U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Atlantic Oceanographic and Meteorological Laboratory
4301 Rickenbacker Causeway Miami FL 33149

Miami, May, 2013

Captain of the MN Colibri

Dear Captain:

On behalf of the United States Department of Commerce's Atlantic Oceanographic and Atmospheric Administration (NOAA), I would like to thank you and your Company for your help and cooperation in providing us with the opportunity to use your ships to deploy oceanographic instrumentation.

The Atlantic Oceanographic and Atmospheric Laboratory is located in Miami, Florida, and is one of twelve laboratories of NOAA. You may be familiar with one of our sister organizations, the U.S. National Weather Service. The Physical Oceanography Division of this laboratory has the mission to investigate the effect of the ocean on climate. To accomplish this we maintain an oceanographic and climate observing system to, for example, measure the upper ocean thermal structure and currents. Several data sets are obtained and developed by our laboratory's staff of scientific and technical support personnel to investigate the ocean processes and their link to climate variability and environmental changes.

In addition to the XBTs, instruments deployed to measure the temperature profile of the ocean, other instruments such as drifters and floats are sometimes also deployed to help investigate ocean currents. Many of the results obtained from our research can be viewed in real or near-real time on our laboratory's web pages at *www.aoml.noaa.gov/phod*. Specific information about this program can be accessed at our projects web page *www.aoml.noaa.gov/phod/soop*. Of special interest to you could be the web pages where we show results obtained from high density deployments done from ships participating in the Ship Of Opportunity Program: *www.aoml.noaa.gov/phod/hdenxbt*. Results obtained from observations and instrument deployments from volunteer ships are transmitted in real-time to our laboratory and then used by the National Weather Service to produce their marine and atmospheric forecast. Shipping companies such as yours then use their information as an aid for their operations.

Please feel free to contact us in case you have any question regarding our activities or results, or if you are further interested in using our ocean currents and wind products. We sincerely appreciate the opportunity you give us to do our research and enhance the current ocean observing system.

Thank you very much for your time, consideration and attention.

Dr. Gustavo Jorge Goni
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National Oceanic and Atmospheric Administration
Atlantic Oceanographic and Meteorological Laboratory - Physical Oceanography Division
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July 2013

Cruise Plan – AX 20

Ship Name: **MN Colibri**

Call Sign: **FNHO**

IMO: **9207390**

Project Title: Ship Of Opportunity Program
High Density XBT Transect AX20

Beginning date: July 2013

Ending date: July 2013

Scientific Ship Riders: Denis Diverres

Cruise overview

A. Scientific and Operational Goals

XBT data are used in ocean analysis and in climate model initialization. For instance, for El Nino prediction XBT data complement that from the TAO array and from satellite-derived sea surface temperature and sea height observations. The use of XBT data serves to measure the seasonal and interannual fluctuations in the upper layer heat storage, now being complemented by profiling float measurements. Heat transport and geostrophic ocean circulation can be measured using the high-density XBT data that determines the mesoscale field.

The XBT data also also helps to document the ocean heat storage and global transport of heat and fresh water, which is crucial to improve climate prediction models that are initialized with temperature profiles. One primary objective of the XBT program is to provide oceanographic data needed to initialize the operational climate forecasts prepared by NCEP. Global coverage is now required as the forecast models not only simulate Pacific conditions but global conditions to improve prediction skill.

-High Density XBT transects

This operation at AOML is designed to measure the upper ocean thermal structure in key regions of the Atlantic Ocean .XBT transects in HD mode are repeated approximately every three months and XBTs are deployed approximately 25 km apart in order to measure the mesoscale structure of the ocean to diagnose the ocean circulation responsible for redistributing heat and other water properties globally. HD XBT transects are carried out globally with AOML taking the lead in most of the operations in the Atlantic Ocean.

B. Project history

The monitoring of the AX20 began October 16, 2011 (Figure 1).

