



**NOAA Teacher at Sea
Melissa Fye
Onboard NOAA Ship HI'IALAKAI
April 4 – 24, 2005**

Daily Log
DAY : 1

DATE: Monday, April 4, 2005

HI'IALAKAI location and related conditions: Departure Delayed (Univ. Of Hawaii Marine Sciences Port)

Latitude: N/A

Longitude:

Visibility:

Wind Direction:

Wind Speed:

Sea Wave Height:

Swell Wave Height:

Sea Water Temperature:

Sea Level Pressure:

Cloud Cover:

SCIENTIFIC LOG OF THE DAY:

The HI'IALAKAI is equipped to perform many operations while sailing the area around the Northwest Hawaiian Island Chain. This mission will involve the use of multibeam sonar equipment to map the nature of the sea floor around the island chain, scuba divers will replace a buoy system which measures many things including the occurrence of photosynthesis in the water, and CTD drops will occur multiple times. A CTD, or Conductivity, Temperature, Depth device measures the depth, salinity, and temperature of ocean water. The boat is stopped in order to drop the device from a crane so it can measure the levels of these categories and that information is used to support multibeam sonar operations.

I will be observing scientists at work and interviewing members of the HI'IALAKAI throughout the next 3 weeks. I will be trying to relate the knowledge I gain to my students' science and math standards in Virginia. The information I gather on board will be available to NOAA and my 4th grade students at Ashburn, Elementary in

Ashburn, VA.

PERSONAL LOG OF THE DAY:

Sunday evening: I arrived at the HI'IALAKAI on Sunday late afternoon and met a few of the hands, including the Chief Engineer and Medical Officer. Next, I met the Executive Officer who helped assign me a room onboard. I simply unpacked and grabbed something to eat with the Medical Officer. Later that evening, I met the Chief Scientist on board and then I retired for the evening. I had a hard time sleeping, in anticipation of the next day's events! It was soon dark so I planned on touring the vessel the next day in the daylight hours. It is much larger than I anticipated and a little daunting to someone who's not familiar with ships.

Monday: Our departure was delayed (originally set for 9 AM) and pushed back to 4:30 PM due to problems with a boat generator needed for a small research vessel that is vital to the studies of the scientists.

Throughout the day I helped the scientific crew pack equipment for the trip. We tied down computer equipment in the dry lab, packed foam pieces around monitors, and cut non slip mats to put under other equipment. Everything that is not bolted down to the ship needs tied down to brackets on the wall. The Executive Officer debriefed us on rules and drills for the cruise. Much of the day was just spent waiting for departure from Honolulu.

QUESTION OF THE DAY for my 4th grade students:

What are the names of all the oceans on our planet and which ocean is the largest?

DAY : 2

DATE: Tuesday, April 5, 2005

HI'IALAKAI location and related conditions:

Latitude: 28.5 N

Longitude: 49.3 W

Visibility: 10 nautical miles

Wind Direction: 42

Wind Speed: 16 kts

Sea Wave Height: 3 feet

Swell Wave Height: 3-4 feet

Sea Water Temperature: N/A

Sea Level Pressure: 1021 mb

Cloud Cover: 3/8 SC, AS, Ci

SCIENTIFIC LOG OF THE DAY:

Today's scientific goals involve running survey lines at Nihoa. Survey lines will begin at the 12:00 position and run counterclockwise one and a quarter times at Nihoa. The ship will be using its multibeam sonar equipment to do this and it will in turn fill in missing data to complete benthic habitat maps of this area.

A formal in-service was given by senior surveyor, Joyce Miller, on multibeam sonar equipment. Some of the interesting facts from that presentation are provided below.

There are 3 multibeam sonar devices available for use on the HI'IALAKAI.

Sonar concepts from the in-service: An echo sounder sends sound down to the sea floor

and then back up. A single beam echo sounder sends a pulse out that comes back to 1 point on the ship. The center of the beam right under the ship, or swath, is termed nadir. Nadir is the shortest distance between the sensor and the location of the beam.

Ensonification is energy within the main part of the beam pattern which radiates toward the sea floor. Decibel is a unit used to measure the relative strength of a signal. Beam width is an angle that defines the main part of the energy that is radiated within a 3db solid angle. The footprint size beneath the sonar beam changes as the water gets deeper because it comes out of the ship at an angular direction. The deeper the water, the less accurate the information will be from the beam because the footprint pattern below the beam gets larger. A narrow beam echo sounder ensonifies a smaller area, so it gets more accurate information because of its narrower angle. A transducer is a device that converts electrical energy into sound energy and vice versa. The "ping" is the sound going down the beam. The frequency is the number of times per second that the same waves of sound repeat itself (vibrations per second). The pulse length, or duration of outgoing pulses of the sonar equipment, in part determines the system's resolution. The shorter the pulse length, the greater the resolution.

Other facts: The transducer range, or how far the sound is effectively transmitting, is determined by a number of factors, including; frequency, transmit power, beam width, transmit pulse length, received bandwidth, absorption, ocean floor composition, and noise level (heavy rain). In summary, high frequency sonars with narrow beam widths provide the highest vertical resolution. If you need both range and resolution, pick a medium frequency sonar to do the job.

What is being measured then? The 2-way travel time of a sound wave and this information is converted to distance. The speed of sound in water ranges from 1450 meters/sec to 1550 m/sec. CTDs, or Conductivity, Temperature/Depth devices are dropped at intervals off the side of the ship daily because the information they gather are the most accurate way to get sound velocity data and is needed when multibeam error sources are being defined.



Multibeam concepts:

Side scan sonars are sonars that are towed behind a boat. Backscatter is the term for when the sonar signal provides information about the character of the sea bottom (smoothness, roughness, etc). Multi-beam sonars were first designed to provide information on depths and they just happen to also give information on backscatter. Benthic habitat maps are maps of the sea floor, so backscatter information is extremely useful and the goal of this expedition. To get good backscatter data, many factors need to be kept constant. The ship should be driven in straight lines and kept at a constant speed. Some of the area around the Hawaiian Island chain has already been mapped using this technology but there are many gaps to be filled in. The cruise aims to fill in more of that



missing information for the benthic habitat maps. Three multibeam are being utilized on this trip. Finally, it is important to understand sources of error in multibeam use. They consist of sound velocity or physical oceanographic parameters that influence the sound velocity structure. These include temperature, salinity, depth, and density, which are all recorded and gathered during CTD drops.

Changes in these parameters affect the multibeam because they are used to create a sound velocity profile.

PERSONAL LOG OF THE DAY:

I awoke to the hustle and bustle of the ship, as my stateroom is located a few doors down from the mess. After eating (I eat better here than I do at home) I attended a formal inservice presentation by the senior surveyor, Joyce Miller, on Multibeam Training. I took notes during her PowerPoint slideshow, to try to better understand the type of sonar equipment they are using onboard. The transducer on the sonar equipment turns electrical energy into sound energy and is sent down to the ocean floor. It bounces and scatters and provides data which is used to create a map of the ocean floor (a benthic habitat map). I also learned some new vocabulary words like nadir, ensonification, and beam width. We broke for lunch and after lunch I attended my first CTD cast on the deck and took some pictures. After noon the scientists met back in the forward mess lounge to finish the multibeam training. The rest of the evening was just left to typing logs, watching a movie, and resting. I am not assigned a watch schedule so I have been sleeping normal hours of 10 to 6am.

QUESTION OF THE DAY for my fourth grade students: Locate the ship using the latitude and longitude coordinates above. Remember "latitude" lines are fat (horizontal) and longitude lines are long (vertical).

What are the 5 major Islands of Hawaii? What does the word salinity mean? Would the Pacific Ocean or the Potomac River be measured for salinity, and why?

PICTURES OF THE DAY: CTD cast and retrieval pictures

DAY : 3

DATE: April 6, 2005

HI'IALAKAI location and related conditions:

Latitude: 21.6 N

Longitude: 3.3 W

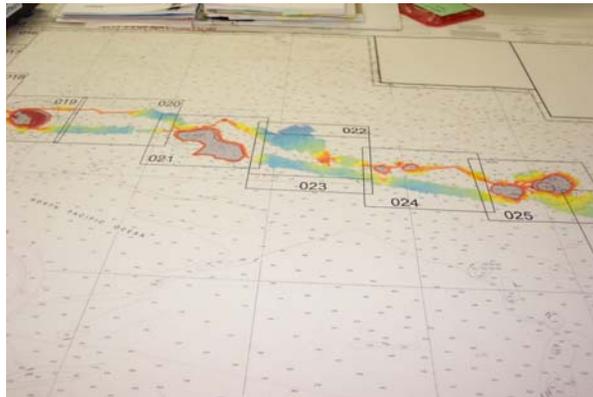
Visibility: 10 nm

Wind Direction: 55
Wind Speed: 14
Sea Wave Height: 1-3
Swell Wave Height: 5-6
Sea Water Temperature:--
Sea Level Pressure: 90
Cloud Cover:4/8 Cu, Ci

SCIENTIFIC LOG OF THE DAY:

Today's plan involved running sonar survey lines in a westerly direction en route to Necker Island (14.5 hours). Run at sea speed. CTD casts were conducted as needed, and I attended one at 1230. The senior surveyor informed me that CTDs are usually cast at least every 12 hours. I also spent the day interviewing various persons onboard to include the senior survey scientist, a deck hand/surveyor/, and the chief medical officer. At 1530, we arrived at our first point of reference, Necker Island, and the proceeded to continue survey lines westerly towards the French Frigate shoals for the next 9.5 hours.

The scientists on board are creating benthic habitat maps to support the Coral Reef Ecosystem Integrated Observing System under the direction of the Pacific Islands Fisheries Science Center and the National Marine Fisheries Service. Basically, several different plans have been laid out to determine fishing and no fishing zones around the island chain. The additional data collected on this cruise will hope those organizations determine the best plan for unrestricted and restricted fishing areas. Mapping boundaries may help to decide what fathoms (depths) to fish at or a longitudinal system may be used. Currently, lobster fishing is not allowed at all because they were all but wiped out in the past. The area around Necker, Brooks Bank, the French Frigate Shoals may eventually be entirely closed to fishing because evidence collected leads scientists to believe that that area may be a genetic gateway for species to the south.



PERSONAL LOG OF THE DAY:

I woke up around 6:30 am and proceeded to eat breakfast and to establish some times to interview people for the day, in between observing CTD casts and popping into the dry lab.

Soon after lunch I interviewed the Chief Medical Officer and got a tour of the on board hospital which is equipped to handle many kinds of emergencies. The chief medical officer is LTJG Mike Futch. While on board he is in charge of handling any emergencies that may occur. Most common emergencies include sea sickness and if someone needs treated for that he can prescribe medication, administer shots, and treat dehydration that may occur from people regurgitating. He likened sea sickness to the feeling you would get if you were stuck on an elevator going up and down continuously

until you got sick. LTJG Futch is authorized to do any lifesaving technique, but he is also



in charge of handling medical questionnaires for members of the ship, weekly sanitation and safety checks, and handling inventory in the medical lab. Proximity to a port determines if a ship is assigned a medical officer (if more than 2 days from a port, then a med. officer is assigned), otherwise other members of the ship are trained for medical emergencies as well. LTJG Futch recommends anyone who would like a job like his to major in chemistry or

biology in college, attend physician's assistant school, and specialize in emergency programs. He is an employee of the United States Public Health Service (the Surgeon General is the leader of this group) which deploys medical personnel to all federal agencies including NOAA, Coast Guard, prison system, Indian affairs, to just name a few. He will spend roughly 200 days at sea this year and he comments that the best part of his job is getting see parts of the world that many others don't see, the pay is good, and you get to function almost like your own boss because there is usually only one or two at most medical officers assigned to a ship.

