

R/V *Knorr* Cruise KN 209-02

SNAPMORE –

Searching for **NAnoparticulate **P**yrite at the **M**id **O**cean
Ridg**E****

October 16 – November 10, 2012

NDSF facility: ROV *Jason II*

Project and Dive Days

This cruise was funded by NSF MGG grant “Pyrite nanoparticles are a kinetically stable iron source to the ocean” (OCE-1131109) to George W. Luther.

Departed Ponta Delgada, the Azores, Portugal on October 16, 2012 and arrived in Charleston, SC on November 9, 2012.

Ten dive days were allocated to this grant.

An engineering dive was added by NSF / UNOLS for a total of eleven dives.

Another dive was added to recover Dr. Ruth Curry’s mooring 300 nautical miles south by southeast of Bermuda (November 5).

| Site | LAT(N) | LON(W) | Depth (m) |
|-----------|------------|------------|-----------|
| Rainbow | 36° 13.8' | 33° 54.14' | 2260-2350 |
| TAG | 26° 08' | 44° 49.6' | 3635-3670 |
| Snake Pit | 23° 22.18' | 44° 57.28 | 3486 |

Good bathymetry from NSF MGDS existed only for Rainbow.

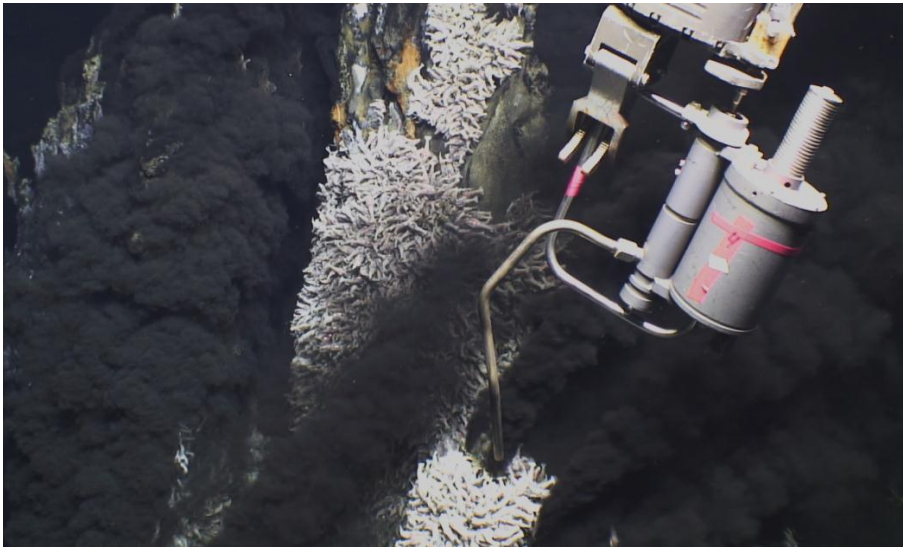
At TAG, the data available from Jason were off by 50 or more meters from our observations.

Snake Pit data were older and less reliable.

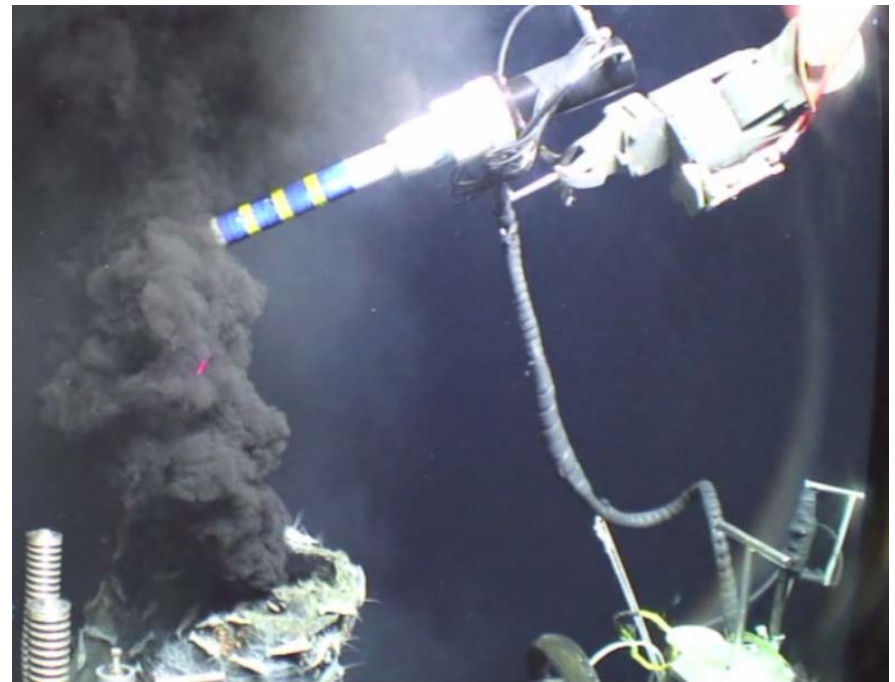


The primary goal was to obtain hydrothermal vent samples and ascertain the amount of nanoparticulate pyrite emanating from the hot fluids.

Chemical mapping of the rising plume was accomplished with titanium majors and *in situ* voltammetry.



