

19991002I-LPS

Mission Summary
991002I Aircraft 43RF
Tropical Cyclone Air-Sea Interaction
Gulf Loop Current/Eddy "Pre-Storm 1" Flight

Scientific Crew (43RF)

Lead Scientist	J. Cione
AXBT Scientists	P. Black
AXCP/AXCTD Scientists	N. Shay, D. Jacob

Mission Briefing:

This was a follow on to the early-season AXBT air-sea interaction flight (990803H) which was designed to map the boundaries of the Gulf Loop Current and associated warm anticyclonic eddies as well as obtain an initial estimate of the heat content anomalies associated with these features. Similar to the early season flight, the goal of this experiment was to determine the 'pre-storm' heat content available in anomalous warm eddies and the loop current within the Gulf of Mexico. As with the earlier experiment, three expendable probe types: AXBT (measures temperature vs. depth), AXCP (measures temperature and current vector vs. depth) and AXCTD (measures temperature and conductivity (salinity) vs. depth from which density is calculated) were used to map out the vertical thermal structure within the Gulf of Mexico. Analysis of this data will enable researchers to quantitatively establish the 'initial heat content' available to an encroaching tropical cyclone.

Using the early season Depth to 26°C objective analyses, blended TOPEX and ERS2 satellite altimeter maps from the University of Colorado (CCAR), as well as High resolution AVHRR 3 and 7 day SST analyses from Johns Hopkins University Advanced Physics Laboratory (JHUAPL), estimates of warm core eddy (WCE) and loop current boundaries were established. From these estimates a flight pattern was designed with the goal of 're-mapping' the main Loop Current/Eddy region (MLCER). In addition, the flight pattern sampled a 'new' distinct closed off eddy located to the south and west of the MLCER. The complex structure deduced from the satellite altimeter data was confirmed (to the first order) by the AXBT/AXCP/AXCTD survey.

Mission Synopsis

The flight departed MacDill AFB at 1739 UTC on 10/2 and landed there at 0005 UTC, on 10/3 for a duration of 6.5 hours. The flight pattern consisted of a west to east leg which transected the upper portion of the MLCER, a figure four pattern that sampled the eddy to the SW and a 'butterfly' pattern (3-legged) centered on the southern portion of the MLCER and associated gradient regions.

Flight level throughout the experiment was 5 K ft. Since AXCTDs and AXCPs have high failure rates when launched at high speed, it was necessary to slow down the aircraft to 190 kt (indicated) before deploying these expendables.

A total of 31 ocean profilers were deployed, 15 AXBTs, 8 AXCPs and 8 CTDs. Clean signals were observed below the mixed layer for all 15 AXBTs and good signal strength (below 1000 m) was noted for both AXCPs and AXCTDs. One AXCP and one AXCTD hung up at the surface. As such only SSTs were obtained (i.e. no subsurface data).

To the first order, the data from the AXBTs, AXCPs and AXCTDs agreed well with the TOPEX/ERS2, and AVHRR-based eddy boundary pre-flight estimates. Surface winds were estimated to be in the 15 kt range (qualitative- no SFMR or GPS sondes) and as such, a noticeable ocean mixed layer structure was evident for most drops. Mixed layer depths (MLD) ranged from 80m within the warm core structures to minimum values near 15m near the coastal shelf. SSTs did not exhibit a great degree of variability and ranged between 28.1°C outside the eddies/loop current to near 28.7°C within the MLCER and SW Eddy.

Due to the nature of this mission, relatively low wind conditions present and lack of precipitation, Doppler and C-band radar systems as well as SFMR were not utilized for this mission. It should also be noted that no GPS dropsondes were used.

Problems:

The major problem associated with this flight occurred ~2223Z when the left front windshield cracked in a 'spider web' fashion. As such, Captain Jerry McKimm immediately aborted the mission and vectored 43RF back to MacDill. Fortunately, no injuries resulted. Due to the aborted mission we had to eliminate ~25-30% of the pattern beginning with the second leg of the 'butterfly' pattern in the MLCER (see drawings from LPS log sheet for more detail). Still, we were able to drop 6 of our planned expendables along this final leg before reaching MacDill. Initially 42 profilers were planned but only 31 were actually deployed (i.e. 74%). Since we did not finish the desired pattern, a 'follow-up' pre-storm air-sea mission was conducted on 10/4/99 which sampled the areas not covered on this mission.

