

2025 RAPID-MOCHA Western Boundary Cruise

Cruise Prospectus

R/V Armstrong, Feb. 25, 2025 - Mar. 14, 2025

This prospectus describes the activities planned to take place during the 2025 RAPID-MOCHA Western Boundary Cruise. This cruise is scheduled to take place on the R/V Armstrong from Feb. 25 to Mar. 14 2025, departing from, and returning to, Port Everglades, FL. Prepared by Dr. Shane Elipot (selipot@miami.edu).

Project Description and Objectives

The specific objectives of the cruise are:

1. To recover four moorings located off the eastern Bahamas along latitude 26.5°N.
2. To re-deploy the same four moorings at the same locations.
3. To conduct CTD (Conductivity-Temperature-Depth) and Lowered ADCP (Acoustic Doppler Current Profiler) sections across the Florida Current at 27°N, Northwest Providence Channel, and along the 26.5°N RAPID-MOCHA western boundary line east of Abaco, Bahamas.
4. To retrieve data from pressure-equipped inverted echo sounders (PIES) by underwater acoustic telemetry at six locations along latitude 26.5°N. PIES may be recovered and redeployed as needed.
5. To perform several additional deep-water CTD casts to calibrate moored instrumentation.

This research cruise is a field component of RAPID-MOCHA program, a U.S. and U.K. joint research program to determine the strength of the meridional overturning circulation in the North Atlantic and to monitor its variability as a indicator of climate change. This program is jointly funded by the U.S. National Science Foundation (NSF) and the U.K. National Environmental Research Council (NERC).

The moorings to be recovered and deployed during this cruise are listed in Tables 1 and 2, respectively. The PIES operational plan is detailed in Table 3, and CTD locations are listed in Tables 4-1 and 4-2. All mooring, PIES, and planned CTD/LADCP stations locations are shown in Figure 1.

The precise schedule of the operations at each site and the order of the CTD stations is undetermined at this time and will be dependent on logistical details and weather conditions during the cruise. High-quality hydrographic CTD measurements will also be obtained at approximately four deep water stations (at locations near the moorings) to help calibrate the instruments to be deployed on the moorings and those recovered from the moorings. At selected CTD stations, small volumes of seawater will be collected and analyzed onboard for their salinity and dissolved oxygen content to help calibrate the electronic CTD sensors. The seawater used for these calibration purposes will be immediately returned to the ocean and will not be kept onboard or exported from the Bahamas.

Figure 1: Operation locations

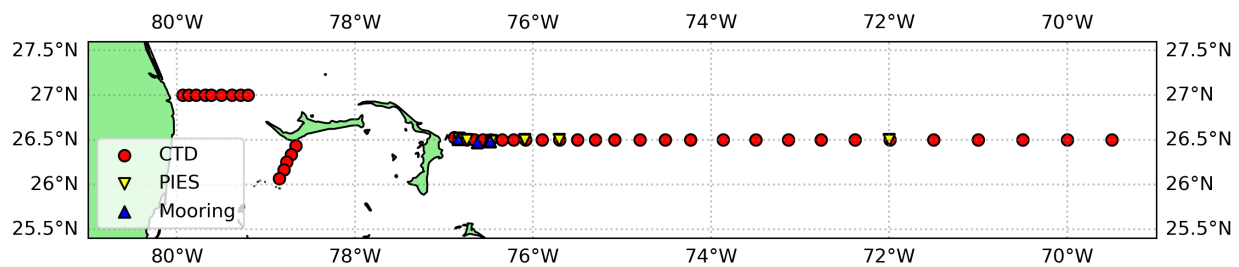


Table 1: Moorings to be recovered

Mooring Site	Mooring Number	Latitude	Longitude	Depth (m)	Deployment Date
WB0	M485	26° 30.551' N	76° 50.5603' W	1004 (uncorr.)	02/17/2023
WBH2	M488	26° 28.5911' N	76° 37.6361' W	4685 (uncorr.)	02/18/2023
WB3	M486	26° 29.535' N	76° 29.784' W	4809 (uncorr.)	02/15/2023
WBL3	M487	26° 28.967' N	76° 28.907' W	4806 (uncorr.)	02/16/2023

Table 2: Moorings to be deployed, target locations and depths

Moorings Site	Moorings Number	Latitude	Longitude	Depth (m)
WB0	TBD	26° 30.55' N	76° 50.50' W	1004 (uncorr.)
WBH2	TBD	26° 29.00' N	76° 37.50' W	4695 (uncorr.)
WB3	TBD	26° 29.80' N	76° 29.80' W	4805 (uncorr.)
WBL3	TBD	26° 29.80' N	76° 29.80' W	4805 (uncorr.)

Table 3: PIES locations for telemetry operation

PIES Site	Latitude	Longitude	Depth (m)
A	26° 30.970' N	76° 50.010' W	1020
A2	26° 30.100' N	76° 44.810' W	3865
B	26° 29.530' N	76° 28.220' W	4800
C	26° 30.000' N	76° 05.624' W	4766
D	26° 30.140' N	75° 42.360' W	4663
E	26° 30.070' N	71° 59.982' W	5240

Table 4-1: CTD station locations (continue in Table 4.2)

Station	Latitude	Longitude
1	27° 0.00' N	79° 56.00' W
2	27° 0.00' N	79° 52.00' W
3	27° 0.00' N	79° 47.00' W
4	27° 0.00' N	79° 41.00' W
5	27° 0.00' N	79° 37.00' W
6	27° 0.00' N	79° 30.00' W
7	27° 0.00' N	79° 23.00' W
8	27° 0.00' N	79° 17.00' W
9	27° 0.00' N	79° 12.00' W
10	26° 26.00' N	78° 40.00' W
11	26° 20.00' N	78° 43.00' W
12	26° 15.00' N	78° 46.00' W
13	26° 10.00' N	78° 48.00' W
14	26° 4.00' N	78° 51.00' W

Table 4-2: CTD stations (continued)

Station	Latitude	Longitude
15	26° 31.5' N	76° 53' W
16	26° 31.00' N	76° 49.90' W
17	26° 30.00' N	76° 44.6' W
18	26° 30.00' N	76° 39.30' W
19	26° 30.00' N	76° 33.90' W
20	26° 30.00' N	76° 28.50' W
21	26° 30.00' N	76° 20.80' W
22	26° 30.00' N	76° 13.00' W
23	26° 30.0' N	76° 5.20' W
24	26° 30.00' N	75° 54.00' W
25	26° 30.00' N	75° 42.20' W
26	26° 30' N	75° 30' W
27	26° 30' N	75° 18' W
28	26° 30' N	75° 5' W
29	26° 30' N	74° 48' W
30	26° 30' N	74° 31' W
31	26° 30' N	74° 14' W
32	26° 30' N	73° 52' W
33	26° 30.00' N	73° 30.00' W
34	26° 30.00' N	73° 8.00' W
35	26° 30.00' N	72° 46.00' W
36	26° 30.00' N	72° 23.00' W
37	26° 30.00' N	71° 59.40' W
38	26° 30.00' N	71° 30.00' W
39	26° 30.00' N	71° 0.00' W
40	26° 30.00' N	70° 30.00' W
41	26° 30.00' N	70° 0.00' W
42	26° 30.00' N	69° 30.00' W