Major sampling of focused flow vents

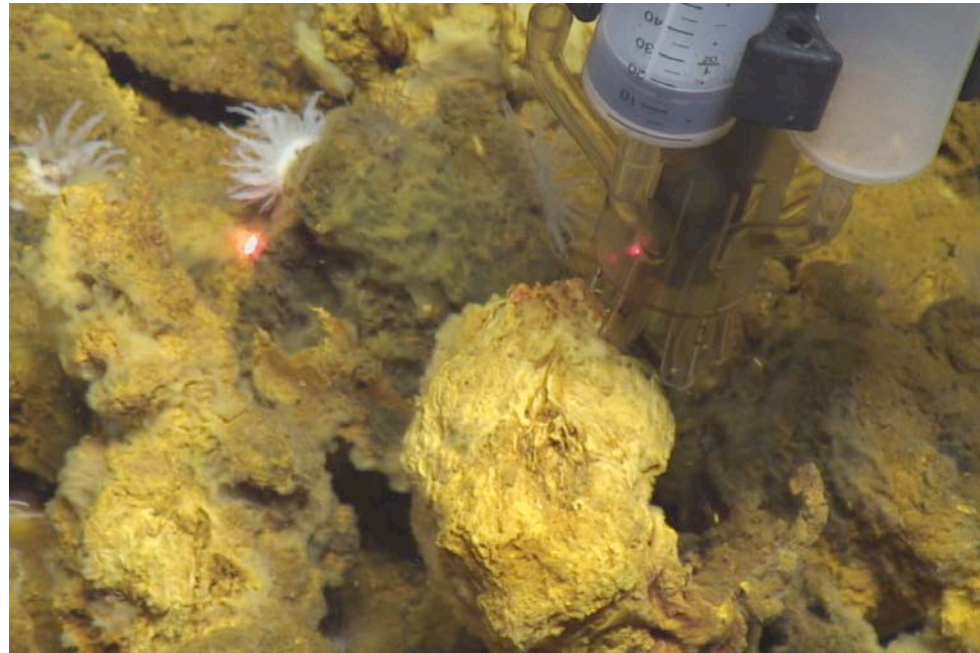


***In situ* voltammetry at TAG**

Secondary goals

Mat samples for iron oxidizing bacteria were collected by Dave Emerson using Chip Brier's new device as well as hand held devices from Sean McAllister of UD.

Slurp samples were taken primarily for shrimp and the surrounding water for Stefan Sievert and Tim Shank of WHOI and Katie Kalis of UD.



Tag Microbial mat sample site 2

Weather Problems cost 4 dive days

We only launched 6 actual Jason II dives at the 3 sites (1 at Rainbow; 3 at TAG and 2 at Snake pit) and 3 were abbreviated for a total of 73 hours 53 minutes of bottom time.

Because of poor weather, we only performed one dive at Rainbow and decided to go to TAG. We performed one dive at TAG and then went to Snake pit as poor weather followed us to TAG. This move cost 0.6 dive days due to weather as we returned to TAG after Snake pit, and this extra steaming time was not in the original cruise plan.

Swells from hurricane Sandy and another storm prevented dives from October 29 through November 1.

Jason II problems cost 1 dive day

First, Jason II experienced a malfunction on our 3rd dive (J2-666) as the fiber portion of the tether was compromised making it impossible to control Jason so the dive was aborted. The tether and a port horizontal thruster were replaced and Jason was launched in 16 hours. Unfortunately that was during good weather.

On dive 5 at TAG, Jason's port horizontal thruster had a hard ground and failed again.

Two more samples were taken and the dive was aborted. The thruster was repaired and the next dive #6 occurred about 12 hours later. Unfortunately that was during good weather.

Outreach

Three undergraduate students from the University of Delaware helped with all of our work. Each wrote a blog for the UD web site and contributed in many ways to the success of the cruise.

Bill Geppert of Cape Henlopen High School (CHHS), Lewes, DE also was aboard to do education and outreach including his CHHS students. He wrote many stories and items for his web site, which was being read by many in Delaware and elsewhere. He also conducted experiments with his students on the following topics: a drifter deployed at Snake pit, shrinking of Styrofoam cups, and pH measurements of waters from the CTD and major samplers. He got much time to interact with the Jason group so that he could take their information back to aid CHHS students in future robotic and ROV competitions.

Two web sites for education and outreach carried news of our cruise.

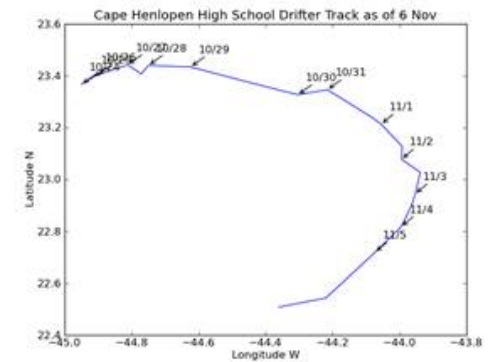
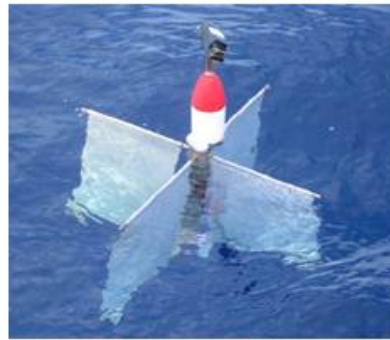
<http://oria.ceoe.udel.edu/>

<http://teacherweb.com/DE/CapeHenlopenSchoolDistrict/Geppert/apt1.aspx>

More outreach including Best of Video



**Satellite calls back to
the classroom**



**Drifter release and tracking of
ocean currents by Physics class**

<http://www.nefsc.noaa.gov/drifter/index.html>