initiative, GoMOOS= Gulf of Maine Ocean Observing System

* Base funded station of the National Weather Service (NWS); however, all stations report data to NWS.

Table B-3.1 cont'd   Moored Buoys

Station Identifier	Type of Station[2]		Location		Area	Special Obs/ Comments[4]
			Lat. (N)	Lon (W)		
42035*	3D	/D	29.25	94.41	GALVESTON	--
42040	3D	/D	29.21	88.20	MOBILE SOUTH	A
42043			28.99	94.90	GA-252/TABS B	TABS
41010	6N	/D	28.90	78.55	CANAVERAL EAST	--
42039	3D	/D	28.80	86.06	PENSACOLA S.	A
42036*	3D	/D	28.51	84.51	W. TAMPA	DW
41009	6N	/A	28.50	80.18	CANAVERAL	--
42021			28.3	83.3	PASCO COUNTY/CMP4	COMPS
42022			27.5	83.72	W. FL CENTRAL/CMP24	COMPS
42023			26.05	83.07	W. FL SOUTH/CM3	COMPS
42013			27.16	82.95	NAVY2/NA2	COMPS
42019*	3D	/D	27.91	95.36	LANEILLE	--
42047			27.54	93.36	HI-A595/TABSN	TABS
42046			27.53	94.02	HI-A389/TABSV	TABS
42041	3D	/M	27.50	90.46	N. MID GULF	A
42038	3D	/A	27.42	92.57	N. MID GULF	A
42020*	3D	/D	26.95	96.70	EILEEN	--
42045			26.13	96.31	PI-745/TABSK	TABS
42044			26.11	97.03	PS-1126/TABSJ	TABS
42002*	10D	/M	25.17	94.42	WESTERN GULF	A
42003*	10D	/M	26.01	85.91	E.AST GULF	A
42001*[3]	10D	/M	25.86	89.67	MID GULF	A

[1] Tables B-3.1 and B-3.2 were updated with information from the **Data Platform Status Report (April 22, 2004)**, NOAA/National Data Buoy Center (NDBC), Stennis Space Center, MS 39529-6000, for the period **April 15 – April 22, 2004**. (Also, the NDBC report lists the location of drifting buoys o/a **April 24 – May 1, 2004**). See subsequent editions of this weekly NDBC report for later information. Tables B-3.2 and B-3.3 were updated with information from **National Weather Service Offices and Stations** (April 2004).

[2]

Hull Type		Anemometer Height	
10D	-	10-m discus buoy	10.0 m
6N	-	6-m NOMAD buoy	5.0 m
3D	-	3-m discus buoy	5.0 m

Payload types: /A = ARES; /D = DACT; /V = VEEP; /M = MARS.

[3] Note remarks section of NDBC report (**April 22, 2004**); see latest edition of NDBC **Data Platform Status Report** for current status.

[4] A = 10-min data (continuous); R = rainfall; DW = directional wave spectra; CSI = Coastal storm initiative, COMPS = Coastal Ocean Monitoring and Prediction System/U of South Florida, TABS = Texas Automated Buoy System

* Base funded station of the National Weather Service (NWS); however, all stations report data to NWS.

Table B-3.2 C-MAN sites[1]

Station Identifier	Station Name/ Payload Type	Location Lat. (N)	Lon (W)	Area	Comments[3]	Height (m)
MDRM[1]*	Mt. Desert Rock, ME/D	43.97	68.13	ME COAST	--	22.6
MISM[1]*	Matinicus Rock, ME/D	43.78	68.86	ME COAST	--	16.5
IOSN[3]*	Isle of Shoals, NH/D	42.97	70.62	NH COAST	--	19.2
BUZM[3]*	Buzzards Bay, MA/M	41.40	71.03	MA COAST	A	24.8
LDLC3	New London Ledge	41.31	72.08		MySound	20.0
ALSN6*	Ambrose Light, NY/A	40.45	73.80	NY COAST	--	49.1
TPLM2*[2]	Thomas Point, MD/M	38.90	76.44	MD COAST	--	18.0
CHLV2*	Chesapeake Light, VA/D	36.91	75.71	VA COAST	A	43.3
DUCN7*	Duck Pier, NC/A	36.18	75.75	NC COAST	A	20.4
DSLN7*[2]	Diamond Shoals Light, NC/D	35.15	75.30	NC COAST	A, DP	46.6
AVAN4	Avalon, NJ	39.09	74.72	NJ COAST	Stevens Inst	10.0
ACMN4	Atlantic City Marina, NJ	39.38	74.42	NJ COAST	Stevens Inst	15.0
BRBN4	Brant Beach, NJ	39.61	74.20	NJ COAST	Stevens Inst	10.0
CLKN7*	Cape Lookout, NC/M	34.62	76.53	NC COAST	A	9.8
FPSN7*[2]	Frying Pan Shoals, NC/D	33.49	77.59	NC COAST	A	44.2
TYBG1	US Navy Tower R8	31.63	79.92	SC COAST	SIO	34.0
FBIS1*[4]	Folly Island, SC/M	32.69	79.89	SC COAST	A	9.8
SPAG1	US Navy Tower R2	31.38	80.57	GA COAST	SIO	50.0
SPGF1*	Settlement Point, GBI/M	26.70	78.99	GR BAHAMA	A	9.8
SHPF1	Shell Point, FL	30.06	84.29	FL COAST	COMPS	5.5
HSSF1	Homosassa, FL	28.77	82.71	FL COAST	COMPS	6.6
ARPF1	Aripeka, FL	28.43	82.66	FL COAST	COMPS	10.3
PTRF1	Port Richey, FL	28.28	82.73	FL COAST	COMPS	10.1
TARF1	Tarpon Springs, FL	28.15	82.75	FL COAST	COMPS	7.0
NFBF1	NW Florida Bay, FL	25.08	81.09	FL COAST	COMPS	5.5
SAUF1*[2]	St. Augustine, FL/V	29.86	81.27	FL COAST	A	16.5
LKWF1*	Lake Worth, FL/M	26.61	80.03	FL COAST	A	13.7
FWYF1*[4]	Fowey Rocks, FL/M	25.59	80.10	FL COAST	A	43.9
MLRF1*	Molasses Reef, FL/V	25.01	80.38	FL COAST	--	15.8
SMKF1*	Sombrero Key, FL/M	24.63	81.11	FL COAST	--	48.5
SANF1*[4]	Sand Key, FL/M	24.46	81.88	FL COAST	A	13.1
LONF1*	Long Key, FL/M	24.84	80.86	FL COAST	--	7.0
DRYF1*	Dry Tortugas, FL/M	24.64	82.86	FL COAST	--	5.7
EGKF1	Egmont Key, FL	27.60	82.76	FL COAST	COMPS	10.0

1 Coastal-Marine Automated Network (C-MAN) stations are located on coastal headlands, piers, or offshore platforms. Payload types, shown next to the station's name (after the "/") are: D = DACT; V = VEEP; M=MARS; and I = Industry-supplied. C-MAN anemometer heights are listed in the **C-MAN User's Guide**.

2 Note remarks section of NDBC report (**April 22, 2004**); see latest edition of NDBC **Data Platform Status Report** for current status.

3 A = 10-min data (continuous); DP = dew point; R = rainfall; DW = directional wave spectra; MySound = UCONN, Dept. of Marine Sci., Stevens Inst = Stevens Institute of Technology, SIO = Skidaway Inst. of Oceanography, COMPS =Costal Ocean Monitoring and Prediction System/ U of South Florida.

4 Hurricane Landfall (HL) Systems whose exposure characteristics are stored on the HRD Surface Wind Analysis database and on NCDC's website.

* Primarily for National Weather Service (NWS) support; however, all stations report data to NWS.

Table B-3.2 cont'd C-MAN sites[1]

Station Identifier	Station Name/ Payload Type	Location Lat. (N)	Lon (W)	Area	Comments[3]	Height (m)
ANMF1	Anna Maria, FL	27.54	82.74	FL COAST	COMPS	10.8
VENF1*	Venice, FL/M	27.07	82.45	FL COAST	A	11.6
CDRF1*	Cedar Key, FL/V	29.14	83.03	FL COAST	A	10.0
SGOF1*	Tyndall AFB Tower C, FL/M	29.41	84.86	FL COAST	A	35.1
KTNF1*	Keaton Beach, FL/M	29.82	83.59	FL COAST	A	10.0
DPIA1*	Dauphin Island, AL/V	30.25	88.07	AL COAST	--	17.4
BURL1*	Southwest Pass, LA/M	28.91	89.43	LA COAST	A	30.5
GDIL1*[4]	Grand Isle, LA/M	29.27	89.96	LA COAST	A	15.8
LKPL1	W. Lake Ponchartrain, LA	30.31	90.28	LA COAST	LUMCON	13.0
LUML1	LUMCON Marine Center, LA	29.25	90.66	LA COAST	LUMCON	13.2
TAML1	Tambour Bay, LA	29.19	90.67	LA COAST	LUMCON	10.0
SRST2*[4]	Sabine, TX/M	29.67	94.05	TX COAST	A	12.5
GLPT2	Galveston Pleasure Pier, TX	29.29	94.79	TX COAST	TCOON	15.0
PCNT2	Matagorda Bay, TX	28.45	96.40	TX COAST	TCOON	9.0
RTOT2	RTNS offshore, TX	27.76	96.98	TX COAST	TCOON	20.0
PTAT2*	Port Aransas, TX/M	27.83	97.05	TX COAST	A	14.9
BABT2	Baffin Bay, TX	27.30	97.42	TX COAST	TCOON	10.0
RSTJ2	Potrero Lopeno, TX	26.80	97.47	TX COAST	TCOON	10.0

[1] Coastal-Marine Automated Network (C-MAN) stations are located on coastal headlands, piers, or offshore platforms. Payload types, shown next to the station's name (after the "/") are: D = DACT; V = VEEP; M=MARS; and I = Industry-supplied. C-MAN anemometer heights are listed in the **C-MAN User's Guide**.

[2] Note remarks section of NDBC report (**April 22, 2004**); see latest edition of NDBC **Data Platform Status Report** for current status.

[3] A = 10-min data (continuous); DP = dew point; R = rainfall; DW = directional wave spectra; LUMCON =Louisiana Universities Marine Consortium, TCOON =Texas Coastal Ocean Observing Network.

[4] Hurricane Landfall (HL) Systems whose exposure characteristics are stored on the HRD Surface Wind Analysis database and on NCDC's website.

* Primarily for National Weather Service (NWS) support; however, all stations report data to NWS.