I then proceeded to the science lab to get a first hand look at the computer system where data is filtered into from the onboard sonar systems. The senior surveyor and another surveyor spoke to me about the details aforementioned. I next interviewed Joyce Miller, Senior Survey Scientist, about her background and duties. Her job is to plan surveys, train new surveyors, and process data. She is at sea for 60-150 days a year depending on the projects she is working on. She comments that her most important piece of equipment is the computer and that any students who might be interested in this type of career should study oceanography (physics, biology, chemistry, geology) and heavily concentrate in computers. She feels a surveyor should be flexible, because things often don't go according to plan, and that this job offers a lot of challenges and movement.

Eventually I attended the launch of another CTD cast and ate lunch. The ship hasn't stopped, except for the occasional CTD cast for 30-40 minutes, because our late start has put us behind and there are 2 contractors aboard who need to be dropped off by a certain date at one of the islands to catch a plane. The afternoon was spent writing logs and lesson plans. Finally, I will go up on the bridge to interview the Operations officer and other officers employed by NOAA so I can give my fourth grade students a sense of the various jobs and people needed aboard a research ship to make it run smoothly. I am happy to report I don't seem to be sea sick at all, which makes me very happy, because many of the people on board are still trying to get their "sea legs!" To this point the seas have not been very rough though!

QUESTION OF THE DAY for my fourth grade students: The scientists on board are compiling data to create benthic habitat maps. What does the word benthic mean? What could maps like these be used for in the future?

PICTURES OF THE DAY: Medical Officer/ Benthic Map

DAY : #4

DATE: Thursday, April 7, 2005

HI'IALAKAI location and related conditions:

Latitude: 43.0 N

Longitude: 20.0 W

Visibility: 10 miles

Wind Direction: 120

Wind Speed: 12 kts

Sea Wave Height: 2-3 feet

Swell Wave Height: 3-5 feet

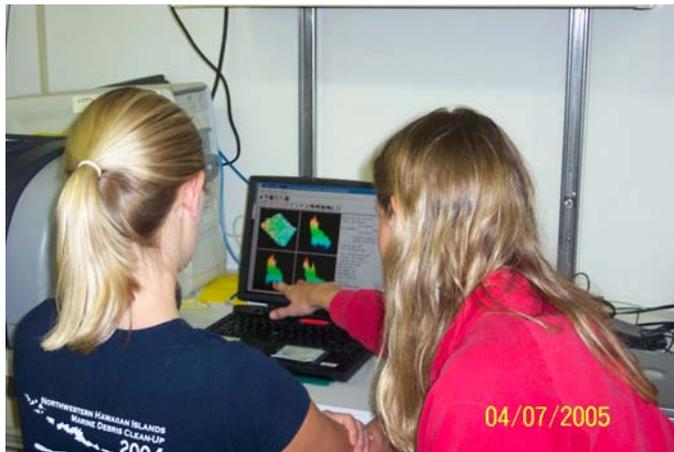
Sea Water Temperature: 23.5 Celsius

Sea Level Pressure: 1022.0

Cloud Cover: 7/8 Cumulonimbus, Ac, Ci

SCIENTIFIC LOG OF THE DAY:

Early this morning the HI'IALAKAI arrived at Shark Island to conduct a 500 m CTD, (Conductivity, Temperature, and Depth) measuring device, at a location of 50.2 N and 24.8W for about 1 hour. The ship then traveled on towards a launch site for the AHI research boat. In the afternoon the AHI research vessel was lowered into the water so that the chief scientist, Scott Ferguson, and other scientists could run



engineering tests on it before using it for a sonar mission. By mid-afternoon the AHI, which stands for Acoustic Habitat Investigator, was once again lowered into the ocean to begin running survey lines closer into the more shallow, shoal areas surrounding the French Frigate Islands. The surveys were run at 7 knots. The AHI boat looks much like an orange lifeboat but has a metal cabin on top which houses a range of computer monitors and a sonar system to take in data about the ocean floor. That data was then transported back onto the HI'IALAKAI to be processed. Inside the ship, GIS, or Geological Information Systems scientists, like Emily Lundblad, process saved data on the computers in the drylab on board. They take one swath of data at a time (think of a swath of data as a line of data -the ship basically runs lines across the ocean much like a lawnmower mows a lawn-trying not to leave any gaps) and edit it on their monitors. The scientists are looking for errors in data which show up as points or scatters of "dots" for

lack of a better word, on the swath. The swath is 3 dimensional on the screen and the scientists put 4 different vantage points of the data on the monitor. Carefully, outliers of data, or tiny dots of color that lie outside of the more solid path, are deleted. The outliers, or errors, in this case are usually due to noise pollution. A school of fish, drilling, or a boat engine can cause extra noise which is picked up by the sonar system, and needs to be edited out of the data. The ship continued to run its own survey lines with its sonar system attached to the hull of the ship.

PERSONAL LOG OF THE DAY:

Today I awoke after a good night's sleep. My stateroom is on the lowest level towards the back of the ship. It is the noisiest room because it is near the cranes that operate, the mess, and engines, but it rides the smoothest. This means that it rocks the least out of any of the rooms on board because of its location. Good news to me! The higher up and more forward you go on the ship, the more the boat sways. There are handrails in all the hallways, bathrooms, decks, etc. so you can hold on while walking on the ship. I spent the day interviewing more members of the ship, to include the Executive Officer, a deck



hand, and a scientist. I stationed myself on the upper deck to watch the AHI research vessel being deployed into the ocean for tests, stood on the bridge for awhile and looked out at La Perouse Pinnacle (23 degrees 46'N, 166 degrees 16'W) a volcanic rock that rises out of the Pacific that is so steep and rugged that it is practically inaccessible. Later, I situated myself in the drylab to observe the scientists editing data.

Then, right before dinner, I gave a presentation to the officers, crew, and scientists in the forward mess about the Teacher At Sea Program and what it entails. I presented a picture of my class, which is posted on board the HI'IALAKAI, and received a lot of feedback. Finally, after dinner, I visited the ship's store for the first time, run by ENS Amy Cox and spent the evening typing logs and watching video from a previous diving cruise, whereas the scientists were studying the ecosystem below the ocean.

QUESTION OF THE DAY for my fourth grade students: After reading the information under the science log, you need to better understand what an outlier is in data collection. Ask everyone in the class to write their age on the chalkboard. Also, include the teacher(s) age in the data, or information, collected on the chalkboard. Make a graph of the data (remember to include a title, x & y coordinates). When you are finished you should notice most of the data is close together but a few pieces of data are much different, or lie outside of most of the other ages. What data is the outlier(s) in the class graph of ages? How can outlier data affect an experiment?

PICTURES OF THE DAY: Scientists processing and editing data on a computer in the

drylab/ Research vessel AHI

DAY : Log #5

DATE: Friday, April 8, 2005

HI'IALAKAI location and related conditions:

Latitude: 23*50.0 North
Longitude: 166*18.7 West
Visibility: 10
Wind Direction: 120
Wind Speed: 20 knots
Sea Wave Height: 1-2 feet
Swell Wave Height: 2-3 feet
Sea Water Temperature: --
Sea Level Pressure: 1022.1
Cloud Cover: 4/8 Cumulonimbus, Ac
Temperature Outside: 24.5 degrees Celsius

SCIENTIFIC LOG OF THE DAY:

The HI'IALAKAI continued running survey lines laid out by scientists across the Pacific Ocean to add to data for the creation of benthic habitat maps. Approximately 10 AM this morning several scientists deployed the AHI research boat with 2 computer engineers aboard from our ship. The engineers were on board to get the new sonar system up and running and correct any glitches as they occurred. Their services did not require them to be on board for the whole cruise, so they went on the AHI this morning to Tern Island to rendezvous with a small plane to fly them back to Honolulu. I began interviewing Scientist Kyle Hogrefe in the dry lab and he showed me a slide show regarding the GhostNet project and the subtropical convergent zone. The projects concern the studies of winds and currents converging in the Pacific Ocean, sometimes coming together near the Hawaiian Islands, which entangles and clumps debris from humans (fishing nets, Bic lighters, toothbrushes-things littered into the sea) and damages coral reefs and kills marine life, choking or strangling them.

Many dead sea animals have been found, the cause of death due to their bodies being full of garbage like lighters and plastics, which ends up getting entangled in their organs or choking them. Mr. Hogrefe works as a Marine Debris Specialist and often goes on diving trips which reclaim some of the pollution that endangers ocean ecosystems. An hour later I boarded a shuttle boat with the Commanding Officer (CO),



a deck hand, and chief boatswain to also go to Tern Island and take a tour of the bird, monk seal, and turtle refuge, run by the Fisheries Dep't (Dep't of Interior) on the island. Jennifer, the manager of the sanctuary, led the CO and me on a tour of the half mile long island, which is nothing more than a few research barracks, a landing strip, and thousands of birds. The studies they are conducting for Hawaii's bird population proved to be very interesting.

At this time, a manager and 3 volunteers are stationed on the island for a minimum of 4 months at a time to count bird eggs, tag chicks, and count the adult species. Tern Island bird sanctuary has the largest collection of data in the world on the species of birds which spend their lives flying over the ocean and which are indigenous to the Hawaiian Island Chain. The data has been collected for over 30 years, the reproductive rates of the birds are improving, and the work there will lead to the Albatross bird being put on the endangered species list. More than 90 percent of Hawaii's bird population uses the island as a mating area. The birds which reproduce on Tern, once adult, may spend up to 4 years flying over the ocean without ever stopping and their bodies have a way for the bird to rest or sleep while in flight. We learned about adaptations, like a waterproofing gland at the base of the bird's body to protect them from ocean water, and we also saw a monk seal, and 5 huge sea turtles. A binder was also given to me about a unit of lessons called "Navigating Change", involving the Northwestern Hawaiian Island Chain that can be used to teach respect and understanding of the ocean and environment to 4th and 5th



graders. It was an invaluable gift! We then boarded the shuttle back to ship for the 15 minute ride across the ocean. Returned to the HI"IALAKAI at approximately 4:30 PM. A CTD cast was made (Conductivity, Temperature, Depth measurement in the ocean) at approximately 6 pm. Deck hand/Surveyor Jeremy Taylor lead a group of new surveyors through the steps to conducting a cast and retrieving the data sent up through the cable. Survey lines continued to be performed by the ship at 7 knots.

PERSONAL LOG OF THE DAY:

I was very busy today and it was the most exciting day of the trip so far. I arose to eat breakfast and send out my computer logs, answer emails, and send pictures to my class via the internet. I soon interviewed scientist Kyle Hogrefe aboard the ship and learned a lot about marine debris, as mentioned in the science log above. I then boarded the shuttle boat to Tern Island, watched the computer engineers take off in their small Cessna plane and took a fantastic tour of the place. The bird sanctuary teemed with thousands of birds! As soon as you stepped foot on the island, you saw thousands of birds flying and roosting below. Literally thousands of birds blanketed the entire island except for the landing strip in the middle.

