

Pre-Cruise Meeting August 22, 2014

**AT26-23 / Taylor/Sievert/White/Scott // Nov 2 to Nov 26, 2014.**

**RV Atlantis & HOV Alvin**

**General Program Overview:**

Scientific Objectives:

**Sievert/Taylor/Rich**:

Knowledge of the in situ metabolism of microorganisms carrying out CO2-fixation at deep-sea hydrothermal vents is very limited. Particularly lacking are studies measuring rates of autotrophic carbon fixation in situ, which is a measurement ultimately needed to constrain production in these ecosystems. Although recent data suggests that nitrate reduction either to N2 (denitrification) or to NH4+ (dissimilatory reduction of nitrate to ammonium, DNRA) might be responsible for a significant fraction of chemoautotrophic production, NO3--reduction rates have never been measured in situ at hydrothermal vents. We hypothesize that chemoautrophic growth is strongly coupled to nitrate respiration in vent microbial communities. As part of this cruise, we are going to deploy and test a newly developed robotic micro-laboratory, the Vent-Time Series Submersible Incubation Device (Vent-TSSID) for measuring rates of relevant metabolic processes at hydrothermal vents at both in situ pressures and temperatures.

**Scott and Girguis**: The relative importance of the two carbon fixation pathways (CBB, rTCA) in Riftia is impossible to infer from the existing data. Bulk stable carbon isotopic compositions, and the presence and activities of enzymes allied to rTCA and CBB in Riftia symbionts, do not definitively answer whether one or both pathways are operational in a single individual, and the contribution of each pathway to net carbon fixation. The objective of this study is to clarify whether the activity of these pathways in Riftia are regulated by environmental conditions (e.g., the relative abundance of redox substrates), internal heterogeneity, or whether both pathways operate simultaneously.

**Scott White:**

Activities:

**Sievert/Taylor/Rich:**

Our component of the cruise has 12 dives with DSV Alvin, to allow time for deployment and collection of experiments and for sampling of discrete vents along the axis of the 9°46’N to 9°53’N segment of the East Pacific Rise (EPR). We will focus our activities at Crab Spa, a diffuse flow vent site near Tica, and deploy experiments and sampling equipment, including the Vent-TSSID and a large volume pump (LVP). During the course of the cruise we will perform several deployments of the Vent-TSSID, as well as collect biomass from fluids and biofilms (deployment/recover experimental microbial colonizers) by utilizing a the LVP. Both the Vent-TSSID and the LVP will be deployed as an elevator. It is planned to deploy the instruments and bring them close to the deployment site the night before a dive, and then to position the instruments at the site with Alvin the next day. Alvin will be releasing the instrument either on the same dive or any subsequent dive, after which the instrument will be picked up at the surface. Furthermore, we will carry out additional opportunistic sampling of other diffuse-flow vents. Fluid samples for chemical analyses will be collected at each deployment site using isobaric gas-tight samplers, which will also be used to sample fluids from the focus site for the shipboard incubations. Finally, we will deploy/recover experimental microbial colonizers to collect microbial biofilms, as well as collect Riftia for subsequent ‘omic analyses. We will also perform several water casts at night, using the CTD/Niskin rosette on board Atlantis.

**Scott and Girguis:**

To address our objectives, it is critical for us to get freshly collected Riftia tubeworms that have been placed in a thermally insulated biobox and sent to the surface as soon after collection as possible (elevators would be fine as long as they were retrieved as soon as they surfaced). Collected tubeworms would be incubated in high-pressure aquaria in the Girguis lab's pressure van for respirometry experiments. After they reach steady-state, they will be subsampled for tissues, enzyme assays, and symbiont preparations (we will need some bench space in one of the ship's labs). Symbiont metabolism will be interrogated via 14C-labelling experiments (we will need to use a radioisotope van and have submitted our radioactive materials use request to WHOI).

