UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
Marine Operations Center
439 W. York Street
Norfolk. VA 23510-1114

MEMORANDUM FOR: Captain Robert Kamphaus, NOAA
Commanding Officer, NOAA Ship *Ronald H. Brown*

FROM: Captain Scott M. Sirois, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for RB-17-03
Tropical Atmosphere Ocean (TAO) 110W/95W

Attached is the final Project Instruction for RB-17-03, Tropical Atmosphere Ocean (TAO) 110W/95W, which is scheduled aboard NOAA Ship *Ronald H. Brown* during the period of May 25 – July 6, 2017. Of the 42 DAS scheduled for this project, 41 days are funded by a Line Office Allocation, 1 DAS is provided by the OMAO UxS Allocation. This project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to **Opsmgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

Draft Project Instructions

Date Submitted: March 27, 2017

Platform: NOAA Ship *Ronald H. Brown*

Project Number: RB-17-03

Project Title: Tropical Oceans Atmosphere (TAO) 110W/95W

Project Dates: May 25 – July 6, 2017

Prepared by: Douglas J. Maxwell Dated: 4/25/17
Douglas Maxwell
Senior Field Operations Specialist
National Data Buoy Center

Approved by: _____ Dated: 4/25/17
Bill Hansen
Operations Manager
National Data Buoy Center

Approved by: _____ Dated: 4/26/17
Stephen Cucullu
Operations Branch Chief
National Data Buoy Center

Approved by: _____ Dated: 5/5/17
Captain Scott Sirois, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

A. Brief Summary and Project Period

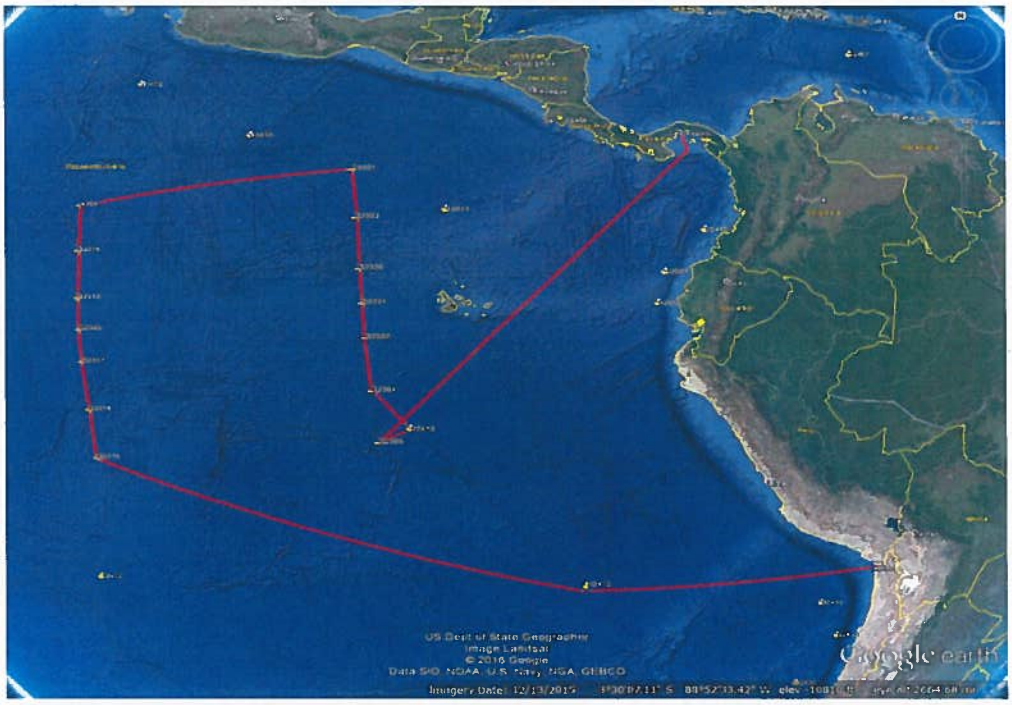
Load ship – May 23 – 24, 2017.
Underway – May 25 – June 29, 2017 (36 DAS)
Port call in Rodman, Panama - June 29 - 1 Jul, 2017.
Panama Canal Transit - 1 July 2017
Underway - transit to Key West, FL 1 - 5 July 2017. (6 DAS)
Unload ship – July 6, 2017.

B. Days at Sea (DAS)

Of the 42 DAS scheduled for this project, 41 DAS are funded by a NWS Line Office allocation; 1 DAS is provided by the OMAO UxS allocation. This project is expected to exhibit a Medium Operational Tempo.

C. Operating Area

NOAA Ship Ronald H Brown
RB-17-03
May 25 – July 5, 2017



D. Summary of Objectives

The objective of this cruise is the maintenance of the TAO Array along the 110°W and 95°W meridians and the maintenance of DART Stations 32412 and 32413. The scientific complement for the cruise will embark in Arica, Chile on May 24, 2017. The ship will depart on May 25, 2017 to commence operations as listed in Section II. After completion of operations, NOAA Ship *Ronald H. Brown* will proceed to Key West, FL via the Panama Canal, arriving on or about July 5, 2017. All dates and times referred to in these project instructions are in Central Standard Time (CST).

E. Participating Institutions

National Data Buoy Center, Argo Floats from Woods Hole Oceanographic Institution (WHOI), and Global Drifting Buoys from AOML.

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
William Thompson	Cruise Lead	5/24/17	7/6/17	M	NDBC	US
Joshua Lee	Lead Tech.	5/24/17	7/6/17	M	NDBC	US
Casey Burge	Support Tech.	5/24/17	7/6/17	M	NDBC	US
Kendall Lumpkin	Support Tech.	5/24/17	7/6/17	M	NDBC	US

G. Administrative

1. Points of Contacts:

Project Coordinator: Douglas Maxwell
National Data Buoy Center
Bldg. 3205
Stennis Space Center, MS 39529
W: 228-688-1831
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Douglas. Maxwell@noaa.gov

NDBC Ops: Bill Hansen
National Data Buoy Center
Stennis Space Center, MS 39529
W: 228-688-1410
C: 228-234-5163
Bill.Hansen@noaa.gov

2. Diplomatic Clearances

EEZ Clearance required for France (Clipperton Island).

3. Licenses and Permits

None Required

II. Operations

A. Project Itinerary

Depart Arica, Chile on May 25, 2017, conduct operations as outlined in Section II, and arrive in Key West, FL on July 5, 2017.

B. Staging and Destaging

Staging will take place in Arica, Chile on May 23-24, 2017. Destaging will take place in Key West, FL on July 6, 2017.