The entire place is covered with bird feces and I was rightfully inducted as a visitor when a bird pooped on my leg! Ha Ha!

There are many interesting species of birds living on the island and the 4 people living there are tracking the reproductive rates of the birds. The sounds the birds make are actually the same sound bites used in the movie, "The Birds!" After a great tour of the place, I saw my first monk seals and gigantic sea turtles and took many pictures. After



returning to the island I spent the afternoon learning how to edit data on the survey computers, so I could help the survey scientists, and I told many members of the crew about the trip to Tern Island since only 4 of us had permits to go. It was quite an informative and exciting day. It was energizing to ride across the ocean on a raft type engine boat and see the coral reef beneath!

QUESTION OF THE DAY for my fourth grade students: If a small plastic bag was found floating in the ocean, and a bird or shark went to eat it, what do you think that small bag looks like to the sea animal (what ocean animal)? After reading the information above, why is it important for humans to recycle?

PICTURES OF THE DAY: Pictures from the sanctuary at Tern Island

DAY : Log #6

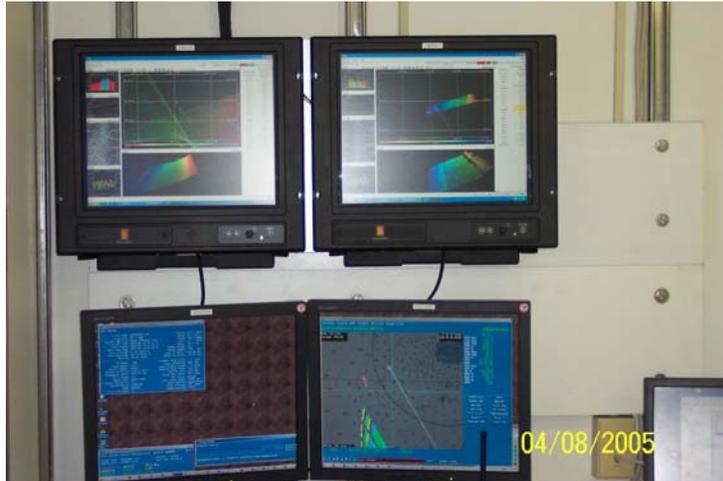
DATE: Saturday, April 9, 2005

HIIALAKAI location and related conditions:

Latitude: 23 degrees 41.9 North
Longitude: 166 degrees 16.4 West
Visibility: 10 nautical miles
Wind Direction: 70
Wind Speed: 7
Sea Wave Height: 1-2 feet
Swell Wave Height: 3-5 feet
Sea Water Temperature: ---
Sea Level Pressure: 1019.9
Cloud Cover: 3/8 Cu, Ci
Temperature outside: 24.4 Celsius

SCIENTIFIC LOG OF THE DAY:

As survey lines continued through the night, the Chief Scientist Scott Ferguson, Joyce Miller, and Jeremy Jones readied the AHI (Acoustic Habitat Investigator) research boat for deployment. Around 7:30 this morning, the 3 boarded the vessel and to engage in more sonar surveying. At noon a shuttle boat was launched with survey scientist Emily



Lundblad aboard, to meet up with AHI so she could be trained in using the sonar system aboard the AHI. Scott Ferguson then returned to the HI'IALAKAI. The afternoon led the ship divers to take out another shuttle boat so that a proficiency dive could be conducted. Around 5:00 pm the AHI and shuttle boat were brought back into the ship and tied up for the night.

PERSONAL LOG OF THE DAY:

Much of this day was spent interviewing personnel while I began to edit data from the swaths taken by the ship's multibeam sonar system. It can take an hour or more to edit at noise pollution from just one file of data. An exciting part of the day included seeing a humpback whale in the ocean. It came very close to the ship. About every 10 minutes its blowhole (spouting water) would appear at the surface along with its tail. It only surfaced three times until it was too far off to see anymore. I finished editing data until dinner time and then succumbed to doing laundry on the ship!

QUESTION OF THE DAY: Using your science book or another resource, find the definition of a mammal. Is a whale a mammal? Why do you think it comes to the surface every 10 minutes?

PICTURES OF THE DAY:

Sonar computer system on board in the dry lab.

DAY : Log #7

DATE: Sunday, April 10, 2005

HI'IALAKAI location and related conditions:

Latitude: 23*36.3'North

Longitude: 164*43.0'W

Visibility: 10

Wind Direction:90
Wind Speed: 14 knots
Sea Wave Height: 2-4 feet
Swell Wave Height: 5-7 feet
Sea Level Pressure: 1018.8
Cloud Cover: 2/8 Cu, As, Si
Temperature outside: 24.4

SCIENTIFIC LOG OF THE DAY:

The plan of the day was to arrive back at Necker Island around 8:00 AM. (We were traveling back forth often between the middle of the island chain). Around 8:30 AM the AHI research boat was deployed to run survey lines around the more shallow areas. 9:00 AM brought the deployment of the HI #1 speed boat into the sea. The purpose of its voyage was to replace a SST buoy (Sea Surface Temperature buoy) and anchor an ODP (Ocean Data Platform) at Mokumanamana. I came along to photograph the work put in to these diving operations.



The transport was rough as it was as warm as normal, and the seas were very choppy. We arrived at the rock outcropping, and using GPS navigational systems, located the coordinates for where the ODP was to be located on the sea floor. Divers prepared themselves (Scientist Jeremy Jones, Kyle Hogrefe, and Joe Chojnacki, along with ENS Sarah Jones) and all 4 descended about 75 feet under the water to find the device. After



30 minutes they resurfaced unable to find the ODP. They came aboard and regrouped.

A school of dolphins encircled our boat while tactics were being discussed. In effort to conserve air and because the current was strong and pulling them under the water, they decided to only send 2 divers to try to locate the ODP a second time. Joe Chojnacki and Jeremy Jones resurfaced again after the second try

only to be frustrated. The pinger was losing and gaining pings erratically and was found to be useless.

In a last attempt the driver of our boat, Keith Lyons, decided to drive the boat over top of

the boat's GPS coordinates, instead of referring to the diver's handheld GPS, and asked the divers to put the pinger right into the water to see if they picked up any signal. The pinger again was unreliable. Finally, Joe Chojnacki stuck his head over the boat, and looking through his snorkeling mask saw the ODP right below us! Kyle Horgrefe and ENS Sarah Jones scrambled to gear up and went below to tie off a buoy to the ODP so they could resurface and know its location. The last dive required 3 of the divers to replace the ODP with a new data platform. An ODP gathers information but that information can only be used once it's been retrieved from the ocean's bottom; unlike a Sea Surface Temperature Buoy which can relay information in real time because it stays on the surface and satellites receive the information all the time. The divers connected a bag, like a balloon, to the new ODP to move it into place and reposition it over the former data platform. The dive was completed but air tanks were low so we drove back to the HI'IALAKAI and exchanged air tanks, dropped off ENS Sarah Jones, and myself. The 3 divers continued on to replace a SST buoy. I didn't stay aboard for the remainder of the dive because of the rough seas and I was freezing because I didn't have a wet suit.



PERSONAL LOG OF THE DAY:

I awoke and ate breakfast. I then began to prepare to go on a dive operation with 3 scientists and ENS Jones this morning. I slathered on SPF and a bathing suit, shorts, and a rash guard (thin shirt often worn by surfers as protection from salt water irritation). I donned a hard hat and life vest and borrowed a snorkel and fins from members onboard in case we were in shallow enough waters to snorkel and so I could see the divers working.

We loaded the HI #1 speed boat with tons of equipment and were lowered to the ocean on a pulley system. The sea was extremely rough and the boat finally broke free from the ship to the rock outcropping where the dives were to be performed. The rock outcropping is nicknamed Lincoln's Head because the side view looks like Lincoln's profile. We arrived and performed the diving operations aforementioned in the science log. It was exciting



to see the work being done and how precarious diving can be. It requires a lot of equipment and effort, especially when weather conditions are less than ideal.

Dolphins swam right up to the boat at one point and the divers saw sharks down below. They assured me they were just curious and not very big sharks! Other than that the divers said we were in too deep of water to snorkel and the water was churning because of underwater currents. I couldn't dive so I sat onboard and photographed the trip and proceeded to get wet from sea spray. Tern birds flew overhead the entire time biting at the buoy, lines, antennae on the boat, and the air bubbles that surfaced from the divers. The birds mistake anything out of place for food. Because I wasn't doing the dive work I got very cold and decided to return to the ship when we dropped off ENS Sarah Jones.

I didn't get to snorkel this day but hopefully I'll have another chance in the next 2 weeks. I spent the evening trying to warm myself and recover from the bumps and bruises incurred from getting on and off the HI#1. Everything is very slippery on those boats and it's easy to lose you balance. Plus, every time we ride up next to the ship, we get doused with water coming out of the bottom of the ship.

QUESTION OF THE DAY for my fourth grade students: The 2 devices (the SST buoy and the ODP) are put in the ocean by divers so that scientists can gather information about the conditions in the ocean over a long period of time. By now, in class, you are beginning to learn about different ecosystems in science class. Cause and effect: What are some examples of conditions that could change in the ocean ecosystem that could be discovered from the data being collected by these buoys (name at least 3)? Try to think how weather or man can affect an ecosystem. Here is an example to get you started

1. ocean temperatures could gradually be getting warmer..... killing the coral reef.....loss of habitat for fish
2. (hint: salinity (saltiness))
3. (hint: ocean water currents)
- 4.

PICTURES OF THE DAY: Dive expedition at Lincoln's Head; Lincoln's Head (volcanic rock) near dive site.

DAY : Log #8

DATE: Monday, April 11, 2005

HI'IALAKAI location and related conditions:

Latitude: 23 degrees 44.4'N

Longitude: 166 degrees 19.1'W

Visibility: 10

Wind Direction: 120

Wind Speed: 20

Sea Wave Height: 2-3 feet

Swell Wave Height: 3-4 feet
Sea Level Pressure: 1017.9
Cloud Cover: 6/8 Ac Cu Ci
Temperature outside: 24.4 C

SCIENTIFIC LOG OF THE DAY: Early before dawn the HI'IAKALAI departed Bank 66 and headed back toward the French Frigate Shoals. Upon reaching the French Frigate Shoals, the AHI research boat was launched. Lead scientist Scott Ferguson, surveyor Jeremy Miller, and scientist Jonathan Weiss clamored aboard the AHI for another day of survey with multibeam sonar equipment fixed to the bottom of the AHI. The AHI can get into the much shallower shoals and atolls to survey the ocean bottom. They surveyed until late in the afternoon near 23 degrees 49.6' North and 166 degrees 18.9' West. Around 8:30 AM, a second boat, the HI#1 speedboat was deployed towing a CREWS buoy.

