Pre-Cruise Meeting 1500 EST, September 23, 2014

AT26-26 / Margot Mulholland. Dec 31st to Jan 23- 2015.

RV Atlantis

General Program Overview:

1. Scientific Objectives:

….We propose to examine N2 fixation rates and nifH gene diversity in the context of light, nutrient, and oxygen gradients (and necessarily temperature gradients) along vertical profiles that penetrate into to the ETNP and ETSP OMZs. These oceanic realms have contrasting surface productivity which may control rates of microbial growth and processes at depth. We will compare rates of N2 fixation and diazotrophic community composition in vertical profiles within the OMZs to those in water masses adjacent to OMZs. Rates will be measured using stable isotope tracer techniques that account for slow gas dissolution and that we have already applied successfully in the ETNP; we will continue to refine those methods as part of this project. We will compare rate measurements of N2 fixation with the abundance and expression of nifH genes and nirS genes as a proxy for active denitrification in the region to better understand the juxtaposition of these two processes in association with OMZs.

Activities:

During cruises we will measure water column hydrography, light, nutrient concentrations (total dissolved nitrogen, ammonium, nitrate, nitrite, urea, dissolved free amino acids, oxygen, and phosphate), and rates of primary productivity and dinitrogen (N2) fixation in detailed depth profiles at stations within and adjacent to oxygen minimum zones in the ETSP (this cruise) and the ETNP (2016). In addition, we will measure the abundance and expression of nifH genes, concentrations of

particulate carbon (C) and nitrogen (N) and the natural abundance of 13C and 15N in particles, chlorophyll a, and cyanobacterial and heterotrophic bacterial abundance. These measurements will be compared with rates of dissolved N uptake (NO3-, NO2-, NH4+, urea, and amino acids). We will conduct experimental incubations wherein we examine the effect of organic C additions on N2 fixation rates. Collaborators will measure rates of denitrification and measure the natural abundance of stable isotopes in nitrate.

We will examine the distribution of N2 fixation and the diversity of diazotrophs with respect to vertical gradients in oxygen, light, and dissolved N, and spatial gradients of productivity in the mesotrophic Eastern Tropical South Pacific (ETSP), one of the most productive oceanic regions on Earth, and the more oligotrophic Eastern Tropical North Pacific Oceans (ETNP).

We will to make detailed vertical profiles (e.g., 20 depths sampled over several days) of N2 fixation and the abundance and activity of diazotrophs with respect to chemical and biological gradients in the ETNP and ETSP both within and adjacent the OMZs.

2. Identify other PIs associated with the cruise:
   Margie Mulholland, Bonnie Chang and Amal Jayakumar

3. Identify the at-sea Chief Scientist:
   Margie Mulholland

4. Identify operating area:
   Eastern Tropical South Pacific Ocean adjacent to Peru.

   14 South - 78 West

   Depth range;
   0 - 2000 meters **SOME AREAS 3000 to 5000 meters**

5. Voyage Dates and Leg #: **Dec 31 - Jan 23, 2015 / AT26-26**
   Pre Mobe October 20, 21 San Francisco CA.

   Arica Mobe: Dec 29 & 30, 2014.
   Move aboard date Dec 29.
   Demobe Jan 23, 24. Science moves off Jan 24.

6. Science party (size) - **EST. 20 - 24 people**

   (32 bunks available for science party)

Pre-cruise and Administrative:

1. **Diplomatic clearance** requirements for operations in EEZs: Peru.

2. **Financial responsibility**: POs? How many to set up per PI?
   (For port / loading logistical expenses)
   Set one up with Margie - $8,000.00

3. **Personnel forms** (Passports, Drivers Lic, Visas, Entry Fees)
   - Personnel forms req. 1 month prior to cruise.
   - We will need list for foreign collaborators if any.

4. Any Special Food Requirements (Gluten Free, Vegetarian, Kosher, etc.)

5. **Berthing Plan** - 1 week prior to mobilization; http://www.whoi.edu/page.do?pid=822

6. Lab Layout plan: http://www.whoi.edu/main/ships/atlantis/lab-science-spaces

RV ATLANTIS Instrumentation & Technician Support

[Installed Scientific Equipment]

1. General Duties of Marine Technicians (SSSG techs) are scheduled SSSG techs for this cruise.
Catie Graver and Dave Sims - 12/3/14

Each tech works a 12 hr shift. Techs will train science team w/ CTD deployments & recoveries.

2. WHOI general use equipment required for cruise ***[Installed Scientific Equipment]***:

A. CTD rosette w/ dual T/C Sensors
- Underwater Par 1000m, SBE O2 sensor, Wet Labs Flurometer, Wet Labs FLNTURTD.

B. Di H2O - how much / day? **20 - 50ltr / day**
C. Fume Hood - **may need all 4 on board**
D. Science Seawater Supply - how much use / users? **The lab SSW will be back supply for deck incubators. No large volumes here.**

E. High Seas Net - Need to receive data and send ashore on regular basis.
F. Navigation position / heading readouts.
~~**G.** Di Oxygen Titration w/ sample bottles~~ **Not needed!**
H. Met Sensors - **all.**
I. Sample storage- **will need all cold / freezer storage**.
- Walk-in refer, Walk-in freezer, -75 Freezer (25c/ft), 8.6 c/ft refer, 3.2 c/ft 070 freezers.