C. Operations to be conducted

The details of station work are summarized in Appendix A. The cruise will involve underway operations between stations, including CTDs, Argo Float and AOML drifter deployments (Section II). During the cruise, it is requested that the vessel provide to the Cruise Lead an updated operations spreadsheet (similar to Appendix A) with actual times and speeds made good for the entire cruise. NDBC will provide regular updates of buoy positions during the cruise in order to recover those adrift.

2.01 Underway Operations

2.01.1 ADCP

A ship-mounted ADCP system will be used to continuously measure the currents in the upper ocean along the trackline. At a minimum, data from the ADCP will be logged from the start of the transit once in international waters (or waters for which there is research clearance) and continue until leaving international waters. For calibration purposes it is essential that bottom

tracking be activated at the start and end of a cruise when in water depths shallower than 500m. The ship's Survey Technician will be in charge of data storage (hard drive to disks and/or CD's as necessary). The ADCP will be interfaced to the ship's GPS receiver and will receive data at one-second intervals. The clock on the ADCP computer will NOT be reset while underway. ADCP operating parameters will not be changed without the permission of the Cruise Lead, in consultation with Dr. Eric Firing, and after informing TAO personnel of the intended parameter change. All ADCP data will be provided to the Cruise Lead and sent to Dr. Eric Firing at the University of Hawaii.

Accurate ship navigation is essential for valid ADCP current measurements. The ship will provide a fully operational GPS receiver and Seapath 200 system (or equivalent) for navigation input. Ship's ET will select proper GPS codes to enable ADCP navigation data collection. The ADCP will be interfaced with the ship's gyro so that accurate heading information is available to the ADCP. A manual comparison of the ADCP heading/gyro reading will be logged by the Electronics Technician while the ship is dockside, at the beginning of a cruise and checked periodically throughout the cruise. For calibration purposes, "Bottom Tracking" should be activated whenever the ship is transiting water shallower than 500m.

Due to compatibility problems, the ADCP is not interfaced to SCS, so GPS navigation and gyro inputs must be connected directly to the ADCP system. If the ADCP becomes interfaced to the SCS, then the ADCP data will be recorded on both the ADCP recording system and the SCS. Appropriate data storage systems will be connected to the ADCP system for ADCP data collection. The ADCP data recorded on the IBM has course and speed information from the navigation data that is exactly time coincident with the ADCP ensembles.

The ADCP system will be operated by ship personnel and will continuously log data to the ADCP storage disks during the entire cruise. If necessary, the ADCP data disks will be changed when full. Full disks will be labeled and backed up. An ADCP log will be maintained by the Electronics Technician and a check of the ADCP recording of heading, time, velocity and navigation information will be done periodically to ensure the system is operating properly. Any inconsistencies, such as heading, time, and/or navigation input not in agreement with actual/expected, will be noted in the log and reported to the Commanding Officer and Cruise Lead.

Principle Investigator:

Dr Eric Firing, University of Hawaii efiring@iniki.soest.hawaii.edu

2.01.2 SST and SSS

Sea surface temperature and salinity will be recorded continuously with a SEABIRD SBE-21 accurate to within 0.1 C and 0.01 psu. The Survey Technician will translate the data from the thermosalinograph to ASCII. It is the vessel's responsibility to ensure that the thermosalinograph is calibrated, at a minimum, annually.

2.02 CTD Observations

A Sea-Bird 911 plus CTD with dual temperature and conductivity sensors will be the primary system and will be provided by the ship.

At a minimum, 1000 meter CTD casts shall be conducted at each mooring site for sensor inter-comparison purposes. As time permits, additional or deeper CTD's should be conducted whenever addition of the CTD's will not impact scheduled mooring work. For example, if the ship would arrive at the next mooring site in the middle of the night, it is preferable to do CTD's on the way, rather than remain hove to waiting for daylight. Another example would be when mooring operations are significantly ahead of schedule. Beyond those at mooring sites, CTD's should be conducted in the following order of priority:

- 1000m CTD's at one-degree latitude intervals between 8° N and 8° S, along the ship's trackline.

- Extend 1000m CTD's at mooring sites to a minimum of 3000m or a maximum depth of 200m from the bottom. Four to six deep casts are optimal, occurring at the beginning and end of the cruise as well as at both equatorial sites.

For each cast, the CTD operator should be notified at least 30 minutes prior to arriving on station in order to ready the underwater package and power up the instrumentation (i.e. turn on the deck unit) giving the electronics time to equilibrate.

Once the CTD has been deployed, it should be held at 10 m for 2 minutes to activate the pumps and remove any air bubbles in the sensor tubing. The winch operator should then raise the package to just beneath the surface being careful to not let the sensors come out of the water. The CTD operator will hit "markscan" and then instruct the winch operator to start down.

Descent rates should be 30 m/min from 0-50 m, 45 m/min from 50-200 m, and 60 m/min beyond 200 m. An entry in the Marine Operations Abstract should be made for each CTD cast at the maximum cast depth by the bridge watch. Ascent rates should not exceed 60 m/min. If possible,

all 8 Niskin bottles should be closed at specified depths in the water column. After recovery and data acquisition is completed, the deck unit should be turned off.

CTD data will be acquired and processed on the ship's computer equipped with SEASOFT software. The capability to display CTD data using the SCS system and monitors will be available. The CTD operator will complete the CTD cast logs. The CTD operator or bridge watch will maintain the CTD weather log.

No salinity water samples will be taken on this cruise.

The Survey Technician will complete the NDBC provided CTD logs. Instructions for filling out the CTD logs are contained in Appendix B: NDBC CTD Procedures.

2.03 Mooring Operations

Mooring Operations are scheduled to be conducted as shown in Appendix A. Operations will be conducted at DART Station 32412 near 17.983S 86.385W, then to 8S 110W to 8N 110W, then to 8N 95W to 5S 95W, then to DART Station 32413 near 7.402S 93.522W and then to 8S 95W. The following mooring operations are anticipated, though the work may be changed by direction of the Cruise Lead in consultation, with the Commanding Officer.