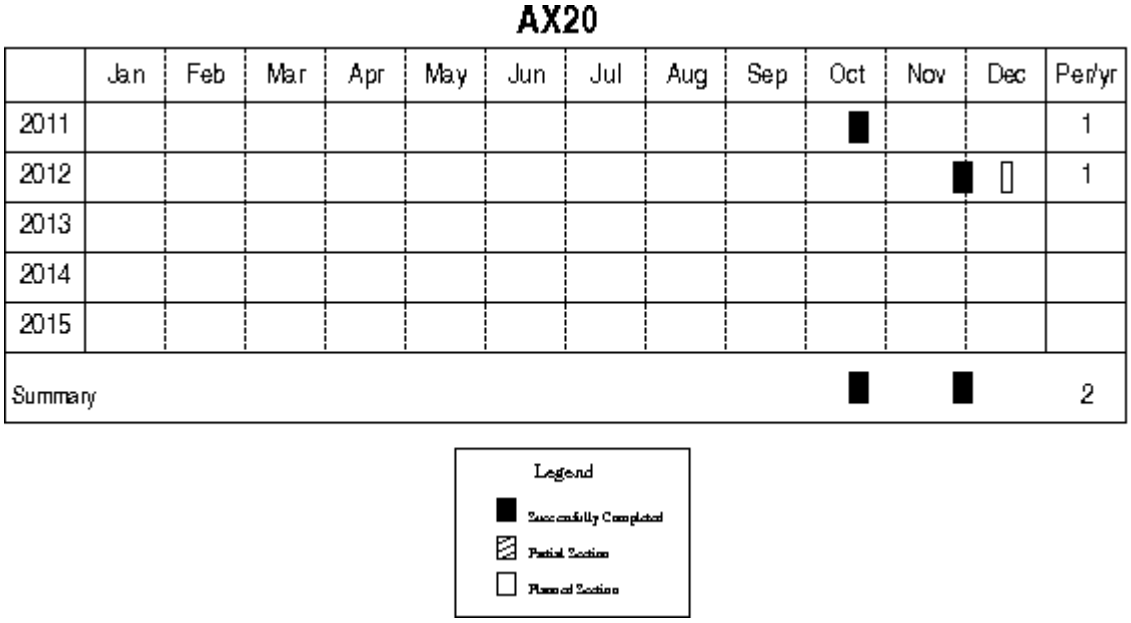

Figure 1: Transect implementations since 2011

XBT Deployment Plan

The overall plan for the sampling assuming previous ship tracks and speeds is as follows:

PLEASE NOTE: IT IS THE RESPONSIBILITY OF THE RIDER TO ENTER THE SHIP'S IMO NUMBER AND CALL SIGN INTO THE AMVERSEAS METADATA SETUP. This information is included in the first page of this Cruise Plan.

From Port of departure **Azores (200m deep)** to Port of Arrival, **French Guiana (200m Deep)**

- High resolution sampling every 30 Km

The time interval between XBT deployments is a function of ship speed. **Use Table 1 below to determine the time interval between consecutive deployments.** If the ship changes its speed it will be necessary to adjust the launch times. If the planned cruise track deviates significantly from the outline above, please notify Molly Baringer at 305-361-4345 or 305-710-9240.

XBT Drop rate						
Ship Speed (knots)	Desired Sampling Space					
	10 km	**15 km**	**20 km**	**30 km**	**40 km**	**50 km**
10	32 min	48 min	1 h 04 min	1 hr 37 min	2 hr 09 min	2 hr 42 min
11	29 min	43 min	58 min	1 hr 28 min	1 hr 57 min	2 hr 27 min
12	27 min	40 min	54 min	1 hr 21 min	1 hr 47 min	2 hr 15 min
13	25 min	37 min	50 min	1 hr 15 min	1 hr 39 min	2 hr 04 min
14	23 min	34 min	46 min	1 hr 10 min	1 hr 32 min	1 hr 55 min
15	22 min	33 min	44 min	1 hr 05 min	1 hr 26 min	1 hr 48 min
16	20 min	30 min	40 min	1 hr 00 min	1 hr 20 min	1 hr 41 min
17	19 min	29 min	38 min	57 min	1 hr 16 min	1 hr 35 min
18	18 min	27 min	36 min	54 min	1 hr 11 min	1 hr 30 min
19	17 min	25 min	34 min	51 min	1 hr 08 min	1 hr 25 min
20	16 min	24 min	32 min	48 min	1 hr 04 min	1 hr 20 min
21	15 min	22 min	30 min	46 min	1 hr 01 min	1 hr 17 min
22	14 min	21 min	28 min	44 min	58 min	1 hr 13 min
23	13 min	20 min	26 min	42 min	56 min	1 hr 10 min
24	13 min	19 min	25 min	40 min	53 min	1 hr 07 min
25	12 min	18 min	24 min	38 min	51 min	1 hr 04 min

Table 1. Time interval between XBT launches based on ship speed and desired sampling spacing.