10 s data
all T90

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 CARCAH or field program director whether aircraft has operational fix responsibility and discuss with AOC flight director/meteorologist and CARCAH unless briefed otherwise by field program director.
- 4. Contact HRD members of crew to:
 - a. Assure availability for mission.
 - b. Arrange ground transportation schedule when deployed.
 - c. Determine equipment status.
- 5. Meet with AOC flight crew at least 90 minutes before takeoff, 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).

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.

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. Determine next mission status, if any, and brief crews as necessary.
- 6. Notify MGOC as to where you can be contacted and arrange for any further coordination required.
- 7. Prepare written mission summary using form E-2 p.3 (due to Field Program Director 1 week after the flight).

Lead Project Scientist Check List

Date 2 Oct 98 Aircraft 43RF Flight ID 991002 I

A. —Participants:

HRD		AOC	
Function	Participant	Function	Participant
Lead Project Scientist	<u>J. Cione</u>	Flight Director	<u>J. Parrish</u>
Cloud Physics	_____	Pilots	<u>J. McKim, P. Kenne,</u>
Radar	_____	Navigator	<u>C. Newman</u>
Workstation	_____	Systems Engineer	<u>S. McMillan</u>
Photographer/Observer	_____	Data Technician	<u>J. Gonzalez</u>
Dropwindsonde AXCP	<u>D. Jacob</u>	Electronics Technician	_____
AXBT/AXCP/Guest	<u>P. Black, N. Shay</u>	Other	_____

Take-Off: 1739Z Location: MacDill Landing: 24:05 Location: MacDill

Number of Eye Penetrations: _____

B. —Past and Forecast Storm Locations:

Date/Time	Latitude	Longitude	MSLP (mb)	Maximum Wind
<u>10/2/12Z</u>	<u>19.2</u>	<u>82.6</u>	<u>~1006</u>	<u>30 kt</u>

C. —Mission Briefing:

Pre-storm Air-Sea Interaction flight.
AXBT, AXCP, AXCTD drops within Gulf of Mexico
warm eddy & Loop Current.

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)	no FAST			
Cloud Physics	—			
Data System	✓			
Dropwindsondes	—			
AXBT/AXCP	✓ ✓			
Workstation	—			
Videography	—			

REMARKS:

Mission Summary
Storm name
YYMMDDA# Aircraft 4_RF

<u>Scientific Crew (4 RF)</u>	
Lead Project Scientist	<u>Cione</u>
Radar Scientist	<u>-</u>
Cloud Physics Scientist	<u>-</u>
Dropwindsonde Scientist	<u>P. Black</u>
Boundary-Layer Scientist	<u>P. Black</u>
Workstation Scientist	<u>-</u>
Observers / AXBT / AXCP	<u>Shay Jacob</u>

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



Mission Synopsis: (include plot of actual flight track)



ocean profile "pre-stm" expt
went as planned except for
abort when P. lot windshield
cracked.

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

Yes. Due to abort we
did lose ~25-30% of the mission ("1/4")
profilers not deployed