Location	*Mooring Type*	*Operation*	*Status*
32412	DART	Recover old BPR Deploy new buoy and BPR	Adrift
8°S 110°W	Refresh	Recover/Deploy	
5°S 110°W	Refresh	Recover/Deploy	
2°S 110°W	Refresh	Recover/Deploy	
0° 110°W	Refresh/Flux/CO2	Recover/Deploy	
0° 110°W	ADCP	Recover/Deploy	
2°N 110°W	Refresh	Recover/Deploy	
5°N 110°W	Refresh	Recover/Deploy	
8°N 115°W	Refresh	Recover/Deploy	
8°N 95°W	Refresh	Recover/Deploy	
5°N 95°W	Refresh	Recover/Deploy	Not transmitting
2°N 95°W	Refresh	Recover/Deploy	
0° 95°W	Refresh	Recover/Deploy	
2°S 125°W	Refresh	Recover/Deploy	Not transmitting
5°S 125°W	Refresh	Recover/Deploy	Not transmitting
32413	DART	Recover old BPR Deploy new buoy and BPR	Adrift

8°S 95°W	Refresh	Recover/Deploy	Not transmitting

2.05 Navigation

Navigation will be based on the best available information, including GPS, dead reckoning, radar and visual bearings as appropriate. GPS is vital to the efficient deployment of a mooring and is the preferred navigational aid in the project area. Radar ranges and visual bearings to buoys may be required during deployment and recovery operations. Navigation events (such CTD casts) will be captured using the Scientific Computer System (SCS).

2.06 Multi-Beam

Multi Beam swath surveys are requested for all mooring sites on this cruise as defined above. The center beam information of the Multi Beam system will be used to observe and record bottom depth for this and future mooring deployments. The Cruise Lead will provide areas and coverage parameters for the surveys relative to time available as the cruise progresses. Contoured plots of mooring site surveys will be generated by the Survey Technician.

2.07 Underway Measurements in support of Global Carbon Cycle Research (GCC)

2.07.1 Request:

As part of the ongoing research to quantify the CO2 uptake by the world's oceans we have installed underway systems on RHB. After initial start-up, which requires about one hour of monitoring, the system needs checking twice a day requiring a total of about 20-minutes. We would also request weekly data downloads and transmission such that we can perform on shore near-real-time quality control to assess if the instrument is operating satisfactorily. All costs of the email transmissions and survey technician overtime would be covered by AOML. In the event of system malfunction that cannot be easily repaired, we will ask the Survey Technician to shut the system down.

2.07.2 Introduction:

The underway sensors on RHB will be used in support of the objectives of the Global Carbon Cycle Research (GCC) to quantify the uptake of carbon by the world's ocean and to understand the bio-geochemical mechanisms responsible for variations of partial pressure of CO2 in surface water (pCO2). This work is a collaborative effort between the CO2 groups at AOML and PMEL.

The semi-automated instruments are installed on a permanent basis in the hydrolab of RHB and are operated by personnel from AOML and PMEL. All work is performed on a not-to-interfere

basis and does not introduce any added ship logistic requirements other than the continuous operation of the bow water pump and thermosalinograph. This effort requires one permanent berth for the operator of the systems. The instrumentation is comprised of an underway system to measure pCO2, a SOMMA (single operator multi-parameter metabolic analyzer) -coulometer system to measure total Dissolved Inorganic Carbon (DIC), - a Turner Designs fluorometer, and a YSI oxygen probe. An oxygen titrator and stand-alone fluorometer will be used to calibrate the underway oxygen and fluorometer, respectively. All the instruments are set up along the port side bulkhead and aft bench in the hydrolab. The batch oxygen and DIC samples will be analyzed in AOML.

2.07.3 Rationale:

Current estimates of anthropogenic CO2 uptake by the oceans range from 1 to 2.8 Gigatons per year. The CO2 fluxes between air and water are poorly constrained because of lack of seasonal and geographic coverage of delta pCO2 (the air-water disequilibrium) values and incomplete understanding of factors controlling the air-sea exchange of carbon dioxide. Seasonal and temporal coverage can be increased dramatically by deploying pCO2 analyzers on ships.

The effort on RHB is expanded beyond the historical scope of the underway programs by incorporating additional sensors to improve our understanding of the factors controlling pCO2 levels.

2.07.4 Sensor Suite and Maintenance:

2.07.4.1 Underway pCO2 system

This system consists of a large (40-liter) air-water equilibrator requiring an unobstructed drain at floor level for the 15 L/min outflow, an infra-red analyzer with valves and flow meters, and a computer controlling the operating sequence and which also logs the data. The underway pCO2 system is an integrated package for measurement of pCO2 in air and water and support sensors necessary to reduce the data (such as equilibrator temperature, location, salinity, sea surface temperature and barometric pressure). This system is an upgrade from the initial systems and requires routine checks at 6-12 hour intervals, including logging of mercury thermometers in the equilibrator.

2.07.4.2 Oxygen sensor

This is a compact pulsed electrode unit which also contains a temperature sensor. This is a new sensor built by Dr. Langdon at LDEO. Water requirement is 2-Liter/minute with a bench top drain. One foot of bench space is required. During this cruise the data will be validated against samples taken four times a day and analyzed by potentiometric winkler titrations.

2.07.4.3 Turner Designs Fluorometer

This instrument, which was jointly purchased by AOML and MOC-A for BALDRIGE, requires a water throughput of about 5 L/min. Periodic cleaning of the flow through cell (2-14 days) is required. The signal of the fluorometer is logged on the shipboard SCS system or on the computer logging the underway pCO2 data. Aliquots of seawater are extracted twice per day and analyzed for chlorophyll and phaeopigments on a separate fluorometer following routine procedures to calibrate the fluorometer signal. This information will be particularly useful to extrapolate the observations from the NASA SEAWIFS satellite to in situ pigment concentrations.

2.07.5 Summary - Ship infrastructure support:

2.07.5.1 Continuous seawater supply: 20 lpm minimum, 40 lpm maximum for instruments, and 75 lpm throughput to assure short residence time of water in line and minimal heating.

2.07.5.2 Access to TSG and SCS data: Temperature at intake, salinity from TSG, fluorometer signal, wind speed (true and relative), wind direction (true and relative), time, latitude, longitude, and ship speed.

2.07.5.3 Bench space, hydrolab space, access to bow water line and drains.

Principal investigators:

Dr Rik Wanninkhof, AOML	305-361-4379	Rik.Wanninkhof@noaa.gov
Dr Richard Feely, PMEL	206-526-6214	Richard.A.Feely@noaa.gov

Specific questions should be directed to:

Kevin Sullivan, AOML	305-361-4382	Kevin.Sullivan@noaa.gov

2.08 Atlantic Oceanographic and Meteorological Laboratory (AOML) Surface Drifters

The Global Drifter Center at NOAA/AOML requests drifter deployments on an ancillary basis. The drifters are small, easily deployed devices that are tracked by ARGOS and provide Sea Surface Temperature (SST) and mixed layer currents. The global array of drifters provides SST ground truth for NOAA's polar orbiting satellite AVHRR SST maps. They also provide data to operational meteorological and ocean models, and research ocean current data sets.