Table B-3.3 NOS National Water Level Observation Network (NWLON)*

		Location	
Station ID	Station Name	Lat. (N)	Lon (W)
8410140	Eastport Bay, ME	44.90	66.98
8519483	Bergen Point West Reach, NY	40.64	74.14
8531680	Sandy Hook, NJ	40.47	74.01
8577330	Solomons Island, MD	38.32	76.45
8573364	Tolchester Beach, MD	39.21	76.25
8632200	Kiptopeke, VA	37.17	75.98
8635750	Lewisetta, VA	37.99	76.46
8635750	Sewells Point, VA	36.95	76.32
8638863	Chesapeake Bay Bridge Tunnel, VA	36.97	76.10
8651370	Duck, Pier, NC	36.18	75.74
8654400	Cape Hatteras Fishing Pier, NC	35.22	75.64
8720218	Mayport (Bay Pilots Dock), FL	30.39	81.43
8720587	St. Augustine Beach, FL	29.86	81.26
8721604	Trident Pier, FL	28.42	80.59
8723214	Virginia Key, FL	25.73	80.15
8725110	Naples, FL	26.13	81.80
8725520	Fort Myers, FL	26.65	81.87
8726520	St. Petersburg, FL	27.76	82.62
8726667	McKay Bay Entrance, FL	27.91	82.42
8726724	Clearwater Beach, FL	27.98	82.83
8728690	Apalachicola, FL	29.73	84.98
8729210	Panama City Beach, FL	30.21	85.88
8747766	Waveland, MS	30.28	89.37
8761724	Grand Isle, LA	29.26	89.96
8770613	Morgans Point, TX	29.68	94.98
8771013	Eagle Point, TX	29.48	94.92
8771510	Galveston Pleasure Pier, TX	29.28	94.79
8772440	Freeport, TX	28.95	95.31
8775870	Corpus Christi, TX	27.58	97.22
8779770	Port Isabel, TX	26.06	97.26

* Quality controlled data from these platforms can be obtained from NDBC's **Seaboard Bulletin Board Service** soon after the fact. For information contact NDBC .

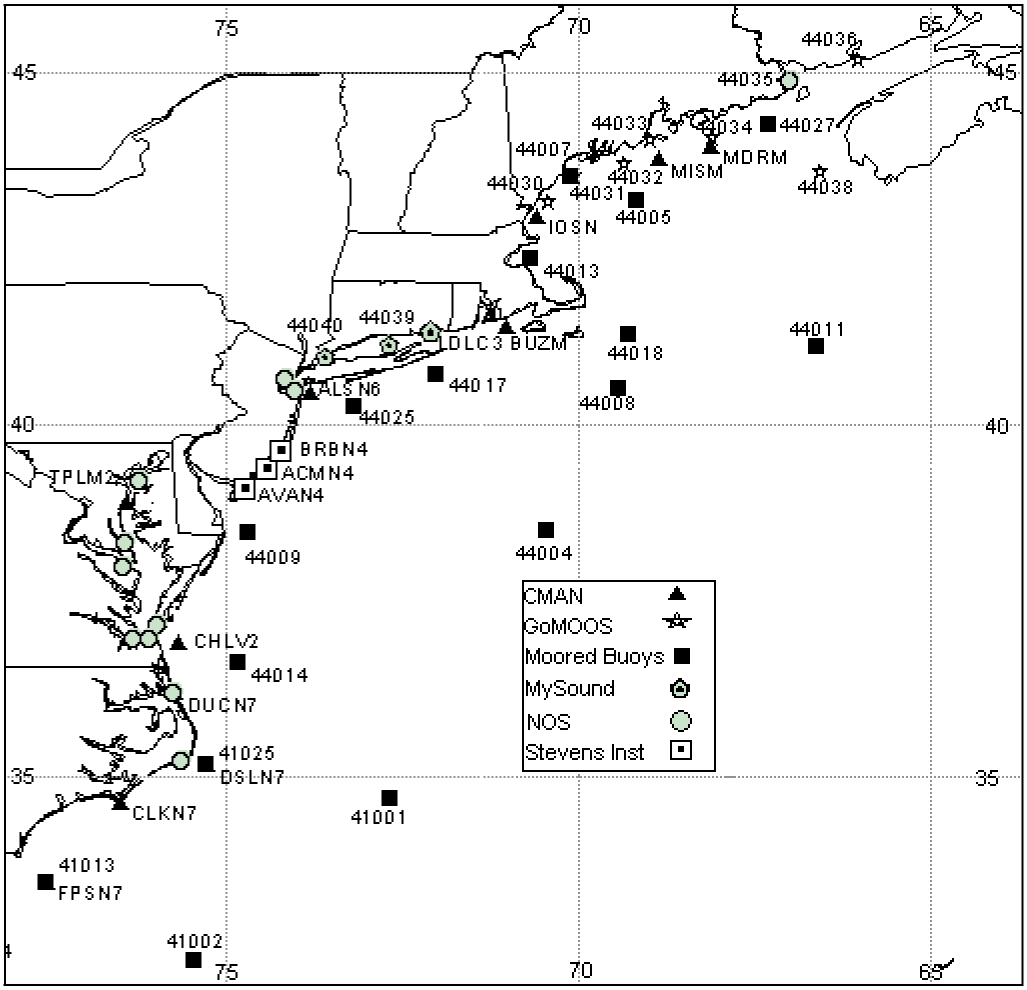


Figure B-3.2. Marine Buoy, C-MAN, NOS, and GoMOOS for the US east coast. See Tables B-3.1-3.3.

C-MANs = Coastal Marine Automated Network
*GoMOOS = Gulf of Maine Ocean Observing Station
*MySound = Monitoring Your Sound, University of Connecticut Dept. of Marine Sciences
*NOS = National Ocean Service
* Stevens Inst = Stevens Institute of Technology

*NDBC receives data from these stations but does not maintain them. For more information see NDBC web site http://www.ndbc.noaa.gov

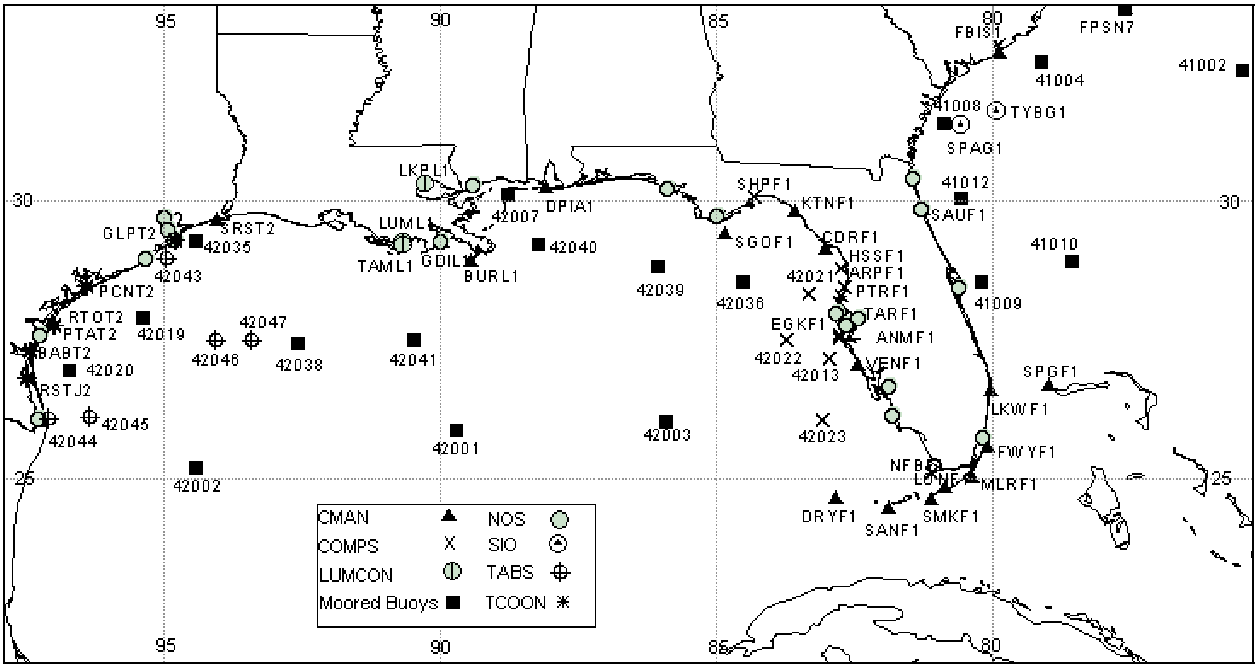
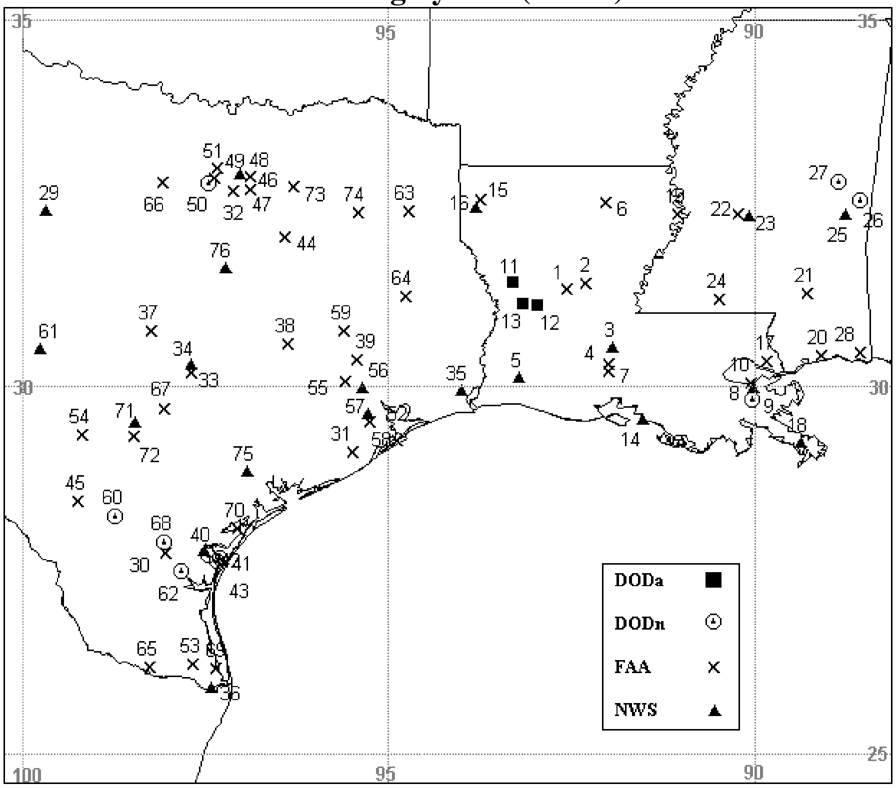


Figure B-3.2. Marine Buoy, C-MAN, NOS, COMPS and TABS for the US gulf coast. See Tables B-3.1-3.3.