Lead scientists for this operation were Kyle Hogrefe and scientist Jeremy Jones, Executive Officer John Caskey, and Joe Chojnacki also accompanied him. This type of buoy is tall and slender and its acronym stands for Coral Reef Early Warning System. One system on board the buoy measures the amount of photosynthesis being made by organisms living in coral in that area of the water. It helps scientists determine if they reef is healthy or not. While on the dive to install the buoy, Jeremy Jones was underneath the buoy to tie it off and a strong current pushed him into the buoy anchor. He soon resurfaced and scrambled to get back in the water because a 9 foot Tiger Shark was seen nearby. He was brought back to the HI'IAKALAI and examined by the Medical Officer's onboard. Because this work can be dangerous, the ship crew and scientists are always thinking about safety.

Hogrefe and the others returned to the dive operation site to complete the work and to tow in the old CREWS buoy. At 4:45, the AHI research boat returned to the ship and at 5:45 the HI#1 also returned for the night. They were both lifted up on board using a series of cranes. The HI'IAKALAI resumed running benthic habitat mapping lines across deeper parts of the ocean. I spent the day on a guided tour of the ship's machinery in the engineering department below decks. Lobo Thomala, Chief Engineer, guided me through the masses of generators, compressors, ac units, fire fighting equipment, converters, propulsion units, etc. that make the ship sail. It was interesting to see the main control console, which contained old and new (computerized) versions of controlling the ship. There are several backup ways of steering the ship if the computer systems go down, which would be done manually by the chief engineer in the hull of the ship. The rudder could even be controlled by a system of chains if all else fails. The "brain" of the ship is integrated and controlled by computer systems, and actually some of the systems are DOS, which the chief engineer can read. GE still makes the parts to replace the DOS system so it will remain that way.



PERSONAL LOG OF THE DAY: After eating breakfast this morning, I sent out my logs and emails to students and other interested parties. I attended a tour of the working parts of the ship, lead by Chief Engineer Lobo Thomala. I was shown the water making unit



for our drinking water, air compressors, main control console, port power converter, main propulsion unit, etc. It is very tight quarters down below, which actually rides 16 feet below the water's surface. For some areas you have to wear protective ear wear because the engine room is so loud. It is also very hot in some areas and very cool, air conditioned in the computer areas of the ship. There is fire fighting equipment in

every area. The amount of detailed work and responsibility heaped on the engineers was impressive to see. The Chief Engineer basically controls whether or not the ship sails, and was part of the last graduating class of American Marine Academy in Louisiana. He acts almost as a trainer now, working on a ship, training the other engineers, and moving on to another ship in about a year's time.

The engineer department on board is actually short handed right now, possessing only 4 engineers, rather than the normal six. They've commented that they are a "dying breed" and it is becoming increasingly difficult to fill positions. I also spent the rest of the evening editing swaths of data about the ocean floor bottom for the scientists and I took readings from the bridge and learned how to do the hourly bridge weather with the Operations Officer. Information on the cloud cover, temperature, sea heights, and pressure are measured (listed at the beginning of each log). The night brought on answering emails from students and a newspaper reporter.

QUESTION OF THE DAY for my fourth grade students: One important piece of weather equipment used on the bridge is a barometer and readings are taken from the barometer every hour. What does a barometer measure?

From the information listed at the top of this log, does a barometer measure the a) temperature b) cloud cover c) sea level pressure

What was the barometric reading for this log? _____

What can the barometric pressure tell a sailor about the weather? Think back to low pressure and high pressure warnings.....

PICTURES OF THE DAY: Main Control Console in the Engineering Department (in the bottom of the ship)

DAY : Log #9

DATE: Tuesday, April 12, 2005

HII'IALAKAI location and related conditions:

Latitude: 23°45'.9" N

Longitude: 166*18'.3"W
Visibility:10
Wind Direction:120
Wind Speed:11 knots
Sea Wave Height:1-2 feet
Swell Wave Height:2-3 feet
Sea Level Pressure: 1017.5
Cloud Cover: 6/8 Cu, Ac
Temperature outside:24.9 degrees Celsius

SCIENTIFIC LOG OF THE DAY: The ship arrived overnight near Tern Island in the Northern Hawaiian Island Chain. The AHI research boat was deployed early this morning again today to continue survey lines with its sonar equipment. Aboard the AHI were scientists Scott Ferguson, Joyce Miller, and Rob O'Connor. They returned to the HI'IAKALAI at approximately 1 PM to trade personnel, swapping Scott and Rob for Scientist Emily Lundblad and Jeremy Jones. The lead scientists are in the process of training the new scientists on how to use the sonar equipment aboard the AHI, and schedule people for half day trips at this time for training.

Meanwhile, back on board the ship, data from the multibeam sonar equipment continued to be edited in the computer lab. The edited swaths of data will then be compiled to form maps of the ocean floor. It's an ongoing process that will continue until the end of the cruise and back at labs on dry land. Scientist Kyle Ferguson, Joe Chojnacki, Rob O'Connor and I then boarded the HI#1 10m Speedboat, with BGL Keith Lyons in control, to drive out to the CREWS (Coral Reef Early Warning System) buoy that was installed on the reef just east of Tern Island yesterday. The scientists finished anchoring it permanently, using wire cutters and other tools to secure it, then basic plastic ties were added to the top of the buoy, near the measurement equipment, placed sticking up, to keep birds from roosting and defecating all over the buoy, which could make it ineffective for transmitting data through satellite systems.



After completing the task at hand, we were given permission to explore the ecosystem under La Perouse Pinnacle nearby. We snorkeled to discover white tip reef sharks, giant green turtles, chum fish, and coral acropora (table coral) below the water's surface at the rock outcropping. We returned to the ship some 15 minutes later without incident. While we were gone the ship continued survey lines NW and SE of the French Frigate Shoals and practiced the weekly fire and safety drills.

PERSONAL LOG OF THE DAY:

After breakfast today, I was invited to attend a trip to the CREWs buoy installed yesterday by Scientist Kyle Hogrefe. Plans got changed and we were delayed, not

leaving until 1:00. The seas were much calmer than my previous trip on Monday (seas were only 1-2 feet this day) and we boarded the speedboat. When we arrived at the buoy location, the 2 divers worked on securing the line while scientist Rob O'Connor and I looked on and snorkeled around them. The water there was not very deep (maybe 15 feet) but the current made it fairly cloudy, difficult to see through, and I was amazed and how strong the pressure was on your ears as soon as you dove down. You have to be careful when you dive or you can get a bloody nose from diving too deep. I got used to the snorkeling mask and at the end of the work we took turns getting on the CREWS buoy for pictures.

Once back on board the HI#1 speedboat, we were told over the radio that we could go snorkeling at La Perouse Pinnacle, only a couple miles away in the distance. What a great treat! We jumped in and immediately saw a thriving ecosystem below our feet. The underwater current wasn't nearly as severe in this location and it was almost protected from the rock outcropping towering above. La Perouse Pinnacle is a volcanic rock about 122 feet high and 60 yards long that is used by sailors as a landmark around the atoll. It is nearly inaccessible because it is so steep and rugged and its guano-coated (bird poop coated) outline resembles an old brig ship with billowing sails from a distance.

As soon as we dove in we saw 2 white tip reef sharks about 15 feet below. After being reassured they wouldn't bother us, I got comfortable and snorkeled around! The sharks were no more than about 6 feet in length and just swimming below. There was also a giant green sea turtle resting on the reef below and millions of fish and coral systems. Several rare table coral (coral acropora) were noticed and I took pictures of everything intermingling in this ecosystem.



An underwater cave was the main habitat of the shark, and two of the scientists swam in and out to see it. Fish darted in and out and the colors of the coral here were brighter and easier to see because of the lack of strong current. It was a fantastic experience! An adventure I didn't think I would ever get to do, and was pleasantly surprised! My students wanted to know if I was going to swim with the sharks while on this cruise and now I can tell them I sure did!

QUESTION OF THE DAY for my fourth grade students: The white tipped reef shark was one of the animals I discovered today in the coral reef ecosystem I was snorkeling in. Using a reference source:

- 1) list 3 facts about this shark
- 2) list the name of the reference source you used
- 3) draw a food chain for the shark like this example: white tipped reef shark----(eats)--

> _____--(eats)----> _____

ANSWER TO YESTERDAY'S QUESTION (Log 8): A barometer measures sea level pressure. The barometer reading from that log was 1017.9 (high). High pressure brings good weather, low pressure usually indicates a storm. The barometer reading is one of the most important pieces of equipment on the ship's bridge, and is checked every hour because if the measurements begin to indicate a change, the captain can prepare for a storm coming.

PICTURES OF THE DAY: Pictures of Scientists anchoring new CREWS buoy to ocean floor, snorkeling the ecosystem around La Perouse Pinnacle



Ms. Fye snorkeling.

DAY : Log #10

DATE: Wednesday, April 13, 2005

HI'IALAKAI location and related conditions:

Latitude: 23*48.6'N

Longitude: 166*18.8'W

Visibility: 10 Nautical Miles

Wind Direction: 120

Wind Speed: 14 knots

Sea Wave Height: 1-2 feet

Swell Wave Height: 2-3 feet

Sea Level Pressure: 1017.6

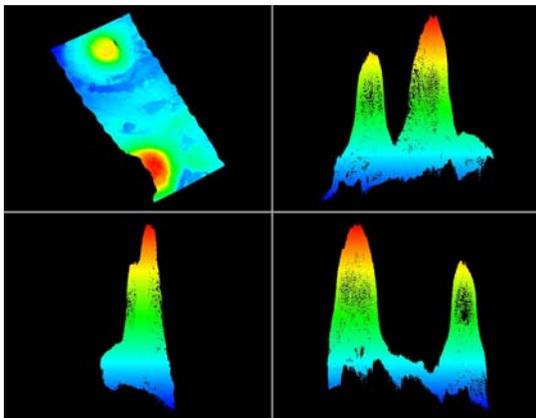
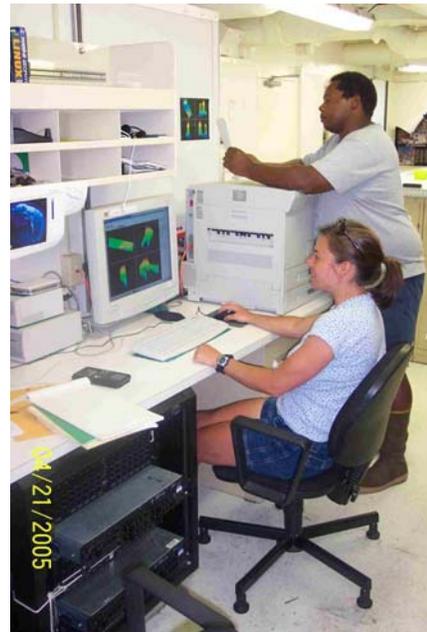
Cloud Cover: 4/8 Cu Clouds

Temperature outside: 25.6 degrees Celsius

SCIENTIFIC LOG OF THE DAY: At approximately 7:45 this morning, the AHI (Acoustic Habitat Investigator), research boat was launched from the side of the ship using the crane system. Three scientists were onboard to continue mapping the ocean floor using the sonar system attached to the bottom of the AHI. This work would take them until four o'clock this afternoon. Meanwhile, back on the HI'IAKALAI, the NOAA officers on board led meetings on safety and concerns, etc. with the crew and department heads.