Drifter Positions – TBA

Principal Investigator

Shaun Dolk, NOAA/AOML	(305) 361-4546	Shaun.Dolk@noaa.gov

2.09 Woods Hole Oceanographic Institution (WHOI) Argo Profiling Floats

Four (4) Argo floats are scheduled for deployment on this cruise. Individual deployment positions can be shifted by a degree or so along the ship track if more convenient. Each float weighs about 60 lbs. The WHOI Profiling floats are self-contained cardboard boxes that are 72" long x 12" high x 12" wide. Boxes are readily deployable and require no further service for deployment. Float deployment locations are as follows:

Drifter Positions –

01 DART/TAO	15° 0'S	88° 52'W
02 DART/TAO	12° 0'S	91° 30'W
03 DART/TAO	9° 0'S	94° 07'W
04 DART/TAO	6° 0'S	94° 22'W

Pell E. Robbins	(508) 289-4917	probbins@whoi.edu
Connor Ahearn	(508) 289-2454	cahearn@whoi.edu

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: Poor weather conditions may delay or cancel certain procedures, such as small boat operations and CTD casts. Decisions will be made on a case by case basis after consultation between the ship's crew and captain and the chief cruise lead. The primary consideration is the safety of the ship's crew and scientists. Possible mitigation strategies include waiting until conditions improve, canceling CTD casts, and recovering moorings without small boat operations. Unforeseen circumstances such as equipment failure may also cause a delay or cancelation of certain operations. Appropriate courses of action will be determined after discussion among the captain, crew, and Cruise Lead.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized):

- Narrow band Acoustic Doppler Current Profiling (ADCP) system.
- Hydro winch with slip rings and sufficient CTD cable for casts up to 5500 meters.
- GPS Navigation equipment.
- Marine Operations Abstracts (OCS Worksheet 001).
- Deck machinery for mooring recovery and deployment.

- Laboratory and storage space.
- PC based SCS workstation.
- Sea surface temperature and salinity system (thermosalinograph).
- Zodiac, or equivalent, and motor for servicing moorings.
- Two recently calibrated Seabird CTD, 2T/C sensor pairs, rosette frame and pylon, and deck unit.
- Electronic & mechanical terminations for CTD.
- Fathometer capable of depth readouts to 6000 meters.

B. Equipment and Capabilities provided by the scientists (itemized):

- All components of the planned moorings.
- Peck & Hale Release-A-Matic hook.
- Consumables - i.e. copy/printer paper, data storage media, pens and pencils.

IV. Hazardous Materials

A. Policy and Compliance

The Cruise Lead is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, or absorbents in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per FEC 07, the scientific party will include with their project instructions and provide to the CO of the respective ship 60 to 90 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories

For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known. Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material

- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program.
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of scientific chemicals is not permitted during projects aboard NOAA ships.

B. Inventory

Common Name of Material	**Qty**	**Notes**	**Trained Individual**	**Spill control**
Lithium batteries	44-16 D-cell batteries	Fire Hazard	William Thompson	Class D fire extinguisher will be available
Lithium batteries	764 AA batteries	Fire Hazard	William Thompson	Class D fire extinguisher will be available
Paint	8 1-gallon can	Fume Hazard	William Thompson	Tarp

C. Radioactive Isotopes

No Radioactive Isotopes are planned for this cruise.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

See section II

C. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information.* To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The Cruise Lead and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Cruise Lead in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting

shall be attended by the ship's officers, applicable crew, the Cruise Lead, and members of the scientific party and is normally arranged by the Operations Officer and Cruise Lead.

D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Cruise Lead. The form is available at http://www.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Cruise Lead. The Cruise Lead and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current makeup of the ship's complement. The Cruise Lead is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Cruise Lead is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Cruise Lead will ensure that all non NOAA or non Federal scientists aboard also have proper orders. It is the responsibility of the Cruise Lead to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled

project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Cruise Lead or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014 must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to set up an account using a valid NOAA email address and password. Accellion's Web Users Guide is a valuable aid in using this service. As a cost-reduction measure under the DOC contract with Accellion, user accounts expire after 30 days of inactivity. Simply re-register to send and receive files.

Persons without a NOAA email account must fax their forms.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
Email MOA.Health.Services@noaa.gov

Prior to departure, the Cruise Lead must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Cruise Lead to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Cruise Lead may be relayed to the program office. Sometimes it is necessary for the Cruise Lead to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Cruise Lead. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of the above requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

IX. Appendices

A. TAO Operations spreadsheet

B. Load list for Arica, Chile and Charleston, SC

C. Field Service Plan for DART stations 32412 and 32413

D. EEZ Clearances

TA-17-02-RHB **Ver 1.0**

Ship: RV Ron Brown
Dates: 5/25/2017 7/5/2017
Ports Arica, Chile Key West, Florida
Locations 95W/110W
Shipping Date: 3/17/2017
Staffing Cruise Lead: Will Thompson Lead Tech.: Joshua Lee Support Tech: Casey Burge Support Tech: Kendall Lumpkin

OPS SUMMARY

	Deploy	Recover	Repair	Visit
Refreshed	14	14	0	0
ADCP	1	1		

Instruments Needed: Does include spares

	TUBE	RMY	ATRH	SWR	LWR	Baro	Rain	SSC	T	TP	TC	SBE44	SON	Release	Top Section
REFRESHED	14	14	14	1	1	1	1	14	109	28	7	5	5	14	14
Spares	2	4	4	1	1	1	1	2	16	4	2	1	1	2	2
ADCP Broad Band	1													2	

BUOYS	Towers	Bridles	Nylon	EV50	50m Cuts	Inserts
7+1(CO2)	9	8	44	6	2	3 sets

AD	CP	HMPE	Vectran
Float	Cage	110W	(spools)
1	1	1	3

NILSPIN	Standard	0 110W	0 95W		
Type/Requirements	East Pac	Flux/Chipods	Chipods		
# Primary	12	1	1		
# Spare	1	1	1		

Anchor	6200	4666	1750	Other
# Primary	4	10	1	
# Spare	1	1	1	

Lithium Batteries	Batery Pack	AA	Contained in Equipment	
Type	14299	14294	14294	
Number	32	450	314	

Fire Extinguisher	Type	QTY.
	Class D	1

ANCILLARY PROJECTS

PMEL, Argo Group Argo Float Deployments - Elizabeth Steffen Tel: (206) 526-6747

AOML drifters are scheduled for deployment, Shaun Dolk NOAA/AOML, Global Drifter Center, - Tel: (305) 361 4439