C-MANs = Coastal Marine Automated Network
*COMPS = Coastal Ocean Monitoring and Prediction System
*LUMCOM = Louisiana Universities Marine Consortium
*NOS = National Ocean Service
*SIO = Skidaway Institute of Oceanography
*TCOON = Texas Coastal Ocean Observing Network
*TABS = Texas Automated Buoy System

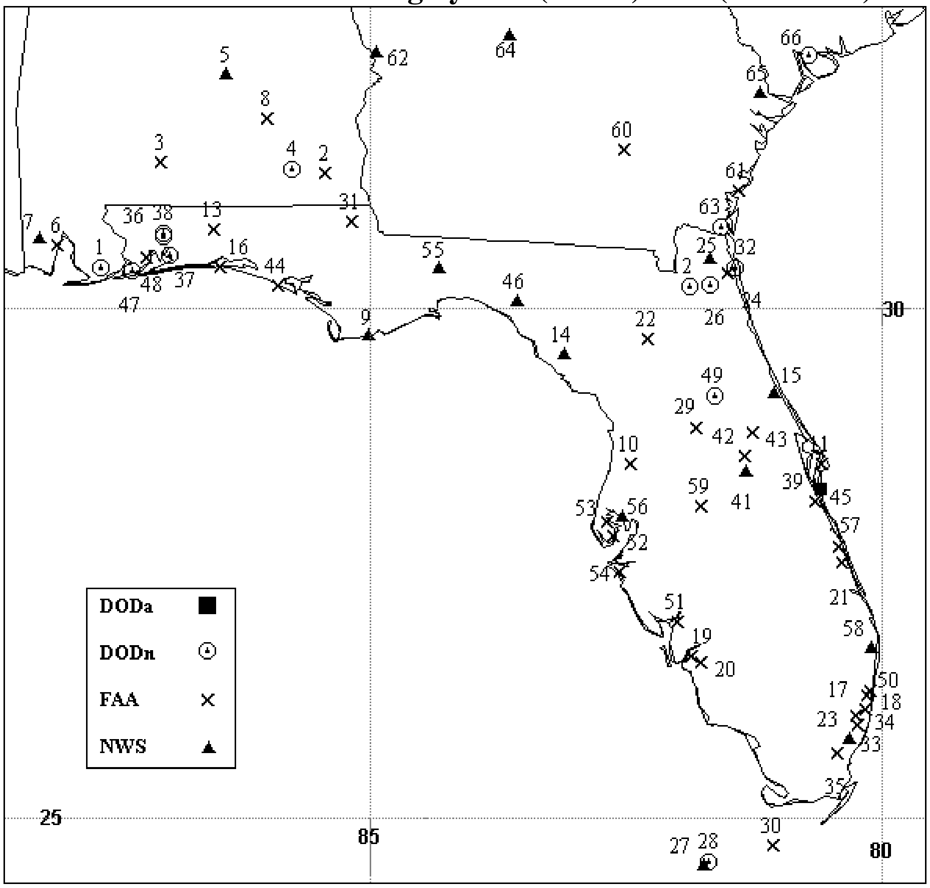
*NDBC receives data from these stations but does not maintain them. For more information see NDBC web site http://www.ndbc.noaa.gov

Table B-3.4 Automated Surface Observing System (ASOS) sites



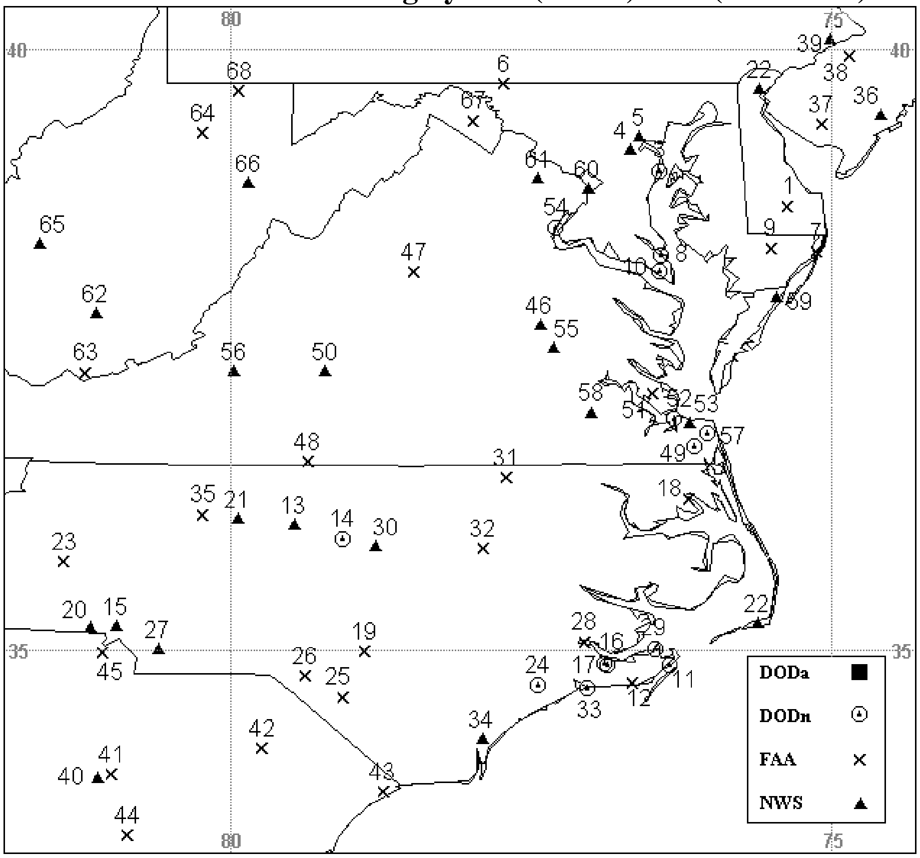
#	ID	Agency	Site Name	Lat. (N)	Lon (W)	#	ID	Agency	Site Name	Lat. (N)	Lon (W)
1	KAEX	FAA	Alexandria, LA	31.33	92.56	39	KCXO	FAA	Conroe, TX	30.36	95.41
2	KESF	FAA	Alexandria, LA	31.40	92.29	40	KCRP	NWS	Corpus Christi, TX	27.77	97.51
3	KBTR	NWS	Baton Rouge, LA	30.54	91.95	41	KNGP	DODn	Corpus Christi, TX	27.68	97.29
4	KLFT	FAA	Lafayette, LA	30.20	91.99	42	KNGW	DODn	Corpus Christi, TX	27.72	97.44
5	KLCH	NWS	Lake Charles, LA	30.12	93.23	43	KNVT	DODn	Corpus Christi, TX	27.63	97.31
6	KMLU	FAA	Monroe, LA	32.51	92.03	44	KCRS	FAA	Corsicana, TX	32.03	96.40
7	KARA	FAA	New Iberia, LA	30.29	91.99	45	KCOT	FAA	Cotulla, TX	28.45	99.22
8	KMSY	NWS	New Orleans, LA	29.99	90.02	46	KDAL	FAA	Dallas, TX	32.85	96.86
9	KNBG	DODn	New Orleans, LA	29.84	90.02	47	KRBD	FAA	Dallas, TX	32.68	96.86
10	KNEW	FAA	New Orleans, LA	30.05	90.03	48	KDFW	NWS	Dallas/Fort Worth, TX	32.90	97.02
11	FTPK1	DODa	Fort Polk, LA	31.41	93.30	49	KFTW	FAA	Fort Worth, TX	32.83	97.36
12	FTPK2	DODa	Fort Polk, LA	31.11	92.97	50	KNFW	DOD	Fort Worth, TX	32.77	97.43
13	FTPK3	DODa	Fort Polk, LA	31.12	93.16	51	KAFW	FAA	Fort Worth, TX	32.97	97.32
14	KP92	NWS	Salt Point, LA	29.56	91.53	52	KGLS	FAA	Galveston, TX	29.27	94.86
15	KDTN	FAA	Shreveport, LA	32.54	93.74	53	KHRL	FAA	Harlingen, TX	26.23	97.66
16	KSHV	NWS	Shreveport, LA	32.45	93.82	54	KHDO	FAA	Hondo, TX	29.36	99.17
17	KASD	FAA	Slidell, LA	30.34	89.82	55	KDWH	FAA	Houston, TX	30.07	95.56
18	K7R1	NWS	Venice, LA	29.26	89.36	56	KIAH	NWS	Houston, TX	29.99	95.36
19	KTVR	FAA	Vicks./Tallulah, LA	32.35	91.03	57	KHOU	NWS	Houston, TX	29.64	95.28
20	KGPT	FAA	Gulfport, MS	30.41	89.08	58	KT02	FAA	Houston, TX	29.52	95.24
21	KHBG	FAA	Hattiesburg, MS	31.27	89.26	59	KUTS	FAA	Huntsville, TX	30.74	95.59
22	KHKS	FAA	Jackson, MS	32.34	90.22	60	KNMT	DODn	Ingleside, TX	28.24	98.72
23	KJAN	NWS	Jackson, MS	32.32	90.08	61	KJCT	NWS	Junction, TX	30.51	99.77
24	KMCB	FAA	McComb, MS	31.18	90.47	62	KNQI	DODn	Kingsville, TX	27.50	97.81
25	KMEI	NWS	Meridian, MS	32.34	88.75	63	KGGG	FAA	Longview, TX	32.39	94.71
26	KNMM	DODn	Meridian, MS	32.55	88.54	64	KLFK	FAA	Lufkin, TX	31.23	94.75
27	KNJW	DODn	Meridian Range, MS	32.80	88.83	65	KMFE	FAA	McAllen, TX	26.18	98.24
28	KPQL	FAA	Pascagoula, MS	30.46	88.53	66	KMWL	FAA	Mineral Wells, TX	32.78	98.06
29	KABI	NWS	Abilene, TX	32.41	99.68	67	K3R5	FAA	New Braunfels, TX	29.71	98.05
30	KALI	FAA	Alice, TX	27.74	98.02	68	KNOG	DODn	Orange Grove, TX	27.89	98.04
31	KLBX	FAA	Angelton/L. Jack., TX	29.12	95.46	69	KT31	FAA	Port Isabel, TX	26.16	97.34
32	KF54	FAA	Arlington, TX	32.66	97.10	70	KRKP	FAA	Rockport, TX	28.08	97.04
33	KBSM	FAA	Austin, TX	30.18	97.68	71	KSAT	NWS	San Antonio, TX	29.53	98.46
34	KAUS	NWS	Austin, TX	30.29	97.70	72	KSSF	FAA	San Antonio, TX	29.34	98.47
35	KBPT	NWS	Beau./Port Art., TX	29.95	94.02	73	KTRL	FAA	Terrel, TX	32.71	96.27
36	KBRO	NWS	Brownsville, TX	25.91	97.42	74	KTYR	FAA	Tyler, TX	32.36	95.40
37	KBMQ	FAA	Burnet, TX	30.74	98.23	75	KVCT	NWS	Victoria, TX	28.86	96.93
38	KCLL	FAA	College Station, TX	30.58	96.36	76	KACT	NWS	Waco, TX	31.62	97.23

Table B-3.4 Automated Surface Observing System (ASOS) sites (continued)