**Scott White:**

1. Identify other PIs associated with the cruise:

Craig Taylor, Stefan Sievert, Kathleen Scott, Scott White

1. Identify the at-sea Chief Scientist: Stefan Sievert
2. Identify operating area & depths:

9 – 50’North / 104-18’West

Depth ranges; 2500 to 2600meters

1. Voyage Dates and Leg # : Nov 2 to Nov 26 // AT26-23

Manzanillo start port. Puntareans Costa Rica end port

1. Science party (size) – **24 bunks** available for science party / \_\_\_\_\_\_\_\_\_\_\_.

(all other bunks go to Alvin group (NDSF) = 10 and 2= SSSG)

Taylor Sievert =

Scott / Girguis =

Scott White =

**Pre-cruise and Administrative:**

1. Diplomatic clearance requirements for operations in EEZs : Mexico Port call only.
2. Financial responsibility: POs? How many to set up? 4 = WHOI, Harvard, FSU, U.South Carolina

1. Personnel forms (Passports, Visas, Entry Fees);

* *Personnel forms req. 1 month prior to cruise.*
* *We will need list for foreign collaborators*.

1. Any Special Food Requirements (Gluten Free, Vegetarian, Kosher, etc)
2. Berthing Plan - 1 week prior to mobilization; <http://www.whoi.edu/page.do?pid=822>
3. Lab Plans – 1 month prior to mobilization:

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)

Allison Heater, Dave Simms are the techs scheduled for this cruise.

1. WHOI general use equipment required for cruise ***[Installed Scientific Equipment]*:**
2. CTD w/ dual T/C sensors, SBE 43 O2 sensor, Wet Labs FLNTURTD combo flourometer and turbidity sensor, transmissometer,

B. Fume Hood

C. Multibeam – Mapping of survey area – no maps req.

D. Deionized H2O – how many liters per day?

E. Science Seawater Supply

J. -70 freezer 25cuft capacity

K. -70 freezer 3.2 cu ft capacity

L. Refer, 8.6 cu ft. capacity

M. Walk in Freezer ?

N. Walk in Refer

*Girguis/Scott: It would be helpful to have a climate controlled space at 15C with bench space and room for two scientists to work.* .

O. High Seas Net for SKYPE or video conferencing

P. Met Sensors?

Q. Chem locker

R. USBL (Alvin navigation)

S. Isotope Van

Other items?

**Science Party Supplied Equipment:**

1. Girugis Pressure Lab Van (8x20) / 480VDC (three phase); two circuits @ 60A each/ Weight = ?

Location = 01 deck

**HOV ALVIN- AT26-23**

# It is most important to communicate with Bruce Strickrott and Pat Hickey directly and to refer to *Alvin Operations* published on the WHOI website:

<http://www.whoi.edu/page.do?pid=10695>

EL for cruise =

1. **General work description / Brief operation description or comments**:

**What type of samples do you expect to collect?**

Sievert/Taylor/Rich/White:

water samples primarily with isobaric samplers, animals (Riftia, mussels), rocks, slurp samples, pick up larval colonization blocks and microbial colonization devices

Girguis/Scott:

Riftia tubeworms. We would be very happy to have these deployed to the surface in elevators as long as they were in thermally insulated bio collection boxes and the elevators were retrieved immediately upon surfacing. We do not want all six collections on one dive; it would be best to have the 6 collections spaced throughout the cruise. We have two dives funded; each collection will take a small portion of each dive in which they occur. We would be happy for our two dives to instead translate into six collections over the course of the cruise, as long as we had a little bottom time to collect environmental data and samples associated with each Riftia collection.

1. **Number of instruments / samples to recover and their most accurate positions:**
   1. Bio Collection Boxes = 12x12x12” & 12x12x24
   2. Low temp heat probe
   3. High temp heat probe
   4. Large capacity slurp samplers; multi-chamber
   5. Small capacity slurp samplers
   6. Push corers (12-pack rack)
   7. Profiling sonar
   8. Search sonar
   9. CTD niskin
   10. Scoop nets
   11. Elevators = 6 (G/S), 10 (S/T/R)
2. **Other sampling from Alvin:**

Sievert/Taylor/Rich:

We are going to use a a number of instruments, most of which have been used with Alvin:

1. We will be using Jeff Seewald's isobaric samplers, which have been used frequently with Alvin

2. We will be using chemical in situ sensors developed by Nadine LeBris, these are self-contained units that have been frequently used with Alvin (last time on AT15-38)

3. A McLane in situ large volume pump is going to be deployed as an elevator. Alvin will need to move the pump to the deployment site and also release it after filtration is finished (6-8 hours)

4. Vent-TSSID: This is a newly developed instrument that has not yet been used with Alvin. The pressure sensitive components will be pressure tested according to Alvin specifications. Fred Thwaites who is engineering the instrument has been in touch with Alvin group.

The LVP and Vent-TSSID are independent units. They will be moved by Alvin and positioned at the sampling site.