Location	Mooring	Operation	Camera	PM ID	Deployed	Days at Sea
Arica, Chile						
8S 110W Comments	Refresh	R/D		DM183A	3/21/2016	401
5S 110W Comments	Refresh	R/D		DM184A	4/11/2016	380
2S 110W Comments	Refresh	R/D	Camera	DM185A	4/12/2016	379
0 110W Comments	Refresh/CO2/FLUX	R/D	Camera	DM186A	4/13/2016	378
0 110W Comments	ADCP	R/D		EA023	4/16/2016	375
2N 110W Comments	Refresh	R/D		DM138A	4/30/2015	727
5N 110W Comments	Refresh	R/D		DM139A	5/1/2015	726
8N 110W Comments	Refresh	R/D		DM140A	5/2/2015	725
8N 95W Comments	Refresh	R/D		DM176A	3/9/2016	413
5N 95W Comments	Refresh	R/D		DM177A	3/10/2016	412
2N 95W Comments	Refresh	R/D		DM178A	3/11/2016	411
0 95W Comments	Refresh	R/D		DM179A	3/12/2016	410
2S 95W Comments	Refresh	R/D	Camera	DM180A	3/14/2016	408
5S 95W Comments	Refresh	R/D	Camera	DM181A	3/15/2016	407
8S 95W Comments	Refresh	R/D		DM182A	3/18/2016	404
Key West, Florida						

Load List

TA-17-02-RHB

Load Date 3/22/2017
Requested Destination Delivery Date: Pierside on May 12, 2017
Shipping Type requested: 4 - 40' Containers
From: Douglas Maxwell
TAO
Building 3203
Stennis Space Center, MS 39529

Shipping Address:
NOAA Ship Ronald H. Brown
Arica, Chile

NOTE **Hazardous materials are highlighted in yellow**

ITEM	NUMBER	WEIGHT PER	TOTAL WEIGHT	DIMENSIONS
Buoy (1 CO2)(1 Solid)	8	700	5,600	2.3m Toroid
Tower	9	150	1,350	2m x 4m
Bridles	8	150	1,200	2m x 4m
Bridle weights	24	110	2,400	12in x 8in x 2in
Buoy Inserts (set)	3	300	900	2m x 3m
ADCP (75Khz)	1	300	300	36in X 40in X 18in
ANCHOR Single Stack	3	4,666	13,998	32" Diameter
DART Buoy Hull / Bridle / Mast	2	3,600	7,200	5'H x 8'Dia
DART BPR and Anchor	3	1,200	3,600	4'x3'x4'
DART Spare BPR Platforms	2	150	300	4'x3'x2'
DART Spare BPR anchor	2	800	1,600	4'x3'x2'
DART Buoy Anchor	3	6,200	18,600	36in Dia x 16in H
DART Basket w/ floats	2	650	1,300	4'x4'x4'
DART Acoustic release	4	115	460	3'x1'x1'
DART mooring line box	3	3,000	9,000	4'x4'x8'
DART Nylon, EV50	3	300	900	32in x 36in
DART Battery Box	1	900	900	48in X 48in X 48in
Spools, Nylon 11/16"	52	300	15,600	32in x 36in
Spool Nilspin wire	17	720	12,240	28in x 28in x 30in
Spools HMPE	1	250	250	32in x 36in
Spools Empty		35	0	32in x 36in
Reel stands		300	0	5'x4'x4'
Spools, Vectran	3	250	750	32in x 36in
Mooring Components, shackles, chain,	1	2,500	2,500	4ft x 4ft x 2.5ft
Camera boxes	4	80	320	3'x1'x1'
Pressure Washer	1	150	150	3'x1'x1'
TOTAL			101,418	

TOTAL WEIGHT: 50.7 Tons

Load List

TA-17-02-RHB

Load Date **04/24-25/2017**
Requested Destination Delivery Date: Pierside on April 24, 2017
Shipping Type requested: Flatbed trucks

From: Doug Maxwell
TAO/DART
Building 3203
Stennis Space Center, MS 39529

Shipping Address:
NOAA Ship Ronald H. Brown
Charleston Marine Support Facility
1050 Register Street
Charleston, SC 29405-2421

Phone (843) 566-9116

NOTE **Hazardous materials are highlighted in yellow**

ITEM	NUMBER	WEIGHT PER	TOTAL WEIGHT	DIMENSIONS
ANCHOR Single Stack	8	4,666	37,328	32" Diameter
ANCHOR Double Stack	5	6,200	31,000	32" Diameter
ANCHOR ADCP	2	1,700	3,400	32" Diameter
Tube Table	1	700	700	5'x10'x4'
ADCP Float with cage and stand	1	1,750	1,750	4'x4'x5'
Cruise Boxes - Grey	20	150	3,000	36" X 24" X 18"
Black Box (Tubes)	1	1,000	1,000	48" X 48" X 48"
Module Boxes	16	50	800	19" X 19" X 17"
Acoustic Releases	18	115	2,070	3' X 1' X 1'
Tool Chests (2) - Palletized	1	350	350	3' X 4' X 5'
Line cutters - Palletized	1	225	225	3' X 3' X 3'
Purge Kit	1	80	80	36" X 24" X 18"
Lithium AA batteries contained in equipment	314			
Lithium sensor AA batteries. 150 to a box	3	4	12	8"x12"x1"
Lithium Payload Batteries.	36	8	288	12"x8"x6"
Paint 1 gallon can	8	3	24	gallon can
TOTAL			82,027	

TOTAL WEIGHT: 41.0 Tons

Note: All Ancillary Science Programs will be shipping their deployment material to Charleston, SC for load

Appendix C of RB-17-03 Project Instruction

FIELD SERVICE PLAN TA-17-02-RHB

START DATE: 05/20/2017
END DATE: 07/07/2017

STATIONS BEING SERVICED: 32412, 32413

SHIP INFORMATION
NOAAS Ronald H Brown
Commanding Officer
1050 Register Street
Charleston, SC 29405-2421

POC: Lt Brian E. Elliot (Operations Officer)
Iridium: 808 659-5690
Ship Cell: 843 693-2082
Personal Cell: 262-909-0796
Ops.Ronald.Brown@noaa.gov

SHIPMENT INFORMATION
Commanding Officer
1050 Register Street
Charleston, SC 29405-2421
and
NOAAS Ronald H Brown
Port of Arica Chile

Charge Number
601305.4.06. AA.40.10.01.004875 (Time and expense)
601305.4.06. AA.40.10.03.004883 (Time only)

SUMMARY OF WORK

Team of William Thompson (Electronics Technician / Cruise Lead), Joshua Lee (Electronics Technician), Kendall Lumpkin (Mechanical Technician) and Casey Burge (Mechanical Technician), will depart SSC on May 20, 2017 and travel to Arica, Chile to meet the NOAAS Ronald H Brown in order to conduct service to the 95W and 110W TAO lines and re-establish DART Stations 32412 and 32413. The team will load their equipment on May 23-24, 2017 and get underway on May 25, 2017 to conduct operations. The team will conduct a re-establishment at station 32412 with the recovery of the previously deployed BPR, deployment of a new BPR and deployment of a new DART hull on a new mooring. The team will conduct a similar re-establishment at DART station 32413 before returning to Key West, Florida on or about July 5, 2017. Upon arrival the team will off load all of their deployment equipment, stage it and ship it back to SSC. The team will then travel back to SSC.