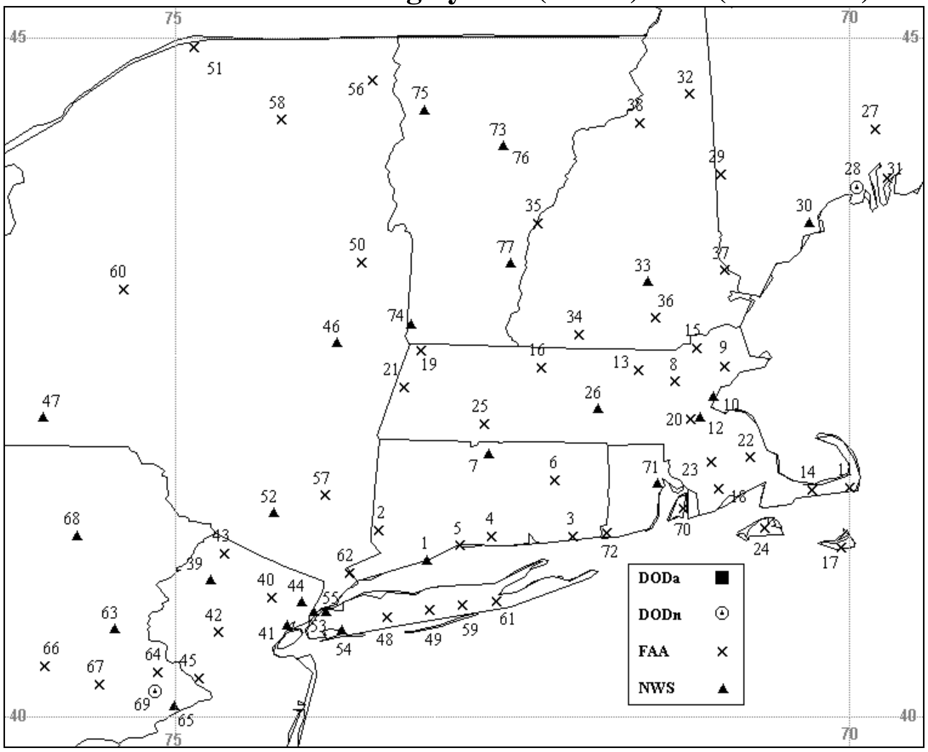
#	ID	Agency	Site Name	Lat. (N)	Lon (W)
1	KNBJ	DODn	Barin, AL	30.39	87.63
2	KDHN	FAA	Dothan, AL	31.31	85.44
3	KGZH	FAA	Evergreen, AL	31.42	87.05
4	KLOR	DODn	Fort Rucker, AL	31.36	85.75
5	KMGM	NWS	Montgomery, AL	32.30	86.41
6	KBFM	FAA	Mobile, AL	30.61	88.06
7	KMOB	NWS	Mobile, AL	30.69	88.25
8	KTOI	FAA	Troy, AL	31.86	86.01
9	KAQQ	NWS	Apalachicola, FL	29.73	85.02
10	KBKV	FAA	Brooksville, FL	28.47	82.45
11	CCAS1	FAA	Cape Canaveral, FL	28.48	80.58
12	KNZC	DODn	Cecil, FL	30.21	81.87
13	KCEW	FAA	Crestview, FL	30.77	86.52
14	KCTY	NWS	Cross City, FL	29.55	83.11
15	KDAB	NWS	Daytona Beach, FL	29.17	81.06
16	KDTS	FAA	Destin, FL	30.39	86.47
17	KFLL	FAA	Fort Lauderdale, FL	26.07	80.15
18	KFXE	FAA	Fort Lauderdale, FL	26.20	80.13
19	KFMY	FAA	Fort Myers, FL	26.58	81.86
20	KRSW	FAA	Fort Myers, FL	26.53	81.77
21	KFPR	FAA	Fort Pierce, FL	27.50	80.38
22	KGNV	FAA	Gainesville, FL	29.69	82.28
23	KHWO	FAA	Hollywood, FL	26.00	80.24
24	KCRG	FAA	Jacksonville, FL	30.34	81.51
25	KJAX	NWS	Jacksonville, FL	30.49	81.69
26	KNIP	DODn	Jacksonville, FL	30.23	81.67
27	KEYW	NWS	Key West, FL	24.55	81.75
28	KNQX	DODn	Key West, FL	24.57	81.68
29	KLEE	FAA	Leesburg, FL	28.82	81.81
30	KMTH	FAA	Marathon, FL	24.73	81.05
31	KMAI	FAA	Marianna, FL	30.84	85.18
32	KNRB	DODn	Mayport, FL	30.40	81.42
33	KMIA	NWS	Miami, FL	25.79	80.32
34	KOPF	FAA	Miami, FL	25.91	80.23
35	KTMB	FAA	Miami, FL	25.64	80.43
36	KNDZ	DODn	Milton, FL	30.70	87.02
37	KNFJ	DODn	Milton, FL	30.51	86.95
38	KNSE	DODn	Milton, FL	30.73	87.02
39	KMLB	FAA	Melbourne, FL	28.10	80.64
41	KMCO	NWS	Orlando, FL	28.42	81.33
42	KORL	FAA	Orlando, FL	28.55	81.34
43	KSFB	FAA	Orlando, FL	28.78	81.25
44	KPFN	FAA	Panama City, FL	30.21	85.89
45	PAFB1	DODa	Patrick AFB, FL	28.23	80.60
46	K40J	NWS	Perry Foley, FL	30.07	83.57
47	KNPA	DODn	Pensacola, FL	30.36	87.32
48	KPNS	FAA	Pensacola, FL	30.48	87.19
49	KNAE	DODn	Pinecastle, FL	29.14	81.63
50	KPMP	FAA	Pompano Beach, FL	26.25	80.11
51	KPGD	FAA	Punta Gorda, FL	26.92	81.99
52	KSRQ	FAA	Sar./Braden., FL	27.41	82.56
53	KPIE	FAA	St. Peter./Clear., F	27.91	82.69
54	KSPG	FAA	St Petersburg FL	27.77	82.63
55	KTLH	NWS	Tallahassee, FL	30.39	84.35
56	KTPA	NWS	Tampa, FL	27.96	82.54
57	KVRB	FAA	Vero Beach, FL	27.66	80.41
58	KPBI	NWS	West Palm Beach, FL	26.68	80.10
59	KGIF	FAA	Winter Haven, FL	28.06	81.76
60	KAMG	FAA	Alma, GA	31.54	82.51
61	KSSI	FAA	Brunswick, GA	31.15	81.39
62	KCSG	NWS	Columbus, GA	32.52	84.94
63	KNBQ	DODn	Kings Bay, GA	30.79	81.56
64	KMCN	NWS	Macon, GA	32.69	83.65
65	KSAV	NWS	Savannah, GA	32.12	81.20
66	KNBC	DODn	Beaufort, SC	32.49	80.70

Table B-3.4 Automated Surface Observing System (ASOS) sites (continued)



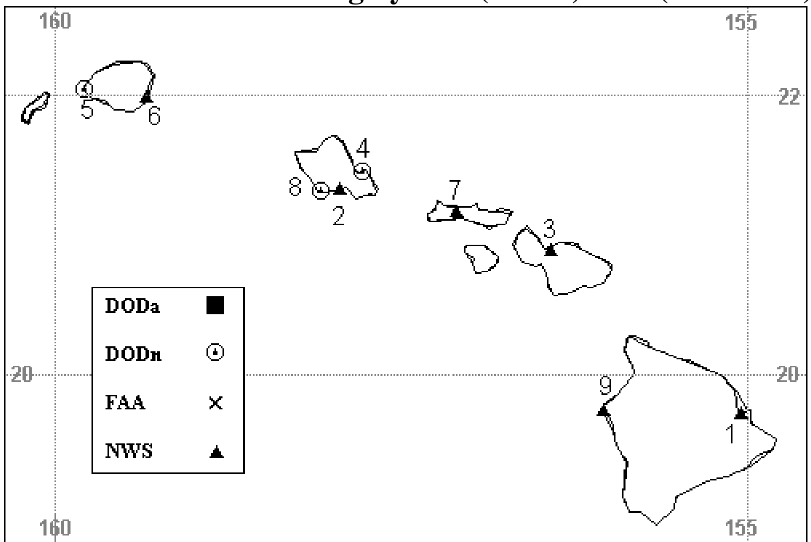
#	ID	Agency	Site Name	Lat. (N)	Lon (W)	#	ID	Agency	Site Name	Lat. (N)	Lon (W)
1	KGED	FAA	Georgetown, DE	38.69	75.36	35	KINT	FAA	Winston Salem, NC	36.13	80.22
3	KNAK	DODn	Annapolis, MD	38.99	76.43	36	KACY	NWS	Atlantic City, NJ	39.46	74.59
4	KBWI	NWS	Baltimore, MD	39.17	76.68	37	KMIV	FAA	Millville, NJ	39.37	75.08
5	KDMH	NWS	Baltimore, MD	39.28	76.61	38	KVAY	FAA	Mount Holly, NJ	39.94	74.84
6	KHGR	FAA	Hagerstown, MD	39.71	77.73	39	KPNE	NWS	Philadelphia, PA	40.08	75.01
7	KN80	FAA	Ocean City, MD	38.31	75.12	40	KCAE	NWS	Columbia, SC	33.94	81.11
8	KNHK	DODn	Patuxent River, MD	38.28	76.41	41	KCUB	FAA	Columbia, SC	33.97	80.99
9	KSBY	FAA	Salisbury, MD	38.34	75.50	42	KFLO	FAA	Florence, SC	34.18	79.73
10	KNUI	DODn	St Inigoes, MD	38.15	76.42	43	KCRE	FAA	Myrtle Beach, SC	33.82	78.72
11	KNLT	DODn	Atlantic City, NC	34.89	76.34	44	KOGB	FAA	Orangeburg, SC	33.46	80.85
12	KMRH	FAA	Beaufort, NC	34.73	76.66	45	K29J	FAA	Rock Hill, SC	34.98	81.06
13	KBUY	NWS	Burlington, NC	36.05	79.47	46	KOFP	NWS	Ashland, VA	37.71	77.43
14	KIGX	DODn	Chapel Hill, NC	35.93	79.06	47	KCHO	FAA	Charlottesville, VA	38.14	78.46
15	KCLT	NWS	Charlotte, NC	35.21	80.95	48	KDAN	FAA	Danville, VA	36.57	79.35
16	KNKT	DODn	Cherry Point, NC	34.90	76.88	49	KNFE	DODn	Fentress, VA	36.70	76.13
17	KNIS	DODn	Cherry Point, NC	34.89	76.86	50	KLYH	NWS	Lynchburg, VA	37.32	79.21
18	KECG	FAA	Elizabeth City, NC	36.26	76.18	51	KPHF	FAA	Newport News, VA	37.13	76.49
19	KFAY	FAA	Fayetteville, NC	34.99	78.88	52	KNGU	DODn	Norfolk, VA	36.93	76.30
20	KAKH	NWS	Gastonia, NC	35.20	81.16	53	KORF	NWS	Norfolk, VA	36.90	76.19
21	KGSO	NWS	Greensboro, NC	36.10	79.94	54	KNYG	DODn	Quantico, VA	38.51	77.29
22	KILG	NWS	Wilmington, DE	39.67	75.60	55	KRIC	NWS	Richmond, VA	37.51	77.32
22	KHSE	NWS	Hatteras, NC	35.23	75.62	56	KROA	NWS	Roanoke, VA	37.32	79.97
23	KHKY	FAA	Hickory, NC	35.74	81.38	57	KNTU	DODn	Virginia Beach, VA	36.82	76.03
24	KNCA	DODn	Jacksonville, NC	34.71	77.44	58	KAKQ	NWS	Wakefield, VA	36.98	77.00
25	KLBT	FAA	Lumberton, NC	34.61	79.06	59	KWAL	NWS	Wallops Island, VA	37.94	75.46
26	KMEB	FAA	Maxton, NC	34.79	79.37	60	KDCA	NWS	Washington, DC	38.84	77.03
27	KEQY	NWS	Monroe, NC	35.02	80.60	61	KIAD	NWS	Washington, DC	38.93	77.45
28	KEWN	FAA	New Bern, NC	35.07	77.05	62	KBKW	NWS	Beckley, WV	37.80	81.12
29	KNBT	DODn	Piney Island, NC	35.02	76.46	63	KBLF	FAA	Bluefield,	0.00	37.30
30	KRDU	NWS	Raleigh/Durham, NC	35.87	78.79	64	KCKB	FAA	Clarksburg, WV	39.30	80.22
31	KRZZ	FAA	Roanoke Rapids, NC	36.44	77.71	65	KCRW	NWS	Charleston, WV	38.38	81.59
32	KRWI	FAA	Rocky Mount Wil., NC	35.85	77.90	66	KEKN	NWS	Elkins, WV	38.89	79.85
33	KNJM	DODn	Swansboro, NC	34.69	77.03	67	KMRB	FAA	Martinsburg, WV	39.40	77.98
34	KILM	NWS	Wilmington, NC	34.27	77.91	68	KMGW	FAA	Morgantown, WV	39.65	79.92