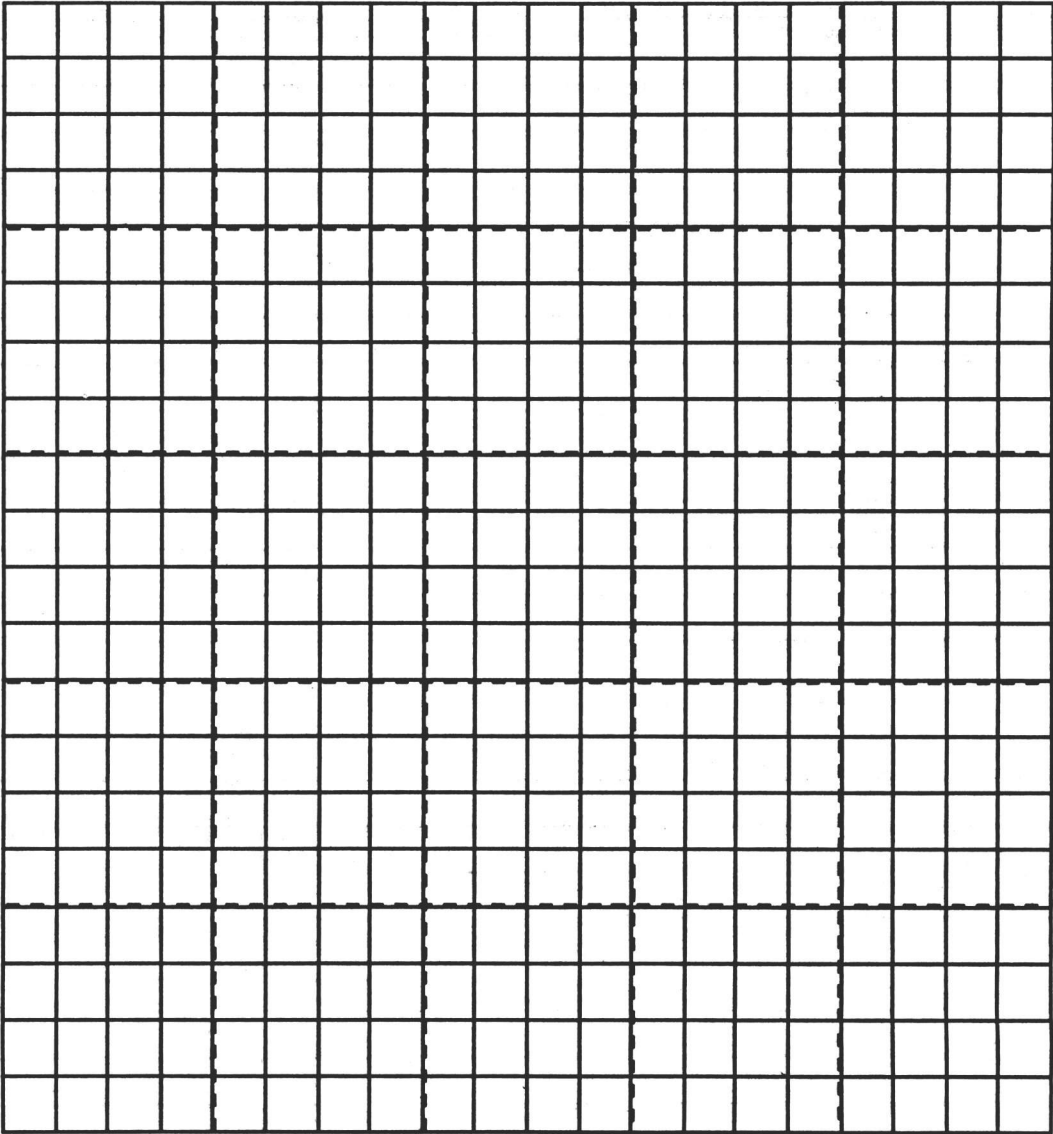
Problems: (list all problems)

only 2 profilers had failures
(1 AXBP + 1 AXCTD). otherwise
2a remaining AXCPs, AXBST +
AXCTDs were fully functional
+ reported data successfully

Observer's Flight Track Worksheet

Date _____ Flight _____ Observer _____

Latitude (°)



Longitude (°)