Estimated Date On Station	Station/Hull	Designated Location	Estimated Depth (Meters)	Notes
05/29/2017	32412	17° 58' 56 S 86° 23' 06" W	4365	• Re-establish station • Recover old BPR • Deploy new BPR • Deploy DART buoy on new mooring
06/24/2017	32413	07° 24' 08 S 93° 31' 34" W	4018	• Re-establish station • Recover old BPR • Deploy new BPR • Deploy DART buoy on new mooring

Safety Note

Before commencing buoy operations at each station, it is important that each of the persons involved know their role on the deck of the ship. The utilization of taglines or tuggers to control the movement of all equipment is imperative, especially when transporting equipment over the water. Prior to buoy operations, all parties involved must meet to discuss a plan of deployment to ensure the safety of the team and equipment. A Deck Safety Observer will be identified prior to all deck operations.

Contact Requirements

It is imperative that the Cruise Lead **check in on a daily basis** with the MCC or Operations to ensure management is updated on the current status of the field service as well as to receive any updates to this document or other directions which may be pertinent. The following matrix defines additional times when the Cruise Lead should make contact concerning mission issues:

When to Contact	Who to Contact	Via
Daily	Operations personnel during normal Mon-Fri working hours. MCC on weekends, holidays and after hours.	Satellite Phone
ETA to station (update as required)	MCC / Field Service Coordinator	*Email
Arrival On Station (if different than ETA by +-30 minutes)	MCC	Satellite Phone
Prior to sub-surface sensor recovery (Provide position/time)	MCC	Satellite Phone
Prior to sub-surface sensor deployment	MCC	Satellite Phone
Following sub-surface sensor deployment	MCC	Satellite Phone
Prior to departure from station	MCC	Satellite Phone
Any issues affecting service visit	Field Service Coordinator / MCC**	Satellite Phone

* If Available; Otherwise contact will be made via Satellite Phone

** Field Service Coordinator / MCC will contact NDBC Operations concerning any issues which may affect the field service mission.

A Supervisor's Report of Accident/Injury Investigation Report form is included in mission package thumb drive, field service procedures, Operational Safety, TE.50.004 along with a Close Call/Near Miss Report form TE.50.005. The Report of Accident/Incident form should be completed within 24 hours after the incident/accident. If an accident/incident occurs, obtain the report number from NTSC Safety Officer.

Reuse of LRUs

In the event that a recovered LRU is required for reuse while in the field, the equipment must be tested for proper operation. Once basic operational functionality has been verified, the equipment property number, date tested, results of testing, and name of the technician performing the tests must be provided to the MCC before being installed and used so that the equipment can be identified by QA as valid for use.

Reporting LRU Failures During System Testing

All LRUs which fail during pre-deployment testing will be tracked and reported in accordance with NTSC M.04.028, found in Handout 1, Section 5.

LRUs Lost at Sea

All LRUs which are found to be unserviceable or lost at sea will be tracked and reported in accordance with NTSC M.04.029, found in Handout 1, Section 5.

Return of Equipment to NDBC

All LRUs recovered from stations will be tagged and returned to NDBC in accordance with NTSC S.02.003, Return of Government Property from Field Service Activity, found in Handout 1, Section 5.

Service at 32412

This station was last service on 06/10/15 with a scheduled service visit. The DART hull 2.6D80 went adrift from station on 03/08/16 and is currently 2,940 NM from station. The plan of operations for this station is to recover the old BPR, deploy a new hull on a new mooring and then deploy a new BPR.

Corrective Maintenance:

- The following actions will be taken:
  - Recover the old BPR

Preventive Maintenance

- The following actions will be taken
  - This will be a station re-establishment

Mooring

- A new mooring will be used to re-establish this station.

Following the service visit at 32412, the team will remain on station for verification of system operation. LRU information (removed / installed on station) and appropriate metadata will be

passed to MCC prior to commencing Ground Truth. Once the system operation is verified the team will depart from station.

Service at 32413
This station was last service on 03/17/16 with a scheduled service visit. The DART hull 2.6D54 went adrift from station on 02/07/17 and is currently 440 NM from station. The plan of operations for this station is to recover the old BPR, deploy a new hull on a new mooring and then deploy a new BPR.

Corrective Maintenance:
- The following actions will be taken:
  - Recover the old BPR

Preventive Maintenance
- The following actions will be taken
  - This will be a station re-establishment

Mooring
- A new mooring will be used to re-establish this station.

Following the service visit at 32413, the team will remain on station for verification of system operation. LRU information (removed / installed on station) and appropriate metadata will be passed to MCC prior to commencing Ground Truth. Once the system operation is verified the team will depart from station.

POC for the Field Service Activities:
Charlie Stewart: x82006 (Work), (985) 290-8575 (Cell), (228) 363-1643 (Cell)
Jeff Oglesbee: x82241 (Work), (601) 916-1367 (Cell)
Ronnie Sanford: X81744 (Work), (601) 916-4042 (Cell), (601) 798-4042 (Home)
Robert Koller: x83744 (Work), (228) 216-5906 (Cell)

Mission Control Center (MCC):
(228) 688-2835 or (228) 688-3134

POC for Logistics:
Stephanie Jordan: x83456 (Work), (228) 222-0134 (Home), or (228) 216-9187 (Cell)

POC for Computer Issues: (ensure a hard boot (turn off) is done first)
Duty iTech: During Work Hours: (228) 688-1415, After Hours: (228) 216-3731

POC for Safety related issues:
Jay Hancock: x81780 (Work), (601) 569-0685 (Cell)

NDBC POC
Bill Hansen: Office: (228) 688-1410, Cell: (228) 234-5163
Stephen Cucullu: Office: (228) 688-3804, Cell: (228) 342-5509

Foreign EEZ: Tropical Atmosphere Ocean (TAO) 95W - 110W RB-17-03

Request Information

Application | Attachments | Authorizations | Action Log

Return To Tasks
Return To Application
Print Friendly Version
Download files in one zip file