The meeting lasted over 2 hours and gave the officers, engineers, and crew a chance to discuss problems, vent frustrations, and get routine meetings finished. The scientists were not involved in those meetings so the dry lab was full of scientists processing data from the ship's onboard sonar system. I helped edit data swaths (lines of data collected about the ocean floor) for several hours. It is interesting to note that the data that is collected from the multibeam sonar systems is information portrayed in number form. Those numbers are then represented on the computers screens as various degrees of color, depending on the depth of the ocean floor. Data is taken out that lies outside the path or swath (it is as if the ship is "mowing" lines across

the ocean to gather



Left: Underwater pinnacles found by the underwater mapping system on the HI'IALAKAI

information) because data like noise pollution is sometimes recorded (noise pollution can involve school of fish, etc.).

This day involved many people just sitting in the computer lab using their laptops to combine data into tables and mapping pictures. As the afternoon progressed, the AHI came back to the ship and was hoisted aboard once more by the cranes. CTD (Conductivity, Temperature, and Depth) casts were made twice throughout the day. The ship stopped to put the CTD device in the water and measure for this information. The information was used by scientists to verify their sonar data. Conductivity refers to salinity of the ocean water. The ship continued to run benthic habitat mapping lines all day long.

PERSONAL LOG OF THE DAY: I spent the day in the dry lab (computer lab) for the most part. I edited data for the scientists and interviewed three people on board. I interviewed Commanding Officer Scott Kuester, ENS Amy Cox, and GVA Greg Wells while on their watch on the bridge. Their watch schedule consists of four hour shifts on the bridge, watching the sea, recording weather data, and communicating with all hands about operations on the ship.

Commanding Officer (CO) Kuester is originally from Michigan and has been sailing for twenty years. His background involves a degree in U.S. Merchant Marine and he told me if someone is interested in a career in the NOAA Corps, they need to possess a bachelor of science degree. Related fields in calculus and physics are also helpful. CO Keuster has sailed many places including the Indian Ocean and the Gulf of Mexico.

All NOAA Corps employees have rotational land and sea assignments and there are 5 NOAA officers aboard this ship. Current assignments aboard this ship last for 2 years and then a land assignment will occur for a few years. The CO has had land assignments in Silver Spring, MD at NOAA headquarters. His overall responsibilities are to stand watch as needed, and he has the responsibility of insuring the safety of the ship and all those onboard, as well as working with the lead scientist to ensure the scientific mission is completed for each cruise. The ship also collects environmental data on the weather at sea, which is used by federal agencies.

CO Keuster gave me an overview of many of intricate devices on the ship's bridge, including the state of the art radar. I learned new terms like dead reckoning and nautical miles. Commanding Officer Scott Keuster recommended that anyone interested in a career in the NOAA Corps, should use their experience in college to gain more knowledge about computers. Diving knowledge is also helpful. In his opinion, a person for this job needs to adapt easily to stressful situations, know the meaning of teamwork, should be professional, and be able to live amongst others in close quarters.

I also interviewed ENS Amy Cox, the newest Corp officer to the ship, and GVA Greg Wells. ENS Cox is also originally from Michigan, and has training through the NOAA Corps as well as B.S. and B.A. degrees in Chemistry and Zoology. She has worked in Alaska aboard ships for the fisheries department; estimating catch of certain species, and population and reproduction rates of fish in that area. She enjoys her new sea assignment here in Hawaii and as an ESN she is responsible for using charts and GPS to map track lines, collecting weather data, maneuvering the ship, and for ship's morale (by running the ship store, providing movie selections for broadcast at night, etc.)

GVA (General Vessel Assistant) Greg Wells also spoke to me while on watch. His permanent home is Myrtle Beach, South Carolina and has worked for NOAA for 4 years. His previous occupation was as an EMT in Seattle, Washington. NOAA has provided him with training like Bridge Resource Management and licensing courses. He will spend roughly 200 days at sea this year working for NOAA and while onboard, has responsibilities of driving the boat, operating cranes, machinery, and CTD operations.

It was exciting to stand on the bridge with them at night. The bridge was completely dark except for the glow of the red lights from radar and machinery. The ENS and GVA also went through a series of very ritualized, historic direction language as they maneuvered the ship into mapping lines. The bridge has to be kept dark so that watch standers can see out into the ocean for any changes or danger that lies ahead.

QUESTION OF THE DAY: My cruise along the HI'IAKALAI has been fairly smooth so far, but keep in mind that the ship rocks back and forth (called rolling) all the time. If the seas (waves) were to get rougher the ship would roll port to starboard (left to right) and it might also begin to move up and down, which is called pitching. If the ship rolls 9 times in one minute in 1-2 foot seas, how many times will it roll in one hour? How many times will it roll in one 24 hour period?

ANSWER TO YESTERDAY's Question:

using a reference source find out more about the whitetip reef shark

- 1) list 3 facts about this shark: usually 5 feet long, diet includes lobster, crab, eels, reef fish cave is used as a habitat
- 2) list the name of the reference source you used: Sharks of Hawaii by Leighton Taylor
- 3) draw a food chain for the shark like this example: white tipped reef shark----(eats)--> eel(eats)---->reef fish

PICTURES OF THE DAY: Coral ecosystem; ecosystem underwater pictures; Underwater pinnacles found by the underwater mapping system on the HI'IALAKAI



DAY : Log 11

DATE: Thursday, April 14, 2005

HI'IALAKAI location and related conditions:

Latitude: 23*46.4'N

Longitude: 166*18.3'W

Visibility:10 n.m.

Wind Direction: 70

Wind Speed: 14

Sea Wave Height: 1-2 feet

Swell Wave Height:2-3 feet

Sea Level Pressure:1018.9

Cloud Cover: 3/8 Cu

Temperature outside: 26.4

SCIENTIFIC LOG OF THE DAY:

Today's operations involved launching the AHI once again, with 3 scientists onboard, to do more benthic habitat mapping around the more shallow areas of the French Frigate



Shoals. Mapping operations were cut short early today for a little rest and relaxation for the crew, scientists, and some NOAA corps members. Around two o'clock pm, the AHI was recovered and the ship launched speedboat HI#1 with 7 members of our ship to Tern Island for a barbeque. Tern Island, as mentioned in previous logs, is a bird sanctuary run by the Fisheries Service of the Department of Interior. In has anywhere from 6-14 personnel at a time counting, tagging, and collecting

data on reproductive rates of bird species on the island. The scientists and volunteers on Tern Island invited the HI'IALAKAI for some rest and good food, in turn for a tour of the ship. After the first shuttle was launched, it brought back 4 members of Tern Island to take a tour of the ship, and it then turned around and took 10 more of the crew to the barbeque. The shuttle ran all day, some members of the HI'IALAKAI also went fishing instead of visiting Tern.

At Tern Island, a tour was lead by the manager of the sanctuary, and after a feast of hamburgers and hot dogs and the like, we were lead on a snorkeling trip on the north side of the island. We were careful not to disturb the birds, and entered the ocean to snorkel the underwater ecosystem. Other scientists, Corps officers, crew, engineers, and myself, dove below the surface to see several colorful fish, a small whitetip reef shark, sea slugs, sea turtle, and a submerged barge. It was very clear and the inhabitants of the reef ecosystem were easily seen. The last shuttle returned to the ship around 6:30 p.m., and data editing and sonar mapping resumed on board.

PERSONAL LOG OF THE DAY: After breakfast this morning, I typed logs and answered email. By mid morning, I helped the chief engineer, below deck, do engine room check of all the machinery below. He showed me how to check the temperature readings and gages on the engines and systems. This type of check, is done three times a day to make sure all machinery is running smoothly. Where there were no gauges to be read, Lobo used a Raytek Thermal Sensor gun, to take readings through pipes. Next, I ate lunch and prepared for the trip to Tern Island. I borrowed snorkeling gear from several members of the ship and embarked on another great adventure. I never thought I would have had so many chances to see the underwater ecosystems of the Northern Hawaiian Islands while out to sea. It is wonderful to explore underwater, and it is new and different every time. The water was particularly clear near Tern and I took pictures of things like brain coral. Its name stems from the fact it looks like a brain and it was a bright green color. I also took pictures of the birds, like the albatross, concentrating this time on recording images of their adaptations (like beak shape and feet formation) to use in later lesson plans. It was a wonderful day and the snorkeling thoroughly wore me out by day's end.



QUESTION OF THE DAY for my fourth grade students:

Use a reference source.

- 1)What is the name of the wettest place on earth? (Hint: it somewhere in Hawaii.)
- 2)List the name of the reference source you used (this includes websites remember!)
- 3)The annual average rainfall of this place is 661 inches a year. How many feet of water is that? ___ How many yards? _____

ANSWER TO YESTERDAY'S Question:

If the ship rolls 9 times in one minute in 1-2 foot seas, how many times will it roll in one hour? $9 \times 60 = 540$ times

How many times will it roll in one 24 hour period? $24 \times 540 = 12,960$ times!

Imagine how many times the ship rolls when there is a storm at sea!

PICTURES OF THE DAY:

Ship HI'IALAKAI, Tern Island Bird Adaptations (many of the underwater pictures I am taking cannot be posted at this time because they are on film that hasn't been processed (not digital))

DAY : Log 12

DATE: Friday, April 15, 2005

HI'IALAKAI location and related conditions:

Latitude: 23° 44.6'N

Longitude: 166*22.6'N
Visibility: 10 knots
Wind Direction: 080
Wind Speed: 16 knots
Sea Wave Height: 1-2 feet
Swell Wave Height: 2-4 feet
Sea Level Pressure: 1020.1 mb
Cloud Cover: 3/8 Cu, Ci
Temperature outside: 26.8 degrees Celsius

SCIENTIFIC LOG OF THE DAY: The AHI (Acoustic Habitat Investigator) research boat was once again launched from the decks of the HI'IALAKAI this morning with



scientists Joyce Miller, Joe Chojnacki, and Jeremy Jones aboard. They set a course for 23*43.6'N and 166* 15.7'N. Their daily ritual involves mapping the sea floor using multibeam sonar technology (sound waves) in more shallow areas than the ship can pass over. While those persons were out to sea, editing of swath data continued in the onboard computer lab and the lead scientist worked out some

data involving conductivity readings. After lunch, the HI#1 10m speedboat was launched from the HI'IALAKAI to shuttle another scientist out to the AHI in a swap. (The AHI is a small research boat and isn't really suited for more than 3 people at a time). The CO, (Commanding Officer) and other members onboard accompanied scientist Kyle Hogrefe out to check on a buoy nearby and they then went scuba diving at La Perouse Pinnacle.

The ship resumed shipboard mapping throughout the afternoon. Around three o'clock PM, the AHI and HI#1 boats were recovered and brought back on board. Later that afternoon and into the evening, scientist Joe Chojnacki began Trackpoint II testing over the side of the ship. Finally, about seven o'clock p.m. the TOAD was fed on a cable line overboard for preliminary testing. TOAD stands for Towed Optical Assessment Device. Basically, it is two cameras and lights attached to a metal apparatus, which is used to ground proof the acoustic data that has been collected by the sonar systems. To break it down even more simply, the sonar system creates data in number form, about the ocean floor, which is then translated into colorful dots of data and made into a map. The sonar detects different heights of the sea floor, including atolls, pinnacles, and such.