J. Cold storage van-?? Listed on questionnaire.
Yes - UNOLS cold van to be at 12Celcius. 01 deck inboard.

STABLE ISOTOPES will be used C13 & N15. Wet lab was the agreed location.

There will be no future rad or background requirements between this cruise and WHOI April 19.

Science Party Supplied Equipment:

Pump Profiler - Size? Weight? For hydro wire or A-frame?
Self contained CTD and pump system.
Very small .322 wire drum & winch. 400 meters .322. with nylon tube/hose for water.
2 foot bolt pattern w/ feet.
Power 220V - clean pwr if able.
USE port hydroboom or stbd. Crane in crutch.
1) How does this secure to deck? deck plates or brackets?
We have used straps attached to both sides of the PPS with eye bolts. Sci wants it installed at least 4 m from the rail.

2) Power?
220 V (clean line hopefully). My estimation is that the power requirement is not bigger than 2 KVA3.-

3) Can the winch run by 60 cycles?
Yes, we have used the PPS onboard of the RVIB N.B. Palmer and R/V New Horizon with any electrical problem

4) Where does the .322 and hose come off the drum leading to the block? Does it come off the top? Or bottom?
Top
This is a link in youtube where you can have a better idea how the PPS is deployed:

http://www.youtube.com/watch?v=a5vl2lMSXtc&feature=player_embedded

SCIENCE Brings Block and sheave.

Incubators - how many? **3** Sizes? **4' x 4' x 1.5'. These are put on 45"x48"x34" pallet boxes to make them taller on deck.**
Need sunny area AND natural dark night area (away from ship lamps).

H2O Hoses - **science is bringing these.**
Flow rates per incubator? - **flow rates low. Need regular spigot pressure. Just low constant flow.**

Ship [Other Requirements] [Shipboard Equipment/Nav]

1. Science / Ship Operations
    a. Instrument Deployment / Recovery Procedures:
    CTD ops - PPS

    b. Overboarding Equipment: (ISM) - **PPS, CTD, nets?**
    c. Vans: **UNOLS cld van**
    d. Hazards: [weight, bulk, chemical, pres.] Types?

    e. Night Operations: **YES**

2. Deck Safety - Safety Shoes (X), Experience (X)
    a. Science personnel have Training/Experience to operate/deploy gear
3. Lab Safety - PPE (X), Lab Training (X)
4. Hazardous Material- Please Fill out **HAZMAT INVENTORY FORM**

http://www.whoi.edu/sbl/liteSite.do?litesiteid=7092&articleId=10875

    a. Chemicals & Compressed Gases? YES
        i. Inventory Form
        ii. Spill Kit
        iii. Loading and waste removal logistics

    b. Isotope Use **[Isotope Use Approval]** - none req.

http://ehs.whoi.edu/ehs/DesktopDefault.aspx?tabindex=2&tabid=5&itemID=543

5. Policies: (speed, departure/arrival times, moving aboard, etc
6. Ship Navigation
7. Communication (voice, fax, e-mail)
8. Equipment
    a. Cranes (X)
    b. Oceanographic winches: Hydro (X), Trawl ( ),
    c. CTD (X)
    d. Electrical power (X)

Logistics [Notes]

1. Shipping gear to and from vessel for Oct 20 and 21 load.
   Please have all shipments in San Fran delivered between Oct 13 - 17th.

   Shipping address:

   Master R/V ATLANTIS
   Attn: Scientist's Name – AT16-26
   c/o BAE Systems Ship Repair
   Foot of 20th Street
   San Francisco, CA 94107
   PLEASE email Eric Benway (ebenway@whoi.edu) and our ship agent VASILE TUDORAN when shipment has been sent. vtudoran@aol.com

   BAE Shipping Office contact:
   Don Merrill, office (415) 829-0267, cell (415) 314-6431

   email address: donald.merrill@baesystems.com

You will need someone on site for pre mobe to ensure all items are loaded and secured in the science hold.

San Francisco dock location:

RV ATLANTIS
BAE Systems Ship Repair

Foot of 20th Street
San Francisco, CA 94107

- TWIC cards / CAC cards - science party & escorting at BAE.

PLEASE COPY ERIC BENWAY ON ALL COMMUNICATIONS WITH OUR AGENTS

- Port of Astoria can handle large shipments.
- Gear should be on between Oct 13 - Oct 17.
- Loading will be Oct 20 and 21st.
- Customs paperwork scanned and emailed to Eric Benway by Oct 17.

ARICA CHILE

- Demobe Jan 23 and 24.
- Shipping samples and gear back to USA from Arica Chile.
- Dry Ice?
- LN2?

Post-Cruise:

1. Actions departing ship. LABELING all items left behind and properly packed.
2. UNOLS cruise evaluation [Chief Scientist & Master] - UNOLS PCA.
3. Reports to foreign government/State Department [required for work in EEZs]- n/a
4. Data delivery [shipboard underway data].
5. Data archiving policy:

All data on a WHOI Cruise Data Distribution (which includes all underway data) will, by default be considered publicly available once a copy of it has been delivered to the chief scientist at the end of the cruise. Please review the Cruise Assignment of Data Access Protection