DRAFT STANDARD FORM A

APPLICATION FOR CONSENT TO CONDUCT MARINE SCIENTIFIC RESEARCH

1. General Information

1.1 Reference ID:

Application number: F2017-027
Project name: Tropical Atmosphere Ocean (TAO) 95W - 110W RB-17-03

1.2 Sponsoring institution(s):

Institution	Contact Information	Director
National Data Buoy Center	Bldg 3205, Stennis Space Center, Mississippi, USA, 39529	Helmut Portman

1.3 Scientist in charge of the project:

Name: Douglas Maxwell
Affiliation: NOAA/NWS/NDBC
Address: Apt/Suite: Bldg 3205
Phone: 2286881831
Fax: 2286883642
Email: douglas.maxwell@noaa.gov

1.4 Scientists from coastal states involved in the planning of the project:

See Section 8 (*Participation*)

1.5 Submitting officer:

Name: Wendy Bradfield-Smith
Affiliation: Marine Operations Center, National Oceanic and Atmospheric Administration, Department of Commerce
Address: 439 West York Street
Phone: 757.441.6172
Fax: 757.441.6495
Email: wendy.bradfield-smith@noaa.gov

2. Description of Project

2.1 Nature and objectives of the project:

The NOAA sponsored Tropical Atmosphere Ocean (TAO) research program is designed to observe, describe and model the variability of the coupled global ocean-atmosphere-land system on seasonal to inter-annual time scales and to understand the mechanisms and processes underlying this variability and its predictability. An array of ATLAS wind and thermistor chain moorings, which report data in real time using the ARGOS and IRIDIUM satellite data telemetry systems, are maintained by TAO. These data are provided to researchers and the operational oceanographic and meteorological centers. A primary goal of this research is to investigate the dominant mechanisms that produce large scale, inter-annual variations of the sea surface temperature in vast regions of the tropical Pacific ocean. Studies indicate that such sea surface temperature variations are linked to perturbations in the mid-latitude atmospheric pressure field and; hence, to weather. T he array is a major component of the El NiÃ±o/Southern Oscillation (ENSO) Observing System, the Global Climate Observing

moorings located along the 110W and 95W meridians.

2.2 Relevant previous or future research projects:

This cruise is intended to be completed approximately every 12 months using NOAA Ships and other charter vessels.

2.3 Previously published research data relating to project:

â€œEvolution of the 2002-03 El NiÃ±oâ€, McPhaden, M.J., Bulletin of the American Meteorological Society, 85, 677-695 (2004). â€œMultidecadal fluctuations in the relationship between equatorial Pacific heat content anomalies and ENSO amplitudeâ€, Cai, W. M.J. McPhaden, and M.A. Collier, Geophysical Research Letter, 31, L01201 (2003). â€œSeasonal and interannual CO2 fluxes for the central and eastern equatorial Pacific Ocean as determined by fCO2-SST relationshipsâ€, Cosca, C.E., R.A. Feely, J. Boutin, J. Etcheto, M.J. McPhaden, F.P. Chavez, and P.G. Strutton, Journal of Geophysical Research, 108(C8), 3278 (2003). â€œTropical Pacific Ocean heat content variations and ENSO persistence barriersâ€, McPhaden, M.J., Geophysical. Research Letter, 30(9), 1480 (2003). â€œMultiple time space comparisons of ATLAS buoy rain gauge measurements to TRMM satellite precipitation measurementsâ€, Serra, Y.L and M.J. McPhaden, Journal of Applied Meteorology, 42, 1045-1059 (2003). â€œEnhanced Oceanic and Atmospheric Monitoring for the Eastern Pacificâ€, Cronin, M.F., N. Bond, C. Fairall, J. Hare, M.J. McPhaden, and R.A. Weller, Eos, Transactions, American Geophysical Union, 83, 205 (2002). â€œBarrier layer formation during westerly wind burstsâ€, Cronin, M. F. and M. J. McPhaden, Journal of Geophysical Research, 107(C12), 8020 (2002). â€œInterannual sea surface salinity and temperature changes in the western Pacific warm pool during 1992-2000â€, Delcroix, T. and M.J. McPhaden, Journal of Geophysical Research, 107(C12), 8002 (2002). â€œSeasonal and interannual variability of CO2 in the equatorial Pacificâ€, Feely, R.A., J. Boutin, C.E. Cosca, Y. Dandonneau, J. Etcheto, H.Y. Inoue, M. Ishii, C.L. QuÃ©erÃ©, D. Mackey, M. McPhaden, N. Metzl, A. Poisson, and R. Wanninkhof, Deep-Sea Research,, 49, 2443-2469 (2002). â€œIntraseasonal variations in the upper equatorial Pacific Ocean prior to and during the 1997-98 El NiÃ±oâ€, Kutsuwada, K. and M.J. McPhaden, Journal of Physical Oceanography, 32, 1133-1149 (2002). â€œInternal waves and turbulence in the upper central equatorial Pacific: Lagrangian and Eulerian observationsâ€, Lien, R.-C., E.D. D'Asaro, and M.J. McPhaden, Journal of Physical Oceanography, 32, 2619-2639 (2002). â€œSignatures of salinity variability in tropical Pacific Ocean dynamic height anomaliesâ€, Maes, C., M.J. McPhaden, and D. Behringer, Journal of Geophysical Research, 107(C12), 8012 (2002). â€œMixed layer temperature balance on intraseasonal time scales in the equatorial Pacific Oceanâ€, McPhaden, M.J., Journal of Climate, 15, 2632-2647 (2002). â€œSlowdown of the meridional overturning circulation in the upper Pacific Oceanâ€, McPhaden, M.J. and D. Zhang, Nature, 415, 603-608 (2002). â€œAssessing ocean buoy shortwave observations using clear-sky model calculationsâ€, Medavaya, M., D.E. Waliser, R.A. Weller, and M.J. McPhaden, Journal of Geophysical Research, 107(C2), 3014 (2002). â€œAir-sea heat exchange along the Northern Sea surface temperature front in the eastern tropical Pacificâ€, Thum, N., S.K. Esbensen, D.B. Chelton, and M.J. McPhaden, Journal of Climate, 15, 3361-3378 (2002). â€œObservations of coupling between surface wind stress and sea surface temperature in the eastern tropical Pacificâ€, Chelton, D.B., S.K. Esbensen, M.G. Schlax, N. Thum, M.H. Freilich, F.J. Wentz, C.L. Gentemann, M.J. McPhaden, and P.S. Schopf, Journal of Climate, 14, 1479-1498 (2001). â€œA note on comparisons between TAO buoy and NASA scatterometer wind vectorsâ€, Dickinson, S., K.A. Kelly, M.J. Caruso, and M.J. McPhaden, Journal of Atmospheric and Oceanic Technology, 18, 799-806 (2001). â€œThe Tropical Ocean Circulationâ€, Godfrey, J.S., G.C. Johnson, M.J. McPhaden, G. Reverdin, and S. Wijffels, In: Ocean Circulation and Climate â€" Observing and Modeling the Global Ocean, G. Siedler, J. Church, and W.J. Gould, eds., Academic Press, 215-246 (2001). â€œEquatorial Pacific Ocean horizontal velocity, divergence, and upwellingâ€, Johnson, G.C., M.J. McPhaden, and E. Firing, Journal of Physical Oceanography, 31, 839-849 (2001). â€œThe El NiÃ±o/Southern Oscillation (ENSO) Observing Systemâ€, McPhaden, M.J., T. Delcroix, K. Hanawa, Y. Kuroda, G. Meyers, J. Picaut, and M. Swenson, In: Observing the Ocean in the 21st Century. Australian Bureau of Meteorology, Melbourne, Australia, 231-246 (2001). â€œInterannual variability in warm water volume transports in the equatorial Pacific during 1993-1999â€, Meinen, C.S. and M.J. McPhaden, Journal of Physical Oceanography, 31, 1324-1345 (2001). â€œVertical velocities and transports in the equatorial Pacific during 1993-1999â€, Meinen, C.S., M.J. McPhaden, and G.C. Johnson,