The TOAD is a camera system which records pictures of the ocean floor to reinforce the data collected by the sonar system. The TOAD feeds real time images on film through its

cables directly into monitors in the dry lab onboard the HI'IALAKAI. While testing proceeded last night, myself and a few others gathered around to see images on the monitors of the sea floor below us. We saw huge table coral and fish swimming below. Benthic habitat mapping proceeded throughout the night.

PERSONAL LOG OF THE DAY:

I spent most of the day recording weather readings, interviewing three more scientists on board, editing data, and watching video from the aforementioned TOAD system. It was exciting to see the ocean floor teeming with life right below our massive ship.

Joe Chojnacki was interviewed today. He is a graduate student at the University of Hawaii, studying geomorphology. Joe is originally from Wisconsin, but grew up living overseas, the son of two teachers who taught abroad. His main responsibility on this cruise at sea, is to deploy the TOAD (towed optical assessment device) and assist with any diving operations on board. His work is primarily filming underwater to substantiate data being collected by the multibeam systems. He has also done work towboarding, an operation in which two divers are pulled (towed) below the surface to scan the ocean floor for debris or bottom type, for further investigation. He enjoys his job and graduate school work because he gets to help solve the puzzle about underwater geography and he is also getting to learn about other facets of the work, like sonar mapping and data editing. The tools he uses most often are the computer, dive and TOAD equipment, as well GPS systems (global positioning systems). He will attend one cruise out at sea a year while taking classes. Mr. Chojnacki comments that a person well suited for this type of career needs to be willing to take risks and be well motivated because it is a difficult lifestyle and not very well paid. There are no well defined career paths, so one must be willing to take opportunities as they arise, to persevere, and be curious about the things around them.

Sea floor mapping specialist, Alyssa Aaby is also onboard for this cruise. She originates from Portland, Oregon and is enjoying her first post graduate job. Her duties involve editing data collected from the sonar and putting the information together into a map. Alyssa is also learning new tasks, like the onboard mapping involved on the AHI. She has been working in Hawaii since August for HMRG (Hawaii Mapping Research Group), which is supported through grant funding by the University of Hawaii. Ms. Aaby has an educational background in environmental science and a graduate degree in GIS through Oregon State. She believes the best part of her job is getting to learn new tasks, like coming out to sea to help collect data while traveling across the Hawaiian Island chain.

Because she spends a majority of her time in front of a computer, she believes the long stretches of nonhuman interaction in front of the screen can sometimes be a drawback in this type of career. She credits a college advisor for helping her narrow down her career path and she believes that anyone interested in this type of career needs to take the path of a computer programmer in their studies. An ability to take an image and rotate it in your mind is also important. Alyssa works 9-5 hours while in her office on land but will travel to sea 5-6 times this year to visit places like Fiji and Papa New Guinea.

My final interview of the day was with Coral Reef Ecosystems Specialist, Jeremy Jones. Mr. Jones is originally from Indiana but has spent the last four years here in Hawaii. Like Mr. Chojnacki, he has worked as a towboard specialist, and has had jobs working in aquariums, a vet technician, and marine debris specialist. He possesses a bachelor of science degree in marine science and credits a high school library advisor with helping him to narrow down his field for college studies. He believes the travel is the best part of the job, and even as a teenager, he enjoyed studying the stars up above and the ocean down below. He has many responsibilities on this cruise; to include the repair and maintenance of the AHI research vessel, assist in dive operations, as a coxswain (driver of the AHI boat), and he is learning more about the collection and editing of the sonar data. Mr. Jones admits that this type of job has a "hurry up, and wait" mentality about it. In other words, someone who is interested in this type of career needs to understand that you must be flexible, think quickly in times of emergency, have infinite patience, and be a people person. You need to be able to adapt to living in close quarters with other people. Mr. Jones will spend 5-6 months at sea this year.

The interviews I have conducted have made me realize the infinite number of occupations in this area of science and I am looking forward to my future interviews this week.

QUESTION OF THE DAY for my fourth grade students: Multiple choice question!
All living things in an area, together with their environment, is called a (an)

-
- a) marine habitat
 - b) ecosystem
 - c) continental shelf
 - d) gulf stream

ANSWER TO YESTERDAY's Question:

- 1)What is the name of the wettest place on earth? (Hint: it somewhere in Hawaii.) Mount Waialeale, Hawaii
- 2)List the name of the reference source you used (this includes websites remember!)
Earth and Environmental Facts book
- 3)The annual average rainfall of this place is 661 inches a year. How many feet of water is that? about 55 feet How many yards? about 18 and 1/3 yards

PICTURES OF THE DAY: AHI boat

DAY : Log #13

DATE: Saturday, April 16, 2005

HI'IALAKAI location and related conditions:

Latitude: 23 degrees 48.7' North

Longitude: 166 degrees 19.5' West

Visibility: 10 nautical miles

Wind Direction: 110
Wind Speed: 10
Sea Wave Height: 2-3 feet
Swell Wave Height: 2-4 feet
Sea Level Pressure: 1021.0
Cloud Cover: 4/8 Cu, Ac
Temperature outside: 26.0 degrees Celsius

SCIENTIFIC LOG OF THE DAY:

Sunrise brought the morning launch of the AHI, Acoustic Habitat Investigator, once again. Scientist Joyce Miller and Jeremy Jones deployed the sonar research boat to 23 degrees 43.6' N and 166 degrees 15.7' West to map shallow areas of the ocean bottom. Throughout the morning and mid-afternoon, the ship, HI'IALAKAI, resumed running benthic habitat mapping lines; filling in gaps around the reef from previous runs. Scientists onboard continued editing swaths of sonar data in the computer lab (dry lab). By 1630, the AHI was recovered in the southern work area and lifted back onto the ship using the cranes. Ship based TOAD camera operations began at 1800 as the sun was setting. The TOAD was set down in the water off the aft deck. The camera recorded images as the ship drifted. Images of coral, sand beds, and small fish zipped by on the monitors. Scientist Chojnacki, commented he would email me some of the images at a later date, since we couldn't capture them any other way at the time. By 2300, TOAD camera operations concluded and the ship resumed benthic mapping around the outer circumference of the French Frigate Shoals.

PERSONAL LOG OF THE DAY: I awoke from a much calmer night at sea and felt refreshed! The day was spent on the ship, interviewing members of the NOAA corps and crew. I also helped edit pixels of data for the multibeam sonar mapping project ongoing in the dry lab. The following interviews were conducted aboard ship on the bridge:

The four to eight watch shift on the bridge is conducted on a daily basis by Operations Officer Lt. Matt Wingate, ENS Sarah Jones, and ABS Gaetano Maurizio. Lt. Wingate is originally from Connecticut and is the Operations Officer for the HI'IALAKAI. Besides having watch duties on the bridge, he is responsible for collaborating with the lead scientist and CO to act as a go between to establish the P.O.D. (plan of the day) for each day at sea. He posts the P.O.D. around the ship every morning to inform all hands of the day's activities. His job involves some paperwork handling and coordinating details. He comments that the best part of his job is that it is different everyday, and every cruise has varied goals. He enjoys the variety on the job but does admit being far from friends and family can be a hindrance in this line of work.

Like many other people onboard the ship, the lieutenant has an alternative sleep schedule. He works from four p.m. to eight p.m. as well as four a.m. to eight a.m. everyday. This type of schedule forces a person to sleep during daylight hours in order to get sufficient rest. Mr. Wingate possesses a bachelor's degree in mechanical engineering and advises anyone thinking of a career in the NOAA corps (officer division) to obtain a degree in science to meet the requirements. It is also helpful to not get seasick in this field of work!

The resources he uses the most for his job are the lead scientist and the computer. He will spend an average of 190 days at sea this year, usually in intervals of 3 weeks at sea and 6 days on land in a one month period. He is the third highest ranking officer aboard the HI'IALAKAI.

Ensign Sarah Jones was also present on watch this afternoon. ENS Jones is originally from Kansas and joined the HI'IALAKAI officers in June of last year. Her undergraduate degree is in meteorology, a perfect fit for the extensive weather data being collected everyday aboard the ship and NOAA's objectives. Upon entering the NOAA Corps (the nation's smallest and most elite uniformed division) she was given a three month hands-on course on driving a ship, using radar, Nobel Tec, and other various equipment located on the helm. Her responsibilities while on watch include the equipment on the helm, observing the depth sounders, using paper charts and the Nobel Tec system to see the ship's course across the Pacific Ocean. She works with the scientists in the survey room (using walkie-talkies) to keep the ship on course, following established survey lines to fill in benthic habitat data needed for the scientific work being conducted onboard. She commented that the perks of her job include the travel and dive training, and the worst part is the occasional sea sickness she suffers from. Patience, situational awareness, and the ability to multi-task are all traits ENS Jones believes someone should embody to perform well at this type of job. Her current assignment will be approximately two years at sea, then a three year land assignment. After accruing years with NOAA she can then decide to go back out to sea or apply for positions in the aviation sector of the organization.

Lastly, I interviewed ABS Gaetano Maurizio. ABS stands for Able Bodied Seaman, which encompasses a myriad of responsibilities. ABS Maurizio originates from Molokai, Hawaii and was in the U.S. Navy prior to his current position at NOAA. He has brought with him knowledge of maritime search and rescue and fire fighting from his previous training in the Navy. His current job encompasses being a coxswain (steering the ship or a Zodiac boat), a deck hand (involved in any aspect on deck, including crane systems), preservation of the ship in emergencies (like fire fighting), and he also occasionally helps the engineering department with tasks as they arise. He comments the pay he receives in this job is encouraging and he enjoys the travel. Drawbacks include being far from friends and family for long periods of time. ABS Gaetano Maurizio reflects on the fact that someone should be mechanically inclined and react quickly to stress or emergencies to perform well at this job.

The ongoing interviews I conduct are helping me to better understand the interdependence between the officers, crew, scientists, and engineers aboard the HI'IALAKAI!

QUESTION OF THE DAY for my fourth grade students: Multiple Choice!

The ocean floor is full of nutrients and food particles resulting from _____.

a) tornadoes.

- b) water currents.
- c) salt water.
- d) decaying matter settling on the bottom.

ANSWER TO YESTERDAY's Question:

All living things in an area, together with their environment, is called an ecosystem.

DAY : Log 14

DATE: Sunday, April 18, 2005

HI'IALAKAI location and related conditions:

Latitude: 23 degrees 50.7' North

Longitude: 166 degrees 22.2' West

Visibility: 10

Wind Direction: 070

Wind Speed: 5

Sea Wave Height: 0-1 feet

Swell Wave Height: 2-3 feet

Sea Level Pressure: 1021.7

Cloud Cover: 3/8 Cumulonimbus

Temperature outside: 26.9 degrees Celsius

SCIENTIFIC LOG OF THE DAY:

The AHI research vessel was launched just prior to eight a.m. this morning with Scientist Joyce Miller and Jeremy Jones aboard. The red and silver sonar boat would continue mapping shallow areas near 23 degrees North and 166 degrees West in the Northern Hawaiian Island chain. The ship resumed running benthic habitat mapping lines also, filling in gaps from previous surveys. Half past noon brought the deployment of several divers to the hull of the ship to determine the installation of the Trackpoint II testing. They dove in adorned with black suits, colorful air tanks, and metal weight belts. It turned out that the Trackpoint II wasn't installed properly and was off by 15 degrees.

