

NOAA Teacher at Sea
Karen Matsumoto
Onboard NOAA Ship *Oscar Elton Sette*
April 19 – May 4, 2010

NOAA Teacher at Sea: Karen Matsumoto

NOAA Ship: *Oscar Elton Sette*

Mission: Transit/Acoustic Cetacean Survey

Geographical Area: North Pacific Ocean; transit from Guam to Oahu, Hawaii, including Wake Is.

Date: Tuesday, April 27, 2010

Science and Technology Log

In addition to the deployment of the acoustic sonobouys and monitoring of the towed hydrophone array, we also do “XBT” drops three times a day, at sunrise, noon, and sunset. The Expendable Bathythermograph (XBT) has been used by oceanographers for many years to obtain information on the temperature structure of the ocean. The XBTs deployed by the Sette research team measures temperature to a depth of 1000 meters.

The XBT is a probe which is dropped from a moving ship and measures the temperature as it falls through the water. Two thin copper wires transmit the temperature data to the ship where it is recorded for later analysis. The probe is designed to fall at a known rate, so that the depth of the probe can be inferred from the time since it was launched. By plotting temperature as a function of depth, the scientists can get a picture of the temperature profile of the water. It is amazing to think that over 1000 meters of thin copper wire is packed into that small tube! When I first launched an XBT, I was expecting to shoot it off like a rifle, but it actually just falls out of the unit by gravity. I was relieved that I didn’t experience “kick-back” from the probe unit when I pulled the lynch pin!



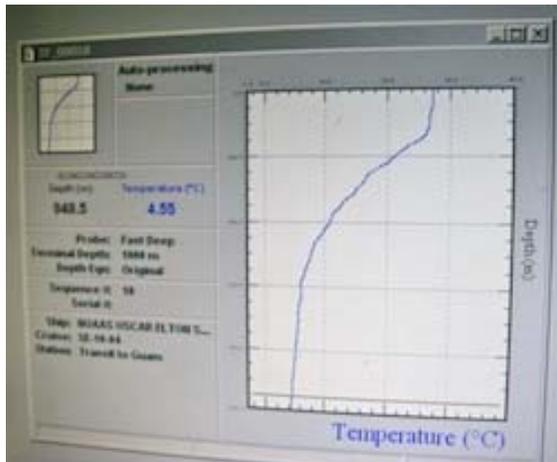
Top left: Chief Scientist Marie Hill preparing to launch the XBT unit.

Top right: XBT deployed and falling to a depth of 1000 feet.

Bottom left: Marie cutting the copper wire ending the connection to the probe and computer.



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Left: Temperature and depth information is sent to the computer from the probe attached to the XBT unit by thin copper wires. The wires are cut when the unit reaches a depth of 1,000 meters, and the unit falls to the ocean floor. The researchers on the Sette use XBTs to obtain information on the temperature structure of the ocean, as seen on the computer screen at left.

We are continuing to conduct visual observations on the “Flying Bridge.” I had a chance to take a shift on the “Big Eyes” which are 25 x 150 magnification binoculars. The person at each of the Big Eye stations does a slow 90 degree sweep toward the bow and then back again, searching the ocean from horizon to ship to spot whales. I have a renewed appreciation for the skill it takes to use binoculars, especially one that weighs over 40 pounds! I had to use stacked rubber mats to be able to reach the Big Eyes at its lowest height setting, and even then it was a struggle to keep them steady every time we hit a wave! I think the Big Eyes were designed by the same people that made the huge Norwegian survival suits!



Karen on the “Big Eyes.”

Personal Log

The more I learn about sperm whales, the more I want to see one! I heard sperm whale clicks this morning, which was super exciting. John Henderson, a member of our science team sent me a cool website that shows an MRI of a juvenile sperm whale. I've included it below. Sperm whales are still on my wish list for whale sightings on this trip!



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QuickTime™ and a
decompressor
are needed to see this picture.

MRI Image of a juvenile sperm whale. © 1999 Ted W. Cranford.
See website at: <http://www.spermwhale.org/SpermWhale/spermwhaleorgV1.html>

Question of the Day: How do sperm whales make their vocalizations? Sperm whale clicks are produced when air is passed between chambers in the animals' nasal passages, making a sound that is reflected off the front of the skull and focused through the oil-filled nose. It has been suggested that powerful echolocation clicks made by sperm whales may stun their prey. Recent studies have shown that these sounds are among the loudest sounds made under water by animals (they can travel up to six miles despite being fairly high frequency).

Sperm whale clicks are heard most frequently when the animals are diving and foraging. These sounds may be echolocation ("sonar") sounds used to find their prey, calls to coordinate movement between individuals, or both. Clicks are heard most frequently when the animals are in groups, while individual sperm whales are generally silent when alone. Most of the sounds that sperm whales make are clicks ranging from less than 100 Hz to 30 kHz

New Term/Phrase/Word of the Day: Expendable Bathythermograph or the **XBT** was developed in the 1960s by former The Sippican Corporation, today Lockheed Martin Sippican. Over 5 million XBT's have been manufactured since its invention. The XBT is used by the Navy and oceanographic scientists to provide an ocean temperature versus depth profile. Some XBT's can be launched from aircraft or submarines, and have been used for anti-submarine warfare. **How many XBTs do you think are on the bottom of the ocean?**

Something to Think About:

"Thar she blows!" was the cry of the whaler!

Whale researchers can identify many whales by their "blows," when the whale comes to the surface to breathe. Observers look for the direction and shape of the blow. For example, sperm whale blows are almost always directed at a low angle to the left, as their single nostril is located on the left side.



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Grey whales, on the other hand, have two blowholes on the top of their head, and have very low heart-shaped or V-shaped blows, with the spray falling inwards. What do you think are you seeing when you see whale blows?

Animals Seen Today:

- Flying fish

Did you know?

Cetaceans evolved from land mammals in the even-toed ungulates group. The hippopotamus is most likely their closest living relative!

Picture of the Day



Abandon ship drill on the Sette!