If the planned sampling is interrupted for any reason (such as an autolauncher failure) the procedure will be to drop another probe as close as possible to the planned drop and continue with the desired spacing of the XBTs for that section of the cruise track (according to the above guide). If a serious malfunction of the autolauncher occurs then manually deploy the XBTs from the stern of the ship using the hand launcher. While this happens, please be troubleshooting the problems and be in contact with Zach Barton, Ulises Rivero (*Ulises.Rivero@noaa.gov),* Kyle Seaton (*Kyle.Seaton@noaa.gov),* Andy Stefanick (*Andrew.Stefanick@noaa.gov),* or Pedro Pena (*pedro.pena@noaa.gov*).

The ship-rider will work as needed around the clock to:

1) check and load the auto-launcher;
2) check that the system is logging data correctly;
3) keep a log of problems, repeated casts due to suspected XBT errors and weather conditions;
4) inform NOAA personnel of any difficulties; and,
5) deploy ARGO profiling floats and surface drifting buoys as necessary.

Argo float deployments

No Argo floats will be deployed during this cruise

Drifter deployments

No drifters will be deployed during this cruise

Summary

This high resolution XBT transect will require 160 probes plus an anticipated 10% failure rate of 16 probes. This typically requires a total of 176 probes per crossing.

Basic Ship Visit and Rider Rules – *courtesy of Steve Cook et al*

The following guidelines pertain to any person who might have occasion to visit, install, repair or replace equipment, or ride on any Ship of Opportunity Program (SOOP) ship participating in any program to collect scientific observations. Most of these guidelines are based upon common sense and respect for those who "live" on the vessel. Visitors are essentially being invited into their home as a guest and, as a guest, desire to be invited back. A goal within the SOOP Program has always been to minimize the shipboard impact as much as possible. These are not "Cruise Ships" or "Research Vessels" and therefore ship riders strive for self-sufficiency. There are times, like departing or arriving in port or navigating congested waters that the bridge officers and crew have to concentrate on their own responsibilities and not the rider's. Please leave them alone during this time. It is always a good idea to brief the Captain and Chief Engineer prior to departure as to the plans and scope of the work and exactly what will be needed from the bridge officers or any other assistance.

These guidelines are not just for the novitiate "first timer", but also for those who have often visited or ridden the same ship many times. It is certainly acceptable and beneficial to be knowledgeable about the ship's standard operation but don't become familiar to the point of complacency and forget the basic rules of respect. Ship riders should always remember that they are professionals involved in the collection of important scientific information and they not only represent themselves but also Scripps and the SOOP program.

Following is a list of basic guidelines that should be observed.

- Always see the Captain and/or Chief Officer when first boarding the ship.
- If riding the ship, then learn the ship's daily watch schedule. Know when meal times and coffee breaks are scheduled and plan activities accordingly.
- Be in good health, as this work can be very exhausting and the hours long.
- If alcohol is allowed on board, limit consumption in order to use good judgment in regards to personal interactions and because it may be necessary at any time to go to work
- Be cognizant of ship customs and protocol.
  - For instance, if people wait for the Captain to sit down, then don't sit down before he does.
  - Wait to be invited or ask permission to enter special places like the bridge, engine room or lounge area.
  - If the officers remove their shoes before entering their lounge area or stateroom, then follow the example
- Wear appropriate clothing and shoes. Ragged shorts, bathing suits or sandals are inappropriate.
- Don't sleep in a public space or prop feet up on any table or desk and "kick back".
- **Don't bring food out on deck, especially in port, and especially in Australia. Instant $1000 fine!**
- If it is necessary to conduct a meeting in a stateroom leave the door open.
- Clean up messes and keep gear stowed away when not in use. Work areas should be kept tidy so ship's personnel don't have to "step over" the equipment or supplies to conduct their own jobs.
- When there is a lot of activity on the bridge, limit questions and conversations. A detailed briefing of what is required from the bridge officers conducted prior to departure should minimize confusion and stress.
- Bring all necessary tools. Don't ask to borrow ship's tools if possible.
- Use email or telephone whenever possible to keep the ship and agents apprised of schedule and plans.