That noted, changes were made to computer software to account for the degree change. Another boat trip was organized for the La Perouse Pinnacle area. Coxswain Merlyn Gordon led me, ENS Amy Cox, Scientists Rob O'Connor and Jonathan Weiss out to sea to snorkel the reef ecosystem. Upon approaching La Perouse, it was determined to be too dangerous, so we changed course and swam the reef area near East Island. We returned to the ship a few hours later and the AHI followed suit, and was hoisted out of the water once again. The HI'IALAKAI transited to deeper waters and ship based TOAD operations and Trackpoint II testing carried on once again. Ten p.m. brought about the reoccurrence of shipboard mapping around the outer circumference of French Frigate Shoals using the onboard multibeam sonar system.

PERSONAL LOG OF THE DAY:

I awoke and after the morning ritual of breakfast and shower, I answered emails from students in my fourth grade classroom in Ashburn, VA. I climbed the stairs and passageway to the drylab to check to see if I could be of some assistance editing data. The efficient scientists were caught up on the editing so my services were not needed. I soon found out about an impromptu snorkeling trip and clambered to get ready and join the expedition. The seas were the calmest I had seen yet, so the ride was very smooth across the Pacific towards Perouse Pinnacle (a volcanic rock out cropping that serves as a good landmark in this area). The ocean looked like glass and the sun rays flashed and hit the water like bright diamonds. There was an underlying surge though, which might indicate a coming storm in the next 48 hours (according to sailors onboard).

After nearing Perouse, we could see the waves crashing around the rock, and pressed on for a safer snorkeling environment where we wouldn't be churned to bits! We approached East Island and could see dark figures grazing the beach. Upon closer inspection, we realized they were not monk seals, but giant green sea turtles basking in the sun. Mating season was upon us, and many of the sea turtles were populating this area to find mates. We snorkeled in four different areas of the reef, being careful not to get near the beach or disturb the coral reef ecosystem. Several sea turtles were curious and encircled our boat, whereas I snapped some good photos.



I finally saw my first Ulua fish, indigenous to this area. The fish had eluded me prior to today and I had been told stories of their aggressive biting behavior. Although quite large, about 3-4 feet, I was told it was small compared to most. It swam around us, but never ATTACKED! It wasn't nearly as ferocious as the picture the crew on board had painted in my mind. It was a very flat, circular fish with a silver sheen. We saw many school of fish, one of which was bright yellow, and neon green coral. I learned from Coxswain Gordon that some of the clouds above the reef bore a greenish undercast or tint. The color was reflected from the coral below and was an aide in locating reef areas. We returned to the HI'IALAKAI later in the afternoon and I spent the evening conducting some more interviews (which will be included in future logs). The sun and exercise tired me out and I fell asleep as soon as I hit the pillow in my stateroom.

QUESTION OF THE DAY for my fourth grade students:

A ***habitat*** is the place where an organism lives and grows. Examples include ponds, forests, and a coral reef. A ***niche*** is the role an organism plays in its surroundings. A niche includes an animal's complete way of life--where it lives, how and what it eats, and how it produces. Find out more about the giant green sea turtle (like the one pictured in

Log 13's attached pictures-- that Ms. Fye swam near). Think about why the turtle is laying on the beach also. List the answer's to the sea turtle's niche:

- 1) Where does it live?
- 2) How does it eat (what body parts does it have to aid in eating?)
- 3) What does it eat? (don't say it eats Ms. Fye:)!! Ugh!
- 4) How does it reproduce? (Does it give birth to live young, lay eggs, etc?)
- 5) What resource did you use to find these answers?

ANSWER TO YESTERDAY's Question:

The ocean floor is full of nutrients and food particles resulting from decaying matter settling on the bottom.

PICTURES OF THE DAY: snorkeling trip (turtles)

Daily Log for Melissa Fye, "Teacher at Sea," on board the NOAA ship HI'IALAKAI:

DAY : Log 15

DATE: Monday, April 18, 2005

HI'IALAKAI location and related conditions:

Latitude: 23 degrees 36.7' North
Longitude: 166 degrees 11.2' West
Visibility: 10
Wind Direction: 050
Wind Speed: 12
Sea Wave Height: 2-3
Swell Wave Height: 3-5
Sea Level Pressure: 1022.2
Cloud Cover: 4/8 Cu, Sc
Temperature outside: 25.3 degrees Celsius

SCIENTIFIC LOG OF THE DAY:

The AHI was once again placed in the water with Joyce Miller and Jeremy Jones aboard to continue running benthic habitat lines around shallow areas in the area of French Frigate Shoals. A wire jumped out of a sheave (pulley) while trying to deploy the AHI. Boatswain O'Connor and other deckhands secured the line, deployed the boat, and went on to repair the sheave. The ship continued to run benthic habitat lines in the area while scientists edited swath data in the drylab. In the wheelhouse, NOAA corps officers continued to plot the ship's position, using charts and GPS systems. GPS (Global Positioning System) are satellites positioned up in space which provides a map of any place on earth. The system sends out a signal that a receiver (like on top of the ship) captures. At least 3 satellites are used to obtain a map because of time delay and other extraneous factors needed to determine one's position. The Nobel Tec software, used on the bridge, combines GPS systems with charting to provide a location. GPS alone cannot provide location coordinates, so additional technology is combined with it to provide

exact positions on a chart. Fire and Abandon Ship drills were also performed prior lunchtime today. Everyone on board has certain positions to be at and jobs to do in case of emergency. Members of the fire team completely suit up, get out hoses and equipment, etc. The AHI was brought back on board in the late afternoon and TOAD operations continued into the evening.



PERSONAL LOG OF THE DAY:

Today consisted mostly of answering emails from students and interviewing more members of the HI'IALAKAI. The drills broke up the usual routines and the seas picked up towards the evening hours, making it more difficult to travel down the passageways and do simple tasks.

I interviewed some members of the ship on watch in the wheelhouse. They included Executive Officer John Caskey, GVA Jason Kehn, and deckhand/survey technician Jeremy Taylor. XO John Caskey has lived many places including Georgia, North Carolina, and California. He has many duties onboard including administrative tasks like hiring, firing, and paying people on the ship. He has been employed by NOAA for twelve years and after graduating from college with a degree in Marine Biology, traveled to Alaska, to be a Fisheries Observer on a NOAA ship. As a Fisheries Observer, people perform sampling techniques (tallying, tagging, counting) to measure the reproductive and population rates of fish. XO Caskey comments that he has known since he was seven years old that he wanted to have a job centered around marine life because his father was a diver and took him on expeditions under the water. NOAA provides the same pay, benefits, and sights to see as the Navy but caters more to scientific research; which attracted Mr. Caskey to the NOAA corp. The travel is a perk in the job but he says the drawbacks include sea sickness and time away from his growing family. Independence, patience, and good interpersonal skills are attributes a qualified applicant should possess for this type of job because XO Caskey comments that it isn't an easy lifestyle. The Executive Officer will spend approximately 190 days at sea this year.

GVA Jason Kehn was also interviewed in the wheelhouse. He is originally from Santa Rosa, California but has spent most of his life moving from place to place. He has worked for NOAA for over 3 years on and off, and his title GVA, stands for General Vessel Assistant. His duties include anything associated with working the ship, to include steering the vessel, being a coxswain of the small boats, as well as operating cranes and machinery while aboard. He enjoys the travel associated with the job and has hobbies like recreational diving and photography (which are very compatible to this profession). He would like to learn more about the biological aspects of the work onboard the HI'IALAKAI and he comments that rope is the tool he uses most in his job. Compatibility is a character trait he believes a person needs to possess in order to

function in close quarters. GVA Kehn will spend an average of 190 days at sea this year also.

Deckhand Jeremy Taylor is a wage mariner employed by NOAA. His duties include operating machinery on the ship, conducting CTD casts, but he additionally helps out as a survey tech in the drylab of the ship. Taylor has degrees in computer science as well as marine biology. His job is tied to the HI'IALAKAI and he enjoys the views, troubleshooting, and computer work he does out at sea. Mr. Taylor believes a person should be inquisitive and enjoy problem solving to do a job such as this one. The myriad of responsibilities he has everyday makes this job interesting in his opinion and the computer is his most used tool on this research trip.

QUESTION OF THE DAY for my fourth grade students:

Using a reference source:

- 1) List the 3 types of coral reefs.
- 2) What type of reef is common in Hawaii (and parts of the Caribbean)?
- 3) What was your reference source?

ANSWER TO YESTERDAY's Question:

Find out more about the giant green sea turtle. List the answers to the sea turtle's niche: Answers to yesterday's question are provided by Sai, one of my 4th grade students at Ashburn Elementary.

- 1) Where does it live? They live mostly in warm and temperate water, also among sea grass.
- 2) How does it eat (what body parts does it have to aid in eating?) 4 flipper- like appendages with 2 tiny claws on each leg. They also have a hawk like beak.
- 3) What does it eat? Jellyfish, crabs, shrimp, snail, seaweed, small fish, mollusks, and algae.
- 4) How does it reproduce? They lay ping-pong sized eggs on land and bury the eggs in the sand. They return to the same beach where they hatched to reproduce again.
- 5) What resource did you use to find these answers? Enchanted Learning.com and Kids Planet.com

PICTURES OF THE DAY: Fire drill/Abandon ship drills

DAY : Log 17

DATE: Wednesday, April 20, 2005

HI'IALAKAI location and related conditions:

Latitude: 23 degrees 04.6' North
Longitude: 161 degrees 57.0' West
Visibility: 10 nautical miles
Wind Direction: 090
Wind Speed: 18
Sea Wave Height: 2-3 feet

Swell Wave Height: 6-8 feet
Sea Level Pressure: 1022.5
Cloud Cover: 2/8 Cu
Temperature outside: 24.9 degrees Celsius

SCIENTIFIC LOG OF THE DAY: Early before daybreak we arrived at Nihoa island to conduct a CTD cast (conductivity, temperature, and depth measurements). By three o'clock a.m., the HI'IALAKAI began running north/south and east/west survey lines of the ocean floor. The ship continued throughout the day, surveying the ocean floor using the multibeam system for benthic habitat mapping.

PERSONAL LOG OF THE DAY:

The trip is winding down and as the end approaches, I am finishing my interviews with the crew of the HI'IALAKAI. I sent out word that I would take anything that anyone has to give away. Several of the officers and crew have been kind enough to give me CDs of past diving trips, maps, and photographs taken on board that I may have missed. I have been reading some of the weather and ocean resources aboard also. We did have an unexpected visitor aboard today. A four foot Wahu fish was caught on the chief steward's fishing line and filleted for dinner. Its scales were a silvery blue/green color and it had rows of very sharp teeth. I've included pictures of it in this log. I also concluded some interviews with other members of the scientific team. Information on scientists Scott Ferguson, Kyle Hogrefe, Emily Lundblad, Jonathan Weiss, and Rob O'Connor are included in this log.