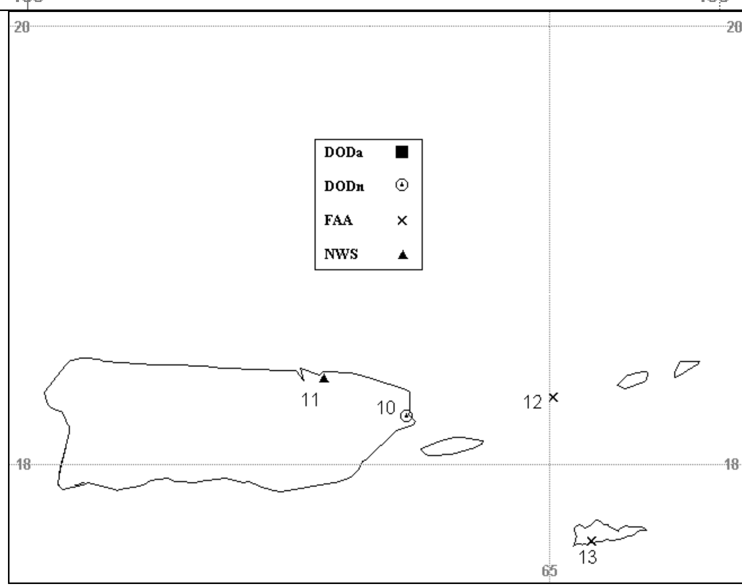
Table B-3.4 Automated Surface Observing System (ASOS) sites (continued)



#	ID	Agency	Site Name	Lat. (N)	Lon (W)	#	ID	Agency	Site Name	Lat. (N)	Lon (W)
1	KBDR	NWS	Bridgeport, CT	41.16	73.13	39	K12N	NWS	Andover, NJ	41.01	74.74
2	KDXR	FAA	Danbury, CT	41.37	73.48	40	KCDW	FAA	Caldwell, NJ	40.88	74.28
3	KGON	FAA	Groton/N. Lon, CT	41.33	72.05	41	KEWR	NWS	Newark, NJ	40.68	74.17
4	KHFD	FAA	Hartford, CT	41.33	72.65	42	KN52	FAA	Somerville, NJ	40.62	74.67
5	KHVN	FAA	New Haven, CT	41.26	72.89	43	KFWN	FAA	Sussex, NJ	41.20	74.63
6	KIJD	FAA	Willimantic, CT	41.74	72.18	44	KTEB	NWS	Teterboro, NJ	40.85	74.06
7	KBDL	NWS	Windsor Locks, CT	41.94	72.68	45	KTTN	FAA	Trenton, NJ	40.28	74.82
8	KBED	FAA	Bedford, MA	42.47	71.29	46	KALB	NWS	Albany, NY	42.75	73.80
9	KBVY	FAA	Beverly, MA	42.58	70.92	47	KBGM	NWS	Binghamton, NY	42.21	75.98
10	KBOS	NWS	Boston, MA	42.36	71.01	48	KFRG	FAA	Farmingdale, NY	40.73	73.42
11	KCQX	FAA	Chatham, MA	41.69	69.99	49	KISP	FAA	Islip, NY	40.79	73.10
12	KMQE	NWS	East Milton, MA	42.21	71.11	50	KGFL	FAA	Glens Falls, NY	43.34	73.61
13	KFIT	FAA	Fitchburg, MA	42.55	71.56	51	KMSS	FAA	Massena, NY	44.93	74.85
14	KHYA	FAA	Hyannis, MA	41.67	70.27	52	KMGJ	NWS	Montgomery, NY	41.51	74.27
15	KLWM	FAA	Lawrence, MA	42.71	71.13	53	KNYC	NWS	New York City, NY	40.78	73.97
16	KORE	FAA	Orange, MA	42.57	72.28	54	KJFK	NWS	New York City, NY	40.64	73.76
17	KACK	FAA	Nantucket, MA	41.25	70.06	55	KLGA	NWS	New York City, NY	40.78	73.88
18	KEWB	FAA	New Bedford, MA	41.68	70.97	56	KPLB	FAA	Plattsburgh, NY	44.68	73.53
19	KAQW	FAA	North Adams, MA	42.70	73.17	57	KPOU	FAA	Poughkeepsie, NY	41.63	73.88
20	KOWD	FAA	Norwood, MA	42.19	71.17	58	KSLK	FAA	Saranac Lake, NY	44.39	74.20
21	KPSF	FAA	Pittsfield, MA	42.43	73.29	59	KHWV	FAA	Shirley, NY	40.82	72.87
22	KPYM	FAA	Plymouth, MA	41.91	70.73	60	KUCA	FAA	Utica, NY	43.14	75.38
23	KTAN	FAA	Taunton, MA	41.88	71.02	61	KFOK	FAA	West Hampton Bch, NY	40.85	72.62
24	KMVY	FAA	Vineyard Haven, MA	41.39	70.62	62	KHPN	FAA	White Plains, NY	41.06	73.70
25	KBAF	FAA	Westfield, MA	42.16	72.71	63	KABE	NWS	Allentown, PA	40.65	75.45
26	KORH	NWS	Worcestor, MA	42.27	71.87	64	KN88	FAA	Doylestown, PA	40.33	75.12
27	KAUG	FAA	Augusta, ME	44.32	69.80	65	KPNE	NWS	Philadelphia, PA	40.08	75.01
28	KNHZ	DODn	Brunswick, ME	43.90	69.94	66	KRDG	FAA	Reading, PA	40.37	75.96
29	KIZG	FAA	Fryeburg, ME	43.99	70.95	67	KPTW	FAA	Pottstown, PA	40.24	75.56
30	KPWM	NWS	Portland, ME	43.64	70.30	68	KAVP	NWS	Wilkes B./Scran., PA	41.34	75.73
31	KIWI	FAA	Wiscasset, ME	43.96	69.71	69	KNXX	DODn	Willow Grove, PA	40.19	75.14
32	KBML	FAA	Berlin, NH	44.58	71.18	70	KUUU	FAA	Newport, RI	41.53	71.23
33	KCON	NWS	Concord, NH	43.20	71.50	71	KPVD	NWS	Providence, RI	41.72	71.43
34	KAFN	FAA	Jaffrey, NH	42.81	72.00	72	KWST	FAA	Westerly, RI	41.35	71.80
35	KLEB	FAA	Lebanon, NH	43.63	72.31	73	KMPV	NWS	Barre/Montpelier, VT	44.20	72.57
36	KMHT	FAA	Manchester, NH	42.93	71.44	74	KDDH	NWS	Bennington, VT	42.89	73.25
37	K6B1	FAA	Rochester, NH	43.28	70.92	75	KMPV	NWS	Burlington, VT	44.47	73.15
38	KHIE	FAA	Whitefield, NH	44.37	71.55	76	KMVL	NWS	Morrisville, VT	44.20	72.57
						77	KVSF	NWS	Springfield, VT	43.34	72.52

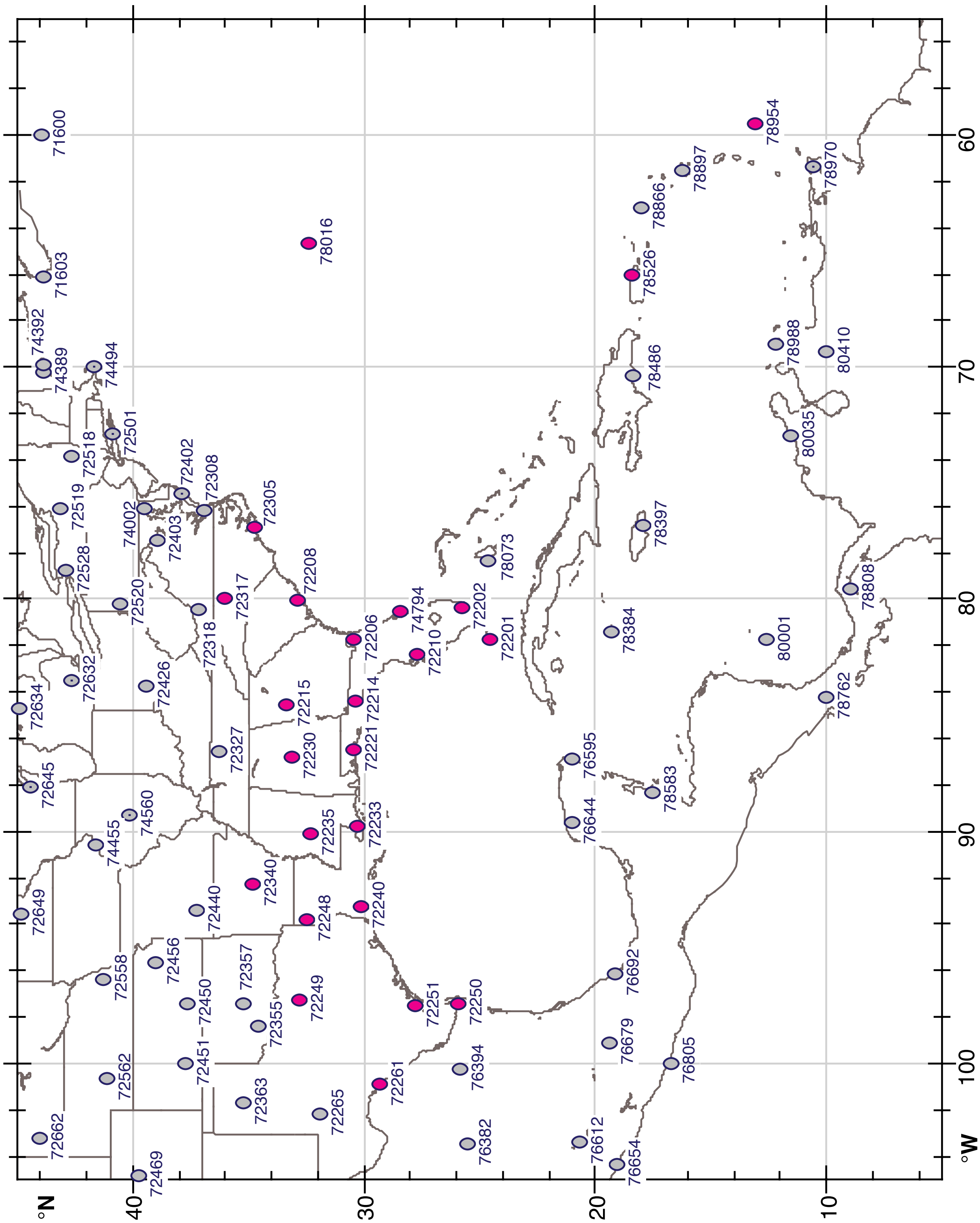
Table B-3.4 Automated Surface Observing System (ASOS) sites (continued)