Chapman, and J.F. Grassle, Bulletin of the American Meteorological Society, 82, 1368-1376 (2001). â€œATLAS self-siphoning rain gauge error estimatesâ€, Serra, Y.L., P. A'Hearn, H.P. Freitag, and M.J. McPhaden, Journal of Atmospheric and Oceanic Technology, 18, 1989-2002 (2001). â€œRemotely-sensed biological production in the Tropical Pacific during 1992-1999â€, Turk, D., M.J. McPhaden, M.R. Lewis, and A.J. Busalacchi, Science, 293, 471-474 (2001). â€œA model study of oceanic mechanisms affecting equatorial Pacific sea surface temperature during the 1997-98 El NiÃ±oâ€, Vialard, J., C. Menkes, J.P. Boulanger, P. Delecluse, E. Guilyardi, M.J. McPhaden, and G. Madec, Journal of Physical Oceanography, 31, 1649-1675 (2001). â€œSurface layer heat balance in the equatorial Pacific Ocean during the 1997-98 El NiÃ±o and the 1998-99 La NiÃ±aâ€, Wang, W. and M. J. 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3. Methods and Means to be Used

3.1 Platform:

Name:	RONALD H. BROWN
Nationality (Flag State):	United States
Identification Number (IMO/Lloyds No.):	IMO 9105786
Owner:	Department of Commerce, National Oceanic and Atmospheric Adminis
Operator:	Office of Marine and Aviation Operations
Overall length:	83.50
Maximum draught (meters):	5.20
Displacement/gross tonnage:	3180.00
Propulsion:	Two Fully Rotating Stern Z-Drives, 3000 HP each;
Call sign:	WTEC
Cruising speed:	23.00
Maximum speed:	28.00
Name of captain/master:	Captain Kurt Zegowitz, NOAA
Number of crew:	31
Number of scientists on board:	4

3.2 Other craft used in the project:

N/A

3.3 Methods and scientific instruments:

Types of Samples and Data	Methods to be Used	Instruments to be Used
Water Temperature, Salinity, Fluorometry, Oxygen and Carbon Dioxide Content	Direct Measurements and Water Samples	CTD and thermosalinograph
Current Speed and Direction	Acoustic	ADCP
ARGO and Drifter Floats	Drifter buoys	ARGO Floats and drifter buoys
Meteorology and Surface Oceanography	In-situ buoy with real-time data telemetry	ATLAS Refresh Buoy

3.4 Will harmful substances be used?

No

3.5 Will drilling be carried out?

No

3.6 Will explosives be used?

No

3.7 Will protected species be studied?

No

4. Installations and Equipment

4.1 Will there be any installations?

yes
yes The ship will service the mooring located at 8 deg N/110 deg W, in the Exclusive Economic Zone of France surrounding Clipperton Island.

5.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude):

The ship will be servicing mooring located at 8 deg N/110 deg W, in the Exclusive Economic Zone of France surrounding Clipperton Island.

5.2 Attach chart(s) showing the geographical areas of the intended work and, as far as practicable, the positions of intended stations, the tracks of survey lines, and the locations of installations and equipment:

See Section 10 (*Attachments*)

6. Dates

6.1 Expected dates:

Project Start Date: May 20, 2017
Project End Date: Jul 07, 2017

Coastal Area	Estimated Entry Date	Estimated Departure Date	Multiple Entries Expected?
Clipperton Island	May 20, 2017	Jul 07, 2017	No
Explanation of multiple entries: N/A			
Research will be performed: between 12-200 nm			
Extent to which Clipperton Island will be enabled to participate or to be represented in the research project: An observer is welcome. The participant should be nominated to the Chief Scientist as soon as possible so that travel arrangements can be made and medical and security screenings can be completed. The participant should stay in touch with the Chief Scientist in case of schedule changes.			
Current participants from Clipperton Island: NO			

Coastal Area	
Chile	**Port Call Only**
Coastal Area	
Panama	**Port Call Only**

7. Port Call(s)

Port	Arrival Date	End Date	Special Logistical Requirements	Shipping Agent
Arica	5/20/2017	5/25/2017	TBD. Dates are approximate and subject to change.	TBD
Balboa	6/29/2017	7/1/2017	TBD. Dates are approximate and subject to change.	TBD

8. Participation

8.1 Extent to which coastal state(s) will be able to participate or to be represented in the research project:

See Section 6 (*Dates*)

8.2 Proposal dates and ports for embarkation/disembarkation:

See Section 7 (*Port Call(s)*)

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary reports, which should include the expected dates of submission of the final results:

No more than 30 days from the end date of the research.

be provided upon request.

9.3 Propose means to provide coastal State with assessment of data, samples and research results or provide assistance in their assessment or interpretation:

Assessment of data, samples, and research results will be provided at no cost to the coastal State(s). Assistance in futher assessment or interpretation will be provided upon request.

9.4 Propose means of making results internationally available:

Data from this cruise will be made available via the National Data Buoy Center (NDBC) web page (http://tao.ndbc.noaa.gov/) approximately June 2019.

10. Attachment(s)

Additional Attachments			
Attachment Type	Description	Attachment	Submission Date
Proposed Cruise Track	From Arica to the 110W TAO line, then to the 95W TAO line and on to Balboa.	3240257500_Proposed Track.jpg	