Some of the participating SOOP support several different scientific projects and, as such, the combined impacts of those projects become cumulative and can increase the stress on the officers and crews. It is essential that all projects coordinate their ship support activities so they don't overburden the system and are asked to leave the ship entirely. There are real-time operational requirements that contribute to safety at sea issues and there are special scientific projects that support science. Both can be accommodated but it is incumbent on those who meet and greet these ships to take the time and effort to accommodate the basic needs of the mariners who contribute so much to the program's success.

High Density Check-in list for the Ship Rider

Date Completed

The ship rider is the primary person responsible for ensuring the success of the cruise. This includes checking that all the necessary equipment has been tested and loaded in the ship, verifying weather conditions, ship schedules, possible ship delays etc. Before traveling the rider must have all documents and contact information required for the cruise.

Equipment testing: _____

- Verify that all equipment to be sent from AOML has been thoroughly tested before shipping.
- Comment if not testing was performed:

  _____

  _____

  _____

Check equipment shipping and loading: _____

- Contact Robert Roddy (*Robert.J.Roddy@noaa.gov, 305 361-4434)*, and/or Zach Barton (*Zach.Barton@noaa.gov, 305-361-4548)* to confirm the status of equipment shipment and loading.

Record height of deployments: _____

- Please take note of and put in your report the approximate height that the deployments were made from. (Top of the water to where the probe was launched from.)

High Density Check-out list for the Ship Rider

Date Completed

Data submission to AOML after the cruise _____

The following files should be sent to AOML after the cruise, regardless of data transmissions during the cruise:

1. All XBT data in .BIN, and electronic XBT drop log sheet.
2. HistoryAllAttempts.txt – found at c:\ProgramFiles\AMVERSEAS\XBT\ARCHIVE
3. Cruise summary for the web page
4. Cruise Report
5. Drifting buoy log sheet and ARGO float log sheet in case of deployments of these instruments

The data can be submitted in a CD, memory stick or in a zip file as an email attachment.

Sent the XBT data and HistoryAllAttempts.txt to each of the following:

Robert Roddy	*Robert.J.Roddy@noaa.gov*	_____
Yeun-Ho Daneshzadeh	*Yeun-Ho.Chong@noaa.gov*	_____
Francis Bringas	*Francis.Bringas@noaa.gov*	_____
Jaime Soto	*Jaime.Soto@noaa.gov*	_____
Zach Barton	*Zach.Barton@noaa.gov*	_____

Argo deployment information while underway:

e-mailed to: *aoml.argo@noaa.gov* and *deploymentinfo@whoi.edu* _____

Drifting buoy deployment information while underway:

Shaun Dolk	*Shaun.Dolk@noaa.gov*	_____

Cruise summary for the webpage. This information goes on the webpage and includes the number of XBTs deployed, drifters/floats deployed, any data affecting issues, etc. Send an email to each of the following with your summary:

Gustavo Goni	*Gustavo.Goni@noaa.gov*	_____
Molly Baringer	*Molly.Baringer@noaa.gov*	_____
Yeun-Ho Daneshzadeh	*Yeun-Ho.Chong@noaa.gov*	_____
Silvia Garzoli	*Silvia.Garzoli@noaa.gov*	_____
Francis Bringas	*Francis.Bringas@noaa.gov*	_____

Please email a Cruise Report to Molly Baringer, Silvia Garzoli, Gustavo Goni, Zach Barton, Robert Roddy, and Francis Bringas stating the following:

- XBTs deployed
- Drifters deployed (ID, date, time, latitude, longitude)
- Profiling floats deployed (start time, deployment time, latitude, longitude)
- GTS transmission (Real-time, twice a day, problems)
- Additional equipment, tools, supplies needed
- Problems
- Recommendations
- Other narrative