Lead Scientist Scott Ferguson works for the University of Hawaii and acts as a contract scientist for NOAA. He is originally from Colorado and Tennessee and went to college in Boston. While in high school, he remembers becoming interested in oceanography and also recalls opening a National Geographic Magazine as an adolescent, which contained hand drawn maps of the ocean and may have subsequently planted the seed for his current specialization in benthic habitat mapping. He obtained a degree in biology, specializing in genetics, while an undergraduate student in Boston. His current assignment is based on grant work submitted by a group of scientists to collect data, based on the most available science, about the sea floor in the Northwestern Hawaiian Island chain. The data collected from this trip, which in turn will be made into maps, will be made available to any managers of the various resource management groups (including the Fisheries Department, state agencies, agencies which protect sea turtles, monk seals, etc.). Nautical charts available at this time are inadequate for use for management of resources in the area, so the multibeam sonar and the scientists aboard have been collecting much more detailed data about the ocean floor for these agencies. The information gathered will determine fishing guidelines, etc., and will help determine boundaries for sanctuary designation of this ecological system. Mr. Ferguson finds this career interesting because it is not routine and provides opportunities for problem solving. The tool he uses most is the computer to collect data. He comments that someone interested in this field of science should build knowledge through mathematics courses, computer classes, and be able to express themselves well through written medium. Persons who consistently pay attention to detail and are inquisitive are well suited to this work, according to Mr. Ferguson. Mr. Ferguson and his wife, scientist

Joyce Miller, will spend 3-4 months a year on assignment in the Pacific Ocean. As an added side note, he, his wife, and their cat take up permanent residence on a boat when not working in the office or out to sea!

Marine Ecosystem Specialist, Kyle Hogrefe, spoke to me in an earlier log about the Ghost Net Project and marine debris trips he has taken part in. I took the time today to interview him more thoroughly about the work he does. Mr. Hogrefe is originally from Medina, Ohio and obtained an undergraduate degree from the University of Colorado in environmental science. He has worked as a debris specialist, fisheries observer in Alaska, and taken jobs related to data management and mapping to increase his knowledge base. His duties on this cruise involve the deployment and retrieval of oceanographic data platforms. His job is important because these devices collect long term data about ocean currents, temperatures, etc. which may effect populations of aquatic species of plants and animals over time. Mr. Hogrefe comments that the best part of his job involves the sense of adventure, travel, and diving he gets to do. He comments images from childhood watching Jacques Cousteau may have led to his career choice. He will spend roughly 6 months at sea this year and the drawbacks of his career involve time away from friends and family. The tool he uses most often is his brain to make decisions and a physical piece of equipment he utilizes often is a lift bag. Patience and an ability to put personal differences aside while working with colleagues are attributes one should possess; according to Scientist Hogrefe.

GIS (Geography Information Systems) scientist Emily Lundblad is originally from the state of Texas and has a master's degree in Marine Resource Management. Her interest in mapping was sparked from a guest speaker who spoke at her high school. It is a very math/science oriented field and the computer is her most important tool. She believes the best part of her job is the travel and the ability to see the application of her work. She enjoys going to sea to help collect the data, whereas she would normally just edit and process it. Miss Lundblad will take part in three cruises at sea this year to help collect mapping data. She mentions that her job on land requires normal eight hour days, but time at sea is different, requiring 12 hour shifts.

Sea floor mapping specialist Jonathan Weiss is a Northern Virginia native, originally from Alexandria, and a graduate of William and Mary. His undergraduate degree is in Geology and he received a graduate degree in Marine Geology from the University of Hawaii. He comments that he has always been curious about the earth and its structure and that research on plate tectonics has revolutionized this field of scientific research. His job requires him to work on backscatter to process the imagery data about the sea floor texture and his most important tool is the computer. He encourages anyone interested in this line of work to take lots of math courses and a broad overview of the sciences. He enjoys his first post graduate job because the hours are flexible enough for hobbies (like surfing), his bosses are encouraging, and he works with many people his own age. He will spend roughly four months at sea this year in the field.

Rob O'Connor, GIS specialist, originates from Texas but has spent most of his life in Maui, Hawaii. His educational background includes an undergraduate degree in Geography from the University of Hawaii. He comments that the computer is also his most important tool for his job and that he became interested in aspects of the earth after taking some introductory geography courses in college. His duties include data processing and cartography (map making). The travel is an added benefit for this line of

work and Mr. O'Connor adds that a person should possess good interpersonal skills and computer knowledge to be successful in this occupation. This is his first cruise of the year as a GIS specialist.

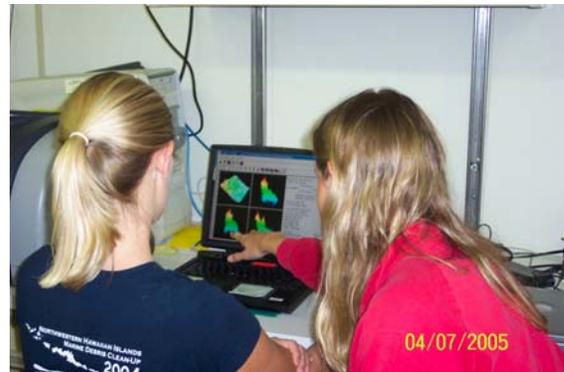
QUESTION OF THE DAY: I have seen many sea creatures around the Northern Hawaiian Islands coral reef ecosystem. Animals such as the whitetip shark, sea turtles, and monk seals. These animals are all *living things that eat other living things for energy*. In a food web, they are called _____.

ANSWER TO YESTERDAY's Question: Ms. Fye saw a humpback whale near the starboard side of the ship the other day. It was performing an adaptive behavior. Fill in the blank to find out what adaptation the whale was performing. The *movement of an animal from one region to another and back again* is called **migration**.

PICTURES OF THE DAY: various pictures of the crew



Medical Doctor



Survey scientists editing data.

DAY : Log 18

DATE: Thursday, April 21, 2005

HI'IALAKAI location and related conditions:

Latitude: 23 degrees 06.2' North

Longitude: 161 degrees 59.3' West

Visibility: 10

Wind Direction: 140

Wind Speed: 12

Sea Wave Height: 2-3 feet

Swell Wave Height: 7-9 feet

Sea Level Pressure: 1022.1
Cloud Cover: 1/8 Cu
Temperature outside: 23.7 degrees

SCIENTIFIC LOG OF THE DAY:

The HI'IALAKAI continued running survey lines of the ocean floor near Nihoa. Scientists continued grouping together larger swaths of data in the drylab, like pieces of a puzzle emerging from the depths of the ocean. We cruised by Nihoa several times collecting benthic data.

PERSONAL LOG OF THE DAY: I began the day answering emails from students and teachers.

I edited a file of data in the drylab and flitted about taking pictures of people and places on board. The cruise is beginning to wind down, so there isn't as much to do at this point and no boats are being deployed either. I must admit my stomach is a little upset from the rolling and pitching of the boat. I sleep terribly one night, then like a rock the next.

QUESTION OF THE DAY: CO Kuester (commanding officer) has given commands for the ship to arrive at the entrance to Honolulu Harbor by 0700 on Saturday, April 23rd. The ship has 260 nautical miles to still cover, and we travel ten knots an hour.

- 1) How many hours will it take us to reach our destination? _____
- 2) A nautical mile > a statute mile (mile on land) if...
1 nautical mile (1 knot) = 1.15 statute miles then...
260 knots = _____ statute miles?

(thanks to Lt. Wingate and ENS Jones for help with this question!)

ANSWER TO YESTERDAY's Question: I have seen many sea creatures around the Northern Hawaiian Islands coral reef ecosystem. Animals such as the whitetip shark, sea turtles, and monk seals. These animals are all *living things that eat other living things for energy*. In a food web, they are called consumers.

PICTURES OF THE DAY: various pictures from the cruise

DAY : Log 19

DATE: Friday, April 22, 2005

HI'IALAKAI location and related conditions:

Latitude: 22 degrees 31.1' North
Longitude: 160 degrees 51.1' West
Visibility: 10
Wind Direction: 050
Wind Speed: 12
Sea Wave Height: 1-2 feet

Swell Wave Height: 095
Sea Level Pressure: 1021.9
Cloud Cover: 3/8 Cu/St
Temperature outside: 24.7 degrees Celsius

SCIENTIFIC LOG OF THE DAY:

At 0500, surveying of the ocean floor was concluded and transit to Honolulu began. Scientists in the lab compiled more data and finished up the survey trip with a benthic habitat map of the French Frigate shoals. There are still a few bits of editing to do on the map and some borders need to be added to the final form, but overall it is complete. Scientist Joyce Miller showed me an overview of the completed work using Fladermouse, or a computer mouse, that gives an onlooker the view a bat would have flying over the map. It is a 3-D view of the map, giving its operator the ability to zoom in on underwater pinnacles, sand waves, and coral reefs from any direction. The contours of the ocean floor were very apparent and Joyce Miller commented that the AHI, new software, etc., enabled the scientists to create the final product much faster; this being the first time they had all the data compiled into map form before the end of a cruise. It was exciting to see all the surveying work put into one picture. With surveying complete for this cruise, and much of the editing done, scientists and crew spent the day doing laundry, finishing up tidbits of work, watching the sunset, etc. The HI'IALAKAI is expected to arrive in the University of Hawaii's port by 0800, Saturday, April 23, 2005.

PERSONAL LOG OF THE DAY:

I spent the day answering the last of the emails from students, printing off previously completed emails and logs, and snapping pictures of the ship and persons aboard. Scientists showed me completed benthic maps in the lab and I began packing up my things. It has been a terrific experience and I was lucky to be onboard with such hospitable people. I have truly enjoyed my time aboard the HI'IALAKAI and I have learned so much about ships, coral ecosystems, the Hawaiian islands, scientific data collecting, and those people on board this cruise. I'm taking back to my classroom a wealth of resources like maps, charts, a binder of lessons, and many photographs and digital movies to weave into science lessons. But more importantly than those things, I will be bringing back to the classroom real-life enthusiasm for the application of science in the real world. I have experienced first hand, biological ecosystems, weather instruments and measurements, and map making, in a real life context. I want my students to know that life is not a collection of *things*, but a collection of experiences. I hope this trip (the resources and anecdotal stories I bring back to the classroom) encourages them to explore opportunities as they arise in their own lives. As a teacher, my underlying goal is to teach my students that learning should be a life long adventure! And isn't that what this trip is really all about? Even with all the pictures I have taken and emails I have written, no one will ever have an experience like I have had on board the HI'IALAKAI. Thank you to NOAA, CO Kuester, Lead Scientist Scott Ferguson, and everyone else I have encountered on this trip!

QUESTION OF THE DAY: There are "rivers" of water in oceans that are called currents. What is name of the current that runs the entire length of the east coast? How does it

affect people on the east coast?

ANSWER TO YESTERDAY's Question:

CO Kuester (commanding officer) has given commands for the ship to arrive at the entrance to Honolulu Harbor by 0700 on Saturday, April 23rd. The ship has 260 nautical miles to still cover, and we travel ten knots an hour.

1) How many hours will it take us to reach our destination? **26 hours**

2) A nautical mile > a statute mile (mile on land) if...

1 nautical mile (1 knot) = 1.15 statute miles then...

260 knots = **299** statute miles

PICTURES OF THE DAY: interior of the ship