Lead Project Scientist Event Log

Date Oct 2 '99 Flight 991002 I LPS C10R

*Note: down size
sig leaders SST/track*

*Note
MLDS SST*



20:22:57

Time	Event	Position	Comments
17:40	Takeoff	Med Hill	—
18:32:02	Drop 1 CTD 12	2730 8559	(Launch time)
18:39:58	Drop 2 BT 12	27°26'86"36	" "
18:41:50	BT 12	—	Splash Time; SST=28.3 MLD ~ 30m
18:50:49	Drop 3 CP 12	27°19'87"26	Launch
18:53:00	Drop 4 BT 16	27°18'87"35	" "
18:54:43	BT 16	—	Splash; SST=28.5 MLD ~ 70m
19:01:45	Drop 5 CTD 12	2713 8816	Launch
19:04:26	Turn PT 1	2710 8829	—
19:12:07	Drop 6 BT 16	2658 8901	Launch
19:13:46	BT 16	—	Splash; SST=28.6 MLD ~ 67m
19:17:55	Drop 7 CP 12	2648 8927	Launch
19:22:45	Drop 8 BT 16	2642 8949	Launch
19:24:27	BT 16	—	Splash SST=28.3 MLD ~ 46m (steep thermocline!)
19:41:32	Drop 9 CTD 14	2610 9103	Launch
19:47:19	Turn PT 2	2559 9129	—
19:52:09	Drop 10 BT 12	2540 9129	Launch - NoF "sweddy"
19:53:50	BT 12	—	Splash SST=28.3 MLD ~ 47
19:55:00	Drop 11 CP 14	2528 9128	Launch
20:02:20	Drop 12 BT 12	25 9129	Launch inside "sweddy"
20:04:07	Splash BT 12	—	Spl. SST=28.5 MLD ~ 99m
20:12:04	Drop 13 CTD 12	2420 9129	Launch
20:22:10	Drop 14 BT 16	2340 9130	Launch ~ 150m
20:23:53	Drop 14 BT 16	—	Splash SST=28.7 60m MLD "inside sweddy"
20:29:30	Drop 15 CP 12	2306 9131	Launch
20:37:22	Turn PT 3	2234 9132	—
20:38:49	Drop 16 CTD 14	2233 9136	Launch
20:45 ~	Deviate track	Due to WX between Pt 3 + 4 ... No sig. ...	

Note: Boundary ~ rel fair w/ no sig w/ noticeable inversion + hazy and no 23N. South of 23N very unsettled + wide spread in ...

Bob,
Frank - 11
Call

Cancel tomorrow
Christine

no go
Down to town
no money

813
828
317
3310

Form E-2
Page 5 of 5

Lead Project Scientist Event Log

Date 10/2/99 Flight 991001 I LPS CIVE

Time	Event	Position	Comments
20:55:57	Drop 17 BT16	2321 9221	along SW gradient of "Suddly"
20:59:35	Drop 18 BT16	-	Splash SST=28 MLD=55m
21:03:37	Drop 18 CP12	2344 9243	launch
21:19:20	TURNPT 4	2429 9325	-
21:19:55	Drop 19 CTD16	2430 9326	launch
21:33:20	Drop 20 BT12	2424 9230	launch
21:35:08	BT12 - spl.	-	splash SST=28.6 MLD=54m
22:00:06	BT16 Drop 22	2409 9034	launch
22:02:50	BT16	-	SST=28.6 MLD=55m
22:08:14	CP12 Drop 23	2406 9004	launch
22:19:30	BT16 Drop 24	2404 8918	launch ? SST ? MLD
22:27:29	BT16 " 25	2409 8851	launch SST=28.6
NITE!	22:23:00	Pilot windshield Broken about	MISSION
Will	Drop	expendables along track here...	
22:35:44	CP14 drop 26	2432 8813	launch
22:47:32	BT16 Drop 27	2450 8744	SST=28.5 MLD=60
22:52:14	CTD12 " 28	2459 8729	launch
23:01:57	BT16 " 29	2519 8653	launch, SST=28.4 MLD=45m
23:06:14	CP14 " 30	2529 8637	-
23:11:35	CTD12 " 31	2541 8619	-

Drop 21
Call

Free Fall →

Free Fall

Free Fall

Call

bi Zarr
MLC
Structure!
"very"

E edges
"Suddly"

Frank 271 7443 cell 306 4947 323-7497
Have Reef Hotel 306 4131