Girguis/Scott:

We may possibly be bringing in situ blenders to preserve tubeworms on the seafloor. They are not pressurized.

ISMASH - HYDRAULIC SPECIFICATIONS:

Minimum tested flow rate: 8 L/min @ ~50 bar (more is better)

Maximum specified flow rate: 18 L/min @ 138 bar

Connections: SAE 8 o-ring bore seal; equivalent to 12mm hydraulic line (we can provide

adapters as necessary)

Motors may be connected individually or in series, depending on available hydraulics

ports.

Scott White: ?

1. **Please give a brief description of the equipment, its intended purpose, the cruise # it was last used on if any and its deployment method.**

**PRESSURE TESTING for visiting instruments?**

**Science instrumentation or computers needed inside the sphere?**

**Does this equipment require manipulation?**  YES

If yes, please describe how the equipment is to be manipulated.

Girguis/Scott:

PIlot needs to open and close lid. Very minor. Specifications are included in the diagram uploaded for the hydraulic schematic. Device has been successfully used with the JASON.

Sievert/Taylor:

LVP and Vent-TSSID need to be moved by Alvin, intake wand needs to be placed in opening of vent, instrument weights need to be released at end of operation

**Do you intend to recover any other previously deployed equipment?** No

**Data & Video duplication and handover to CH Sci.**

**Ship** ***[Other Requirements][Shipboard Equipment/Nav] :***

* 1. Science/Ship Operations
  2. Instrument Deployment / Recovery Procedures
  3. Overboarding Equipment (ISM)
  4. Vans – (Chemical van & Radioisotope van)
  5. Hazards [weight, bulk, chemical, pres.] Types?
  6. Night Operations : YES

1. Deck Safety – Safety Shoes ( X ), Experience ( X )
   1. Science personnel have Training/Experience to operate/deploy gear
2. Lab Safety – PPE ( X ), Lab Training ( X )
3. Hazardous Material***[Notes] Please Fill out HAZMAT INVENTORY FORM***

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

* 1. Chemicals & Compressed Gases
     1. Inventory Form
     2. Spill Kit
     3. Loading and waste removal logistics
  2. Isotope Use ***[*Isotope Use Approval] – KT Scott – Any others?**

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

1. Policies: (speed, departure/arrival times, moving aboard, etc
2. Ship Navigation
3. Communication (voice, fax, e-mail)
4. Equipment
   1. Cranes ( X )
   2. Oceanographic winches: Hydro ( X ), Trawl ( ), CTD ( X )
   3. Air Tuggers ( X )

## Logistics *[Notes]*

1. Shipping gear to and from vessel?

* San Francisco PRE MOBE:
* **OCT 20 – 21.**

**BAE SHIPYARD.**

Physical address of ship:

**BAE Systems Ship Repair**

**Foot of 20th Street**

**San Francisco, CA 94107**

Shipping address:

Master R/V ATLANTIS

Attn: Scientist's Name – AT26-23

c/o BAE Systems Ship Repair

Foot of 20th Street

San Francisco, CA 94107

BAE Shipping Office contact:

Cheri Mendieta, cell (415) 829-0267

email address: [Cheri.Mendieta@baesystems.com](mailto:Cheri.Mendieta@baesystems.com)

Please contact and copy our agent **Vasile Tudoran at**:

Phone: (562) 882-5590

Fax: (562) 434-9800

Email: [vtudoran@aol.com](mailto:vtudoran@aol.com)

LABEL EVERYTHING WITH OWNERS NAME AND VOYAGE #AT26-23

* Need full list of names who will attend for access lists.
* TWIC cards – science party & escorting
* Containers – 1
* Gases –
* Chems –
* Waste removal plan -
* Isotopes –
* Waste removal plan -
* Mobe will be in Manzanillo Oct 31 and Nov 1st.
* Science can move aboard Oct 31.
* DEMOB Nov 26 and 27.
* Science will need to move off Nov 27.
* Shipments from Puntareans -
* Samples?
* Agent services / dry ice / LN2 / packaging?

**Post-Cruise**:

1. Actions departing ship. LABELING all items before demob. Prevent loss of gear.
2. UNOLS cruise evaluation [Chief Scientist & Master]
3. Reports to foreign government/State Department [required for work in EEZs]- n/a
4. Data delivery [shipboard & Jason].
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](http://www.sssg.whoi.edu/sssg/pdf/cruiseData_v3.pdf)