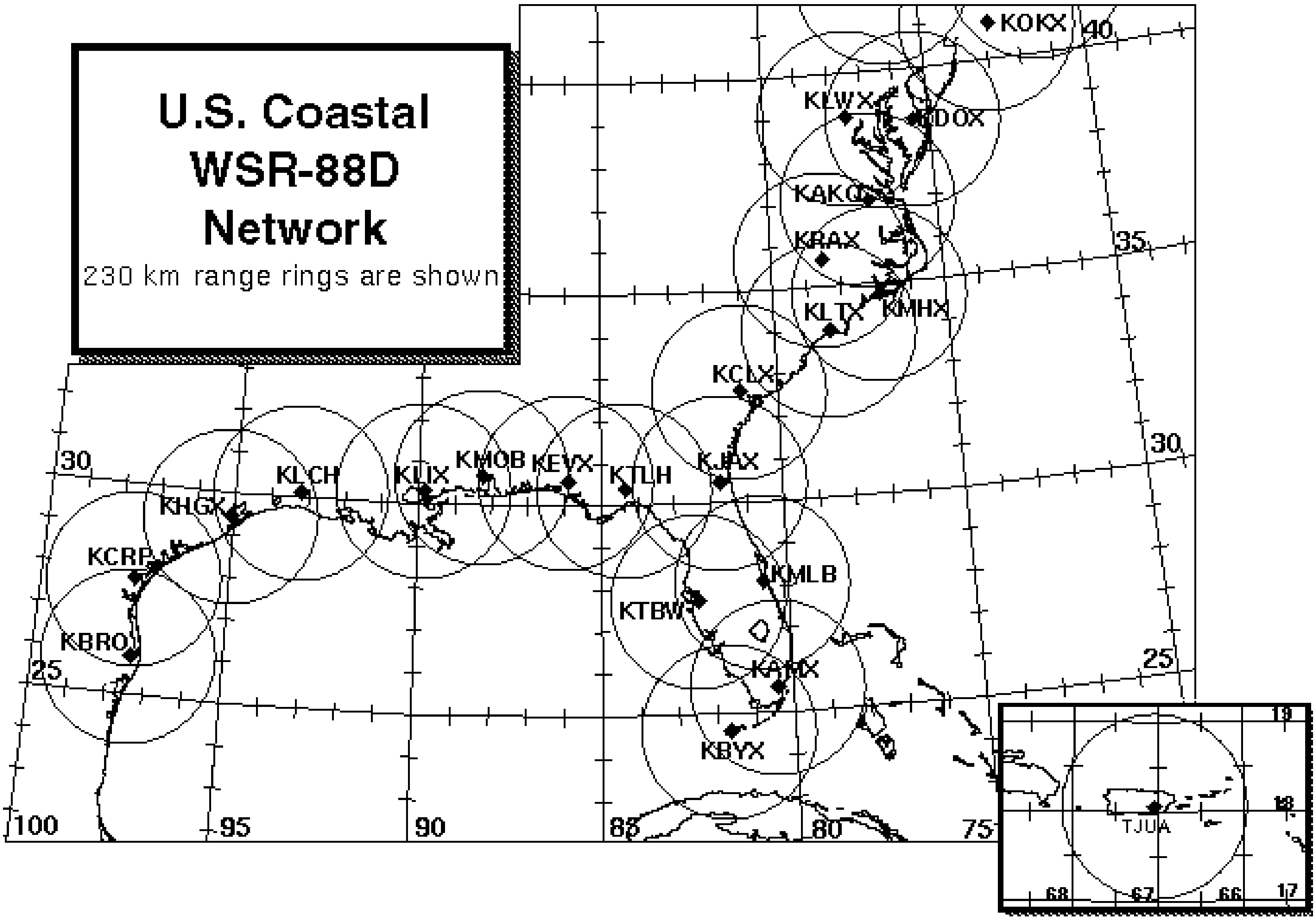




#	ID	Agency	Site Name	Lat. (N)	Lon (W)
1	PHTO	NWS	Hilo, HI	19.72	155.05
2	PHNL	NWS	Honolulu, HI	21.32	157.94
3	PHOG	NWS	Kahului, HI	20.89	156.43
4	PHNG	DODn	Kaneohoe, HI	21.45	157.77
5	PHBK	DODn	Kekaha, HI	22.04	159.79
6	PHLI	NWS	Lihue, HI	21.98	159.34
7	PHMK	NWS	Molokai, HI	21.16	157.10
8	PHNA	DODn	Oahu, HI	21.31	158.07
9	PHKO	NWS	Kailua/Kona, HI	19.74	156.05
10	TJNR	DODn	Roosevelt Roads, PR	18.26	65.64
11	TJSJ	NWS	San Juan, PR	18.43	66.01
12	KSTT	FAA	Charlotte Amali, VI	18.34	64.98
13	KSTX	FAA	Christiansted, VI	17.70	64.81

Appendix C: DOD/NWS RAWIN/RAOB and NWS Coastal Land-based Radar Locations




U.S. Coastal
WSR-88D
Network
230 km range rings are shown
KOKX
KLWX
KDOX
KAKQ
KRAX
KLTX
KMHX
KCLX
KJAX
KMLB
KTBW
KAMX
KBYX
KTLH
KEVX
KMOB
KLIX
KLCH
KHGX
KCRP
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APPENDIX D: PRINCIPAL DUTIES OF THE NOAA SCIENTIFIC PERSONNEL

CAUTION

Flight operations are routinely conducted in turbulent conditions. Shock-mounted electronic and experimental racks surround most seat positions. Therefore, ***for safety onboard the aircraft all personnel should wear a flight suit and closed toed shoes***. For comfort, personnel should bring a jacket or sweater, as the cabin gets cold during flight.

Smoking is prohibited within 50 ft of the aircraft while they are on the ground. No smoking is permitted on the aircraft at any time.

Section 4-401, of the NOAA Safety Rules Manual state that: "Don't let your attention wander, either through constant conversation, use of cell phone or sightseeing while operating vehicles. Drivers must use caution and common sense under all conditions. Operators and passengers are not permitted to smoke or eat in the government vehicles. Cell phone use is permitted while car is parked."

GENERAL INFORMATION FOR ALL SCIENTIFIC MISSION PARTICIPANTS

Mission participants are advised to carry the proper personal identification [i.e., travel orders, "shot" records (when appropriate), and passports (when required)]. Passports will be checked by AOC personnel prior to deployment to countries requiring it. All participants must provide their own meals for in-flight consumption. AOC provides a refrigerator, microwave, coffee, utensils, condiments, ice, water, and soft drinks for a nominal fee per flight.

D.1 Field Program Director/ CBLAST Chief Scientist;

(1) Responsible to the HRD director for the implementation of the Hurricane Field Program Plan.

(2) Only official communication link to AOC. Communicates flight requirements and changes in mission to AOC.

(3) Only formal communication link between AOML and CARCAH during operations. Coordinates scheduling of each day's operations with AOC only after all (POD) reconnaissance requirements are completed between CARCAH and AOC.

(4) Convenes the Hurricane Field Program Operations Advisory Panel. This panel selects missions to be flown in comparison with others as specified in sections 9-15 of this plan.

(5) Provides for pre-mission briefing of flight crews, scientists, and others (as required).

(6) Assigns duties of field project scientific personnel. Ensures safety during the field program.

(7) Coordinates press statements with NOAA/Public Affairs.

D.2 Assistant Field Program Director

(1) Assumes the duties of the field program director in his absence.

D.3 Miami Ground Operations Center: Senior Team Leader

(1) During operations, the MGOC senior team leader is responsible for liaison between HRD base and field personnel and other organizations as requested by the field program director, the director of HRD, or their designated representatives.

D.4 Named Experiment Lead Project Scientist

(1) Has overall responsibility for the experiment.

(2) Coordinates the project and sub-project requirements.

(3) Determines the primary modes of operation for appropriate instrumentation.

(4) Assists in the selection of the mission.

(5) Provides a written summary of the mission to the field program director (or his designee) at the experiment's debriefing.

D.5 Lead Project Scientist

(1) Has overall scientific responsibility for his/her aircraft.

(2) Makes in-flight decisions concerning alterations of: (a) specified flight patterns; (b) instrumentation operation; and (c) assignment of duties to on-board scientific project personnel.

(3) Acts as project supervisor on the aircraft and is the focal point for all interactions of project personnel with operational or visiting personnel.

(4) Conducts preflight and post flight briefings of the entire crew. Completes formal checklists of safety, instrument operations - noting malfunctions, problems, etc.

(5) Provides a written report of each mission day's operations to the field program director at the mission debriefing.

D.6 Cloud Physics Scientist

(1) Has overall responsibility for the cloud physics project on the aircraft.

(2) Briefs the on-board lead project scientist on equipment status before takeoff.

(3) Determines the operational mode of the cloud physics sensors (i.e., where, when, and at what rate to sample).

(4) Operates and monitors the cloud physics sensors and data systems.

(5) Provides a written preflight and post flight status report and flight summary of each mission day's operations to the on-board lead project scientist at the post flight debriefing.

D.7 Boundary-Layer Scientist

(1) Insures that the required number of AXCPs, AXBTs, and AXCTDs are on the aircraft for each mission.

(2) Operates the AXCP, AXBT, and AXCTD equipment (as required) on the aircraft.

(3) Briefs the on-board lead project scientist on equipment status before takeoff.

(4) Determines where and when to release the AXCPs, AXBTs, and AXCTDs (as appropriate) subject to clearance by flight crew.

(5) Performs preflight, inflight, and post flight checks and calibrations.

(6) Provides a written preflight and post flight status report and a flight summary of each mission day's operations to the on-board lead project scientist at the post flight debriefing.

D.8 Radar Scientist

(1) Determines optimum meteorological target displays. Continuously monitors displays for performance and optimum mode of operations. Thoroughly documents modes and characteristics of the operations.

(2) Provides a summary of the radar display characteristics to the on-board lead project scientist at the post flight debriefing.

(3) Maintains tape logs.

(4) During the ferry to the storm, the radar scientist should record a tape of the sea return on either side of the aircraft at elevation angles varying from -20° through +20°. This tape will allow correction of any antenna mounting biases or elevation angle corrections.

D.9 Dropsonde Scientist

(1) Processes dropsondes observations on HRD workstation for accuracy.

(2) Provides TEMP drop message for ASDL, transmission or insures correct code in case of automatic data transmission.

D.10 Workstation Scientist

(1) Operates HRD's workstation.

(2) Runs programs that determine wind center and radar center as a function of time, composite flight-level and radar reflectivity relative to storm center and then process and code dropwindsonde observations.

(3) Checks data for accuracy and sends appropriate data to ASDL computer.

(4) Maintains records of the performance of the workstation and possible software improvements.

APPENDIX E: NOAA RESEARCH OPERATIONAL PROCEDURES AND CHECK LISTS

Hurricane Field Program Deployment Safety Checklist

The Field Program Director is responsible for making sure safety is enforced and ensuring necessary materials are in place and/or any actions have been completed before the start of the HFP. Field program participants are responsible for reviewing this checklist.

Scientist________________________________ Date _______________

Before leaving AOML

_____ 1. Contact MGOC personnel to notify departure time.

_____ 2. Things to take

a. Flight bag (s)
b. Cell phone
c. List of HFP important numbers
d. HRD Field program plan
e. Flight suit

Ground transportation

_____ 1. Arrange for ground transportation

_____ 2. Visual inspection of government vehicle

a. Make sure tires do not appear to be flat
b. Check for any cracked/broken lights, windshield and mirrors
c. Check for any major dents around the vehicle

_____ 3. Inspection inside the government vehicle

a. Check all lights work properly (head and tail lights, dome lights, dashboard and turn signal lights)
b. Make sure the engine, oil, or temperature light does not flash. *If so, contact facilities management.*
c. **Note** the gas and mileage

_____ 4. Contents inside the government vehicle

a. Make sure there is first aid kit and fire extinguisher
b. Proper jack and lug wrench
c. Spare tire
d. Basic auto repair kit (i.e. road hazard reflector or flares)
e. *Consider carrying a flashlight*

_____ 5. If possible, return vehicle with full tank (regular unleaded gasoline)

_____ 6. **Note** mileage on AOML log when returning vehicle keys

_____ 7. Contact MGOC personnel upon returning

E.1 "Conditions-of-Flight" Commands

Mission participants should be aware of the designated "conditions-of-flight." There are five designated basic conditions of readiness encountered during flight. The pilot will set a specific condition and announce it to all personnel over the aircraft's PA (public address) and ICS (interphone communications systems). All personnel are expected to act in accordance with the instructions for the specific condition announced by the pilot. These conditions and appropriate actions are shown below.

CONDITION 1: TURBULENCE/PENETRATION. All personnel will stow loose equipment and fasten safety belts.

CONDITION 2: HIGH ALTITUDE TRANSIT/FERRY. There are no cabin stations manning requirements.

CONDITION 3: NORMAL MISSION OPERATIONS. All scientific and flight crew stations are to be manned with equipment checked and operating as dictated by mission requirements. Personnel are free to leave their ditching stations.

CONDITION 4 AIRCRAFT INSPECTION. After take-off, crew members will perform wings, engines, electronic bays, lower compartments, and aircraft systems check. All other personnel will remain seated with safety belts fastened and headsets on.

CONDITION 5: TAKE-OFF/LANDING. All personnel will stow or secure loose equipment, don headsets, and fasten safety belts/shoulder harnesses.

E.2 Lead Project Scientist

E.2.1 Preflight

_____ 1. Participate in general mission briefing.

_____ 2. Determine specific mission and flight requirements for assigned aircraft.

_____ 3. Determine from field program director whether aircraft has operational fix responsibility and discuss with AOC flight director/meteorologist unless briefed otherwise by field program director.

_____ 4. Contact HRD members of crew to:
   a. Assure availability for mission.
   b. Review field program safety checklist
   c. Arrange ground transportation schedule when deployed.
   d. Determine equipment status.

_____ 5. Meet with AOC flight director and navigator at least 3 hours before take-off for initial briefing.

_____ 5. Meet with AOC flight crew at least 2 hours before take-off for crew briefing. Provide copies of flight requirements and provide a formal briefing for the flight director, navigator, and pilots.

_____ 6. Report status of aircraft, systems, necessary on-board supplies and crews to appropriate HRD operations center (MGOC in Miami).

_____ 7. Before take-off, brief the on-board GPS dropsonde operator on times and positions of drop times.

_____ 7. Make sure each HRD flight crew members have life vests

_____ 7. Perform a headset operation check with all HRD flight crew members. Make sure everyone can hear and speak using the headset.

_____ 8. Collect “mess” fee ($2.00) from all on-board HRD flight crew members.

E.2.2 In-Flight

_____ 1. Confirm from AOC flight director that satellite data link is operative (information).

_____ 2. Confirm camera mode of operation.

_____ 3. Confirm data recording rate.

_____ 4. Complete Form E-2.

_____ 5. Check in with the flight director to make sure the mission is going as planned (i.e. turns are made when they are supposed to be made).

E.2.3 Post flight

_____ 1. Debrief scientific crew.

_____ 2. Report landing time, aircraft, crew, and mission status along with supplies (tapes, *etc*.) remaining aboard the aircraft to MGOC.

_____ 3. Gather completed forms for mission and turn in at the appropriate operations center. [**Note**: all data removed from the aircraft by HRD personnel should be cleared with the AOC flight director.]

_____ 4. Obtain a copy of the 10-s flight listing from the AOC flight director. Turn in with completed forms.

_____ 5. Obtain a copy of the radar DAT tapes. Turn in with completed forms.

_____ 6. Obtain a copy of the all VHS videos form aircraft cameras (3-4 approx.). Turn in with completed forms.

_____ 7. Obtain a copy of CD with all flight data. Turn in with completed forms.

_____ 8. Determine next mission status, if any, and brief crews as necessary.

_____ 9. Notify MGOC as to where you can be contacted and arrange for any further coordination required.

_____ 10. Prepare written mission summary using form E-2 p.3 (due to Field Program Director1 week after the flight).

Form E-2
Page 1 of 5

Lead Project Scientist Check List

Date _______________ Aircraft ______________ Flight ID ____________________

A. —Participants:

HRD		AOC	
Function	**Participant**	**Function**	**Participant**
Lead Project Scientist		Flight Director	
Cloud Physics		Pilots	
Radar		Navigator	
Workstation		Systems Engineer	
Photographer/Observer		Data Technician	
Dropwindsonde		Electronics Technician	
AXBT/AXCP/Guest		Other	

Take-Off: ________ Location: _______________

Landing: ________ Location: _________________

Number of Eye Penetrations: ______

B. —Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP	Maximum Wind

C. —Mission Briefing:

Form E-2
Page 2 of 5

D. —Equipment Status (Up ↑, Down ↓, Not Available —, Not Used **O**)

Equipment	**Pre-Flight**	**In-Flight**	**Post-Flight**	**# of DATs or Expendables**
Aircraft				
Radar/LF				
Radar/TA (Doppler)				
Cloud Physics				
Data System				
GPS sondes				
AXBT/AXCP				
Workstation				
Videography				

REMARKS:

Mission Summary
Storm name
YYMMDDA# Aircraft 4__RF

Scientific Crew (4 RF)
Lead Project Scientist ______________________
Radar Scientist____________________________
Cloud Physics Scientist______________________
Dropwindsonde Scientist____________________
Boundary-Layer Scientist___________________
Workstation Scientist_______________________
Observers_________________________________

Mission Briefing: (include sketch of proposed flight track or page #)

Mission Synopsis: (include plot of actual flight track)

Evaluation: (did the experiment meet the proposed objectives?)

Problems:(list all problems)

Expendables used in mission:
GPS sondes : _________________
AXBTs :___________________
Sonobuoys: __________________

Page __of __

Observer's Flight Track Worksheet

Date ________________ Flight ________________ Observer _________________

Latitude (°)

Longitude (°)

Form E-2
Page 5 of 5

Lead Project Scientist Event Log

Date ________________ Flight ________________ LPS _____________________

Time	Event	Position	Comments

E.3 Cloud Physics Scientist

The on-board cloud physics scientist (CPS) is responsible for cloud physics data collection on his/her assigned aircraft. Detailed operational procedures are contained in the cloud physics kit supplied for each aircraft. General procedures follow. (Check off and initial.)

E.3.1 Preflight

_____ 1. Determine status of cloud physics instrumentation systems and report to the on-board lead project scientist (LPS).

_____ 2. Confirm mission and pattern selection from the on-board LPS.

_____ 3. Select mode of instrument operation.

_____ 4. Complete appropriate instrumentation preflight check lists as supplied in the cloud physics operator's kit.

E.3.2 In-Flight

_____ 1. Operate instruments as specified in the cloud physics operator's kit and as directed by the on-board LPS.

E.3.3 Post flight

_____ 1. Complete summary checklist forms and all other appropriate forms.

_____ 2. Brief the on-board LPS on equipment status and turn in completed check sheets to the LPS.

_____ 3. Take cloud physics data tapes and other data forms and turn these data sets in as follows:

a. Outside of Miami-to the LPS.
b. In Miami-to AOML/HRD. [**Note**: all data removed from the aircraft by HRD personnel should be cleared with the AOC flight director.]

_____ 4. Debrief as necessary at MGOC or the hotel during a deployment.

_____ 5. Determine the status of future missions and notify MGOC as to where you can be contacted.

Form E-3
Page 1 of 2

Cloud Physics Scientist Check List

Date ____________________ Aircraft ____________ Flight ID __________________

A. —Instrument Status and Performance:

System	Pre-Flight	In-Flight	Downtime
PMS Probes:			
—2D-P			
—2D-C			
—FSSP			
—Data System			
DRI Field Mills			
King Probe			
DMTCIP			

B. —Remarks:

E.4 Boundary-Layer Scientist

The on-board boundary-layer scientist (BLS) is responsible for data collection from AXBTs, AXCPs, AXCTDs, BUOYs, and SST radiometers (if these systems are used on the mission). Detailed calibration and instrument operation procedures are contained in the air-sea interaction (ASI) manual supplied to each operator. General supplementary procedures follow. (Check off and initial.)

E.4.1 Preflight

_____ 1. Determine the status of equipment and report results to the on-board lead project scientist (LPS).

_____ 2. Confirm mission and pattern selection from the on-board LPS.

_____ 3. Select the mode of operation for instruments after consultation with the HRD/BLS and the on-board LPS.

_____ 4. Complete appropriate preflight check lists as specified in the ASI manual and as directed from the on-board LPS.

E.4.2 In-Flight

_____ 1. Operate the instruments as specified in the ASI manual and as directed by the on-board LPS.

E.4.3 Post flight

_____ 1. Complete summary checklist forms and all other appropriate check list forms.

_____ 2. Brief the on-board LPS on equipment status and turn in completed checklists to the LPS.

_____ 3. Debrief as necessary at MGOC or the hotel during a deployment.

_____ 4. Determine the status of future missions and notify MGOC as to where you can be contacted.

Form E-4
Page 1 of 3

AXBT and Sonobuoy Check Sheet Summary

Flight _________________ Aircraft _____________ Operator _________________

Number

(1) Probes dropped _______

(2) Failures _______

(3) Failures with no signal _______

(4) Failures with sea surface temperature, but terminated above thermocline _______

(5) Probes that terminated above 250 m, but below thermocline _______

(6) Probes used by channel number CH12 _______

CH14 _______

CH16 _______

CH__ _______

NOTES:

Form E-4

AXBT and Sonobuoy Check Sheet (revised 6/23/04)

Flight Number ____________________ Storm _________________________ Storm Direction/Speed _______________________

Take-Off Time _____________________ Landing Time ______________________________

Drop #	Channel Number	Drop Time (HHMMSS)	Latitude (Decimal)	Longitude (Decimal)	Splash Time (HHMMSS)	Sfc Temp. AXBT	MLD (m) (#secs **x** 1.5)	Comments

Form E-4

AXBT Log

Flight Number ____________________

Take-Off Time ____________________ Landing Time ___________________________

Storm __________________________ Storm Direction/Speed ____________________

Leg/ Drop #	Channel #	Probe Type		Launch Time (HHMMSS)	Latitude (decimal)	Longitude (decimal)	Status		Comments
		Slow	Reg				Good/	Bad	

E.5 Radar Scientist

The on-board radar scientist is responsible for data collection from all radar systems on his/her assigned aircraft. Detailed operational procedures and checklists are contained in the operator's manual supplied to each operator. General supplementary procedures follow. (Check off and initial.)

E.5.1 Preflight

_____ 1. Determine the status of equipment and report results to the on-board lead project scientist (LPS).

_____ 2. Confirm mission and pattern selection from the on-board LPS.

_____ 3. Select the operational mode for radar system(s) after consultation with the on-board LPS.

_____ 4. Complete the appropriate preflight calibrations and check lists as specified in the radar operator's manual.

E.5.2 In-Flight

_____ 1. Operate the system(s) as specified in the operator's manual and as directed by the on-board LPS or as required for aircraft safety as determined by the AOC flight director or aircraft commander.

_____ 2. Maintain a written commentary in the radar logbook of tape and event times, such as the start and end times of F/AST legs. Also document any equipment problems or changes in R/T, INE, or signal status.

E.5.3 Post flight

_____ 1. Complete the summary checklists and all other appropriate check lists and forms.

_____ 2. Brief the on-board LPS on equipment status and turn in completed forms to the LPS.

_____ 3. Hand-carry all radar tapes and arrange delivery as follows:

a. Outside of Miami-to the LPS.
b. In Miami-to MGOC or to AOML/HRD. [**Note**: all data removed from the aircraft by HRD personnel should be cleared with the AOC flight director.]

_____ 4. Debrief at MGOC or the hotel during a deployment.

_____ 5. Determine the status of future missions and notify MGOC as to where you can be contacted.

HRD Radar Scientist Check List

Flight ID: ________________________________

Aircraft Number: __________________________

Radar Operators: __________________________

Radar Technician: _________________________

Number of digital magnetic tapes on board: ______

Component Systems Status:

MARS __________________________ Computer ____________________________

DAT1____________________________ DAT2 ______________________________

LF ______________________________ R/T Serial # ___________________________

TA ______________________________ R/T Serial # ___________________________

Time correction between radar time and digital time: _____

Radar Post flight Summary

Number of digital tapes used: DAT1 _______________________

DAT2 _______________________

Significant down time:

DAT1 ______________________ Radar LF ____________________

DAT2 ______________________ Radar TA ____________________

Other Problems:

Form E-5
Page 2 of 3

HRD Radar Tape Log

Flight ______________ **Aircraft** _______ **Operator** _______________ Sheet ____ of ____

LF RPM _______________ TA RPM ______________

(Include start and end times of DATs, as well as times of F/AST legs and any changes of radar equipment status)

Tape #	F/AST On?	Event Time (HHMMSS)	Event

Form E-5
Page 3 of 3

HRD Radar Down-Time Log

Flight ______________ **Aircraft** ________ **Operator** ______________ Sheet ____ of ____

Item	Time Down (HHMMSS)	Time Up (HHMMSS)	Problem

Item List: DAT1, DAT2, COMP, MARS, LF, and TA.

Include serial numbers of any new R/Ts.

E.6 Dropsonde Scientist

The on-board lead project scientist (LPS) on each aircraft is responsible for determining the distribution patterns for dropwindsonde releases. Predetermined desired data collection patterns are illustrated on the flight patterns. However, these patterns often are required to be altered because of clearance problems, etc. Operational procedures are contained in the operator's manual. The following list contains more general supplementary procedures to be followed. (Check off and initial.)

E.6.1 Preflight

_____ 1. Determine the status of equipment and report results to the on-board LPS.

_____ 2. Confirm the mission and pattern selection from the LPS and assure that the proper number and distribution (frequency) of dropsondes are on board the aircraft.

_____ 3. Complete the appropriate preflight calibrations and checklists.

E.6.2 In-Flight

_____ 1. Operate the system as specified in the operator's manual.

_____ 2. Obtain drop release approval (for each drop) from the AOC flight director or navigator for each specific time and location of drop.

_____ 3. Report to the LPS as soon as it is determined that the dropsonde is (or is not) transmitting a good signal.

_____ 4. Report completion of each drop and readiness for the next drop.

_____ 5. Complete Form E-6.

E.6.3 Post flight

_____ 1. Complete the summary form for GPS sondes.

_____ 2. Brief the on-board LPS on equipment status and turn in reports and completed forms to the LPS.

_____ 3. Hand-carry all dropwindsonde data tapes and printouts and inform the AOC flight director that you are arranging delivery as follows:

a. Outside of Miami-to the LPS.
b. In Miami-to AOML/HRD. [**Note**: all data removed from the aircraft by HRD personnel should be cleared with the AOC flight director.]

_____ 4. Debrief at the MGOC or the hotel during a deployment.

_____ 5. Determine the status of future missions and notify MGOC as to where you can be contacted.

N42/3RF HRD GPS Dropwindsonde Scientist Log (Revised 5/2002)

Storm__________ Dropwindsonde Scientists__________ Page ____ of ____

Flight ID__________ Flight Director__________ Takeoff from __________ at ______ UTC

Mission ID__________ AVAPS Operators__________ Recovery at __________ at ______ UTC

Drop #	Sonde ID #	Time (UTC)	Lat (°N)	Lon (°W)	Surface Pressure (mb)	Wind closest to surface dir/spd (kt)	hgt (m)	BT SST (°C)	Eye, Eyewall, Rainband (direction)	Comments	Ob #

N49RF HRD GPS Dropwindsonde Scientist Log (Revised 5/2002)

Storm____________________ Dropwindsonde Scientists____________________ Page ____ of ____

Flight ID________________ Flight Director____________________ Takeoff from ______________ at ______ UTC

Mission ID_______________ AVAPS Operators____________________ Recovery at ______________ at ______ UTC

Drop #	Sonde ID #	Time (UTC)	Lat (°N)	Lon (°W)	Surface Pressure (mb)	Wind closest to surface dir/spd (kt)	hgt (m)	DLM wind (kt)	Comments	SATCOM tries	Ob #

APPENDIX F : SYSTEMS OF MEASURE AND UNIT CONVERSION FACTORS

Table F-1 Systems of measure: Units, symbols, and definitions

Quantity	SI Unit	Early Metric	Maritime	English
length	meter (m)	centimeter (cm)	foot (ft)	foot (ft)
distance	meter (m)	kilometer (km)	nautical mile (nm)	mile (mi)
depth	meter (m)	meter (m)	fathom (fa)	foot (ft)
mass	kilogram (kg)	gram (g)		
time	second (s)	second (s)	second (s)	second (s)
speed	meter per second (mps)	centimeter per second (cm s^{-1}) kilometers per hour (km h^{-1})	knot (kt) (nm h^{-1})	miles per hour (mph)
temperature -sensible	degree Celsius (°C)	degree Celsius (°C)	---	degree Fahrenheit (°F)
-potential	Kelvin (K)	Kelvin (K)	---	Kelvin (K)
force	Newton (N) (kg m s^{-2})	dyne (dy) (g cm s^{-2})	poundal (pl)	poundal (pl)
pressure	Pascal (Pa) (N m^{-2})	millibar (mb) (10^3 dy cm^{-2})	inches (in) mercury (Hg)	inches (in) mercury (Hg)

Table F-2. Unit conversion factors

Parameter	Unit	Conversions
length	1 in	2.540 cm
	1 ft	30.480 cm
	1 m	3.281 ft
distance	1 nm (nautical mile)	1.151 mi
		1.852 km
		6080 ft
	1 mi (statute mile)	1.609 km
		5280 ft
	1° latitude	59.996 nm
		69.055 mi
		111.136 km
depth	1 fa	6 ft
		1.829 m
mass	1 kg	2.2 lb
force	1 N	10^5 dy
pressure	1 mb	102 Pa
		0.0295 in Hg
	1 lb ft^{-2}	4.88 kg m^{-2}
speed	1 m s^{-1}	1.9
	at. 6 h^{-1}	10 kt

ACRONYMS AND ABBREVIATIONS

θ_e	equivalent potential temperature
ABL	atmospheric boundary-layer
A/C	aircraft
ACLAIM	Airborne Coherent Lidar for Advanced In-flight Measurements
AES	Atmospheric Environment Service (Canada)
AFRES	U. S. Air Force Reserve
AOC	Aircraft Operations Center
AOML	Atlantic Oceanographic and Meteorological Laboratory
ASDL	aircraft-satellite data link
AXBT	airborne expendable bathythermograph
AXCP	airborne expendable current probe
AXCTD	airborne expendable conductivity, temperature, and depth probe
CARCAH	Chief, Aerial Reconnaissance Coordinator, All Hurricanes
CDO	central dense overcast
CIRA	Cooperative Institute for Research in the Atmosphere
C-MAN	Coastal-Marine Automated Network
CP	coordination point
CW	cross wind
DLM	deep-layer mean
DOD	Department of Defense
DOW	Doppler on Wheels
DRI	Desert Research Institute (at Reno)
E	vector electric field
EPAC	Eastern Pacific
ETL	Environmental Technology Laboratory
EVTD	extended velocity track display
FAA	Federal Aviation Administration
F/AST	fore and aft scanning technique
FEMA	Federal Emergency Management Agency
FL	flight level
FP	final point
FSSP	forward scattering spectrometer probe
GFDL	Geophysical Fluid Dynamics Laboratory
G-IV	Gulfstream IV-SP aircraft
GOMWE	Gulf of Mexico Warm Eddy
GPS	global positioning system
HL	Hurricanes at Landfall
HRD	Hurricane Research Division
INE	inertial navigation equipment
IP	initial point (or initial positionIWRS Improved Weather Reconnaissance System
JW	Johnson-Williams
Ku-SCAT	Ku-band scatterometer
LF	lower fuselage (radar)
LIP	Lightning Instrument Package
LPS	Lead Project Scientist
MCS	mesoscale convective systems
MGOC	Miami Ground Operations Center
MLD	Mixed Layer Depth
MPO	Meteorology and Physical Oceanography
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research

NCEP	National Centers for Environmental Prediction
NDBC	NOAA Data Buoy Center
NESDIS	National Environmental Satellite, Data and Information Service
NHC	National Hurricane Center
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OML	oceanic mixed-layer
PDD	pseudo-dual Doppler
PMS	Particle Measuring Systems
POD	Plan of the Day
PPI	plan position indicator
PV	potential vorticity
RA	radar altitude
RAOB	radiosonde (upper-air observation)
RAWIN	rawinsonde (upper-air observation)
RECCO	reconnaissance observation
RHI	range height indicator
RSMAS	Rosenstiel School of Marine and Atmospheric Science
SFMR	Stepped-Frequency Microwave Radiometer
SLOSH	sea, lake, and overland surge from hurricanes (operational storm surge model)
SRA	Scanning Radar Altimeter
SST	sea-surface temperature
TA	tail (radar)
TAS	true airspeed
TC	tropical cyclone
TOPEX	The Ocean Topography Experiment
TPC	Tropical Prediction Center (at NHC)
UMASS	University of Massachusetts (at Amherst)
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USWRP	U. S. Weather Research Program
UTC	universal coordinated time (U.S. usage; same as “GMT” and "Zulu" time)
VTD	velocity-track display

Acknowledgment

The preparation of HRD's 2004 **Hurricane Field Program Plan** was a team effort. The authors would like to express their appreciation to: the HRD scientists that contributed information on specific experiments; Shirley Murillo, Joyce Berkeley, Howie Friedman and Russell St. Fleur for their efforts on updating the information in Appendix B; Neal Dorst for expertly drafting